CITY OF LYNN HAVEN
STORMWATER MASTER PLAN

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City of Lynn Haven Stormwater Masterplan April 2019

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EXECUTIVE SUMMARY

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EXECUTIVE SUMMARY

The Lynn Haven stormwater master plan effort included a comprehensive review of the primary stormwater outfall paths that serve the major stormwater basins within the City. This study was commissioned for the purpose of determining priorities for future drainage improvements that would benefit areas in the City that are known to experience varying degrees of localized flooding during high intensity rainfall events. Based on the results of modeling multiple basins, storm events and options for improvements and the review of existing stormwater management systems, the following list of improvements has been developed along with their associated order-of-magnitude costs. These improvements are listed in order of suggested priority.

Item Name	Estimated Cost	Reimbursement (%)	Total Cost to City
Hurricane Michael Debris Removal	$ 7,500,000	75	$ 1,875,000
Pine Forest Estates	$ 1,380,000	0	$ 1,380,000
Colorado Avenue	$ 225,000	0	$ 225,000
Railroad Ditch System Improvements	$ 500,000	0	$ 500,000
Belaire Estates	$ 100,000	0	$ 100,000
Minnesota Avenue	$ 90,000	0	$ 90,000
15th Street	$ 20,000	0	$ 20,000
Krystal Lane	$ 30,000	0	$ 30,000
Georgia Avenue	$ 140,000	0	$ 140,000
Pennsylvania Avenue	$ 80,000	0	$ 80,000
7th Street	$ 470,000	0	$ 470,000
Bradley Circle	$ 235,000	0	$ 235,000
11th Street	$ 650,000	0	$ 650,000
10th Street	$ 135,000	0	$ 135,000
Acme Lane	$ 235,000	0	$ 235,000
Virginia Avenue	$ 60,000	0	$ 60,000
Florida Avenue	$ 9,000	0	$ 9,000
City-wide Ditch&Culvert Rehab	$ 6,500,000	0	$ 6,500,000
McCain Creek Widening	$ 870,000	0	$ 870,000
Dundee Lane	$ 185,000	0	$ 185,000
24th Street	$ 410,000	0	$ 410,000
Aberdeen Parkway	$ 290,000	0	$ 290,000
Mosley Drive	$ 190,000	0	$ 190,000
Indiana Avenue	$ 120,000	0	$ 120,000
1103 Wyoming Avenue	$ 320,000	0	$ 320,000
TOTAL	**$ 20,744,000**		**$ 15,119,000**

INTRODUCTION

City of Lynn Haven Stormwater Masterplan April 2019

INTRODUCTION

BACKGROUND

The City of Lynn Haven commissioned this stormwater master plan to guide and direct the planning and implementation of stormwater and other infrastructure improvement projects necessitated by growth and development across the City. The goal for the master plan is to serve as the basis for a Stormwater Capital Improvements Plan (CIP) which will guide planning and budgeting for the City's stormwater infrastructure. The Stormwater CIP will direct future improvements to facilitate growth, maintain public safety, and protect public and private property.

SCOPE OF STUDY

The general intent of this analysis was to evaluate the City's primary stormwater conveyance systems and recommend improvements by priority. The study included modeling runoff conditions through the City's existing infrastructure to identify and prioritize proposed improvements to be implemented via the Stormwater CIP. The scope of this study included the gathering of data for input into computer modeling software. Data regarding the existing soils, land use and coverage was combined with that of the existing stormwater infrastructure to simulate, via computer modeling, the conditions experienced across the City during high intensity storm events. An initial model of the City's existing conditions was developed and then utilized to identify and prioritize the improvements recommended in this report. This study also included the review of existing stormwater management systems serving areas of the City that are known to have a history of localized flooding.

CLIMATE AND RAINFALL

The climate in and around the City of Lynn Haven, Florida is generally humid to sub-tropical with warm summers and mild winters. The area receives an average of 61 inches of rainfall per year with an average of 78 days per year that receive rainfall. Most of this rainfall occurs in the wet season, from June through September. Coastal rain showers are common in the warmer months and range in intensity from mild to moderate. The City is also prone to the effects of tropical depressions and cyclones during the annual hurricane season (June 1 through November 30). These tropical disturbances have the potential to inundate coastal regions with catastrophic levels of rainfall and subject communities to devastating winds. These high-force winds generate substantial amounts of debris which can greatly hinder the functional ability of stormwater infrastructure.

LOCATION AND POPULATION

The City of Lynn Haven is located in Bay County, Florida and is generally bound to the north by North Bay, to the west and southwest by the City of Panama City and to the east and southeast by US Highway 231. The City encompasses approximately 7,500 acres and has approximately 21,000 residents. All of the stormwater basins within the City discharge to North Bay, the ultimate receiving water.

STORMWATER REGULATIONS

The design and permitting of the most common types of stormwater management improvements are regulated by the State of Florida via the Environmental Resource Permit (ERP) program. For the area in and around the City of Lynn Haven, this program is administered by either the Florida Department of Environmental Protection (FDEP) or the Northwest Florida Water Management District (NWFWMD). Although current Florida regulations stipulate minimum standards for water quality and quantity control, a significant portion of the existing stormwater infrastructure within the City was installed prior to their implementation. The design and permitting of new stormwater conveyance and management facilities are subject to current regulations however these requirements are applied and subjected to permitting processes in accordance with the scope of the proposed improvements. Many maintenance and repair activities are exempt from permitting, however improvements are evaluated on a case by case basis to determine what, if any, permitting is to be sought for approval of construction. Improvements to existing "pre-rule" municipal systems may also qualify for stormwater retrofit general permitting, as deemed appropriate by the applicable reviewing agency. For activities that require ERP permitting, the corresponding documentation is submitted to either the FDEP or NWFWMD for review, approval and permit issuance.

APPROVALS AND PERMITTING

In addition to the regulated stormwater permitting noted above, proposed improvements to the City's infrastructure may require approvals by outside entities having jurisdiction over other related, regulated activities. These include the U.S. Army Corps of Engineers (USACE) for permitting dredging or filling activities in waters of the Unites States, the Florida Department of Transportation for activities that impact their facilities or right-of-way, and the Florida Department of Environmental Protection for permitting construction zone stormwater discharges via the National Pollutant Discharge Elimination System (NPDES). These are above and beyond the permits/approvals required by the City of Lynn Haven and will be required when/where proposed activities fall within the associated jurisdiction and surpass minimum thresholds for permitting. As with stormwater permitting, the type of permit processes applicable to proposed infrastructure improvements are reviewed on a case-by-case basis to determine what permits are required by each governing authority.

METHOD
OF
ANALYSIS

City of Lynn Haven Stormwater Masterplan April 2019

METHOD OF ANALYSIS

APPROACH

In general, the approach to this study included 3 distinct phases. The first phase was data gathering, which included meetings with City staff, compiling historical City files and research of our firm's historical data. A significant amount of information was collected for the purpose of creating a computer model of the City's existing conditions to simulate how the primary conveyance systems react to a design storm event. This included specifics about the land within the limits of the study area and addressed the various coverage, land uses, and soils information for each basin. It also included data on the major stormwater outfall paths leading from the interior portions of the City to North Bay, the ultimate downstream receiving water.

The second phase of the study was the incorporation of the gathered data into a stormwater model. A computer model of the existing conditions was prepared to simulate the functional characteristics and performance of the City's primary conveyance systems. Design storms were then routed through the analysis software (ICPR v4.03.02) and the results analyzed to identify systems or components that were underperforming.

The last phase included the analysis of proposed solutions to establish priorities for future improvements. Options for improvements were reviewed for each major outfall path to determine the most efficient solution to address areas and properties known to experience flooding during high intensity storm events.

Although the modeling effort analyzed the primary conveyance systems, this did not address all properties within the City known to have a risk of flooding. These specific areas were reviewed in the field to determine what improvements would be recommended to address the risk of localized flooding.

DATA GATHERING

Information used in this study was collected from a variety of sources including:

- Topographic surveys and LIDAR topography
- As-built and survey data
- Historical City data and staff knowledge
- Aerial interpretation
- Online and GIS database research
- Permit documentation
- Drainage studies (by others)
- Site visits and field reconnaissance
- Eyewitness reports and photographs

Gathered data was categorized for input into the stormwater model and referenced to analyze system performance. To the maximum extent possible, topographic surveying was performed only when other sources of data were unavailable for critical portions of stormwater model development.

SOIL CONDITIONS

In preparation of the computer model, soil conditions were reviewed to determine runoff characteristics for areas within the City that remain undeveloped or include minimal surface improvements (i.e. wetlands, agricultural land, undeveloped lots, etc.). Soils information was sourced from the U.S. Dept. of Agriculture's Natural Resources Conservation Service website (websoilsurvey.sc.egov.usda.gov). The predominant soils within the study area are listed below. It should be noted that the majority of soils within the City are poorly drained and classified as hydrologic group A/D. This poorly drained soil condition is typically due to either the presence of fines in the soil stratum, a shallow depth to the water table or because both of these factors limit the soil's infiltration rate.

A full copy of the NRCS soils report is located in Appendix B.

Symbol	Name	Slopes	Drainage Class	Water Table Depth	Hydrologic Group
13	Leon Sand	0-2%	Poorly Drained	2 – 18 inches	A/D
22	Pamlico-Dorovan complex	0-1%	Very Poorly Drained	0 -12 inches	A/D
25	Hurricane Sand	0-2%	Somewhat Poorly Drained	24 -42 inches	A
29	Rutlege Sand	0-2%	Very Poorly Drained	0 – 6 inches	A/D
31	Osier Fine Sand	0-2%	Poorly Drained	0 – 6 inches	A/D

EXISTING INFRASTRUCTURE

The City's existing stormwater collection and conveyance infrastructure consists primarily of ditch and pipe systems that generally increase in size and capacity as the outfall path continues downstream. Most of these systems were constructed prior to the implementation of state stormwater regulations. This has resulted in large watersheds that discharge to receiving waters without treatment or flood attenuation. Regional stormwater management systems are also limited in number and scale within City limits. These conditions contribute to largely uncontrolled runoff rates which exceed historic pre-development conditions and result in significant flows reaching natural channels that are still utilized today for stormwater conveyance. Development and growth within the City has also outpaced stormwater infrastructure improvements rendering some systems incapable of providing the level of service needed. Another contributing factor is the lack of maintenance of existing systems. Several natural and man-made outfall systems were observed to have excessive vegetation growth and siltation further reducing their ability to serve the community during design storm events**.** A significant portion of residential driveway culverts are clogged with silt and are not maintained on a regular basis. Additionally, there are numerous driveway culverts which are damaged and limit stormwater conveyance.

The recent impacts of Hurricane Michael are also hindering the performance of the City's stormwater systems. A significant amount of debris has been deposited in the stormwater conveyance systems throughout the City causing a reduction in flow and storage capacity.

STORMWATER MODEL

The computer program Interconnected Channel and Pond Routing Model (ICPR) version 4.03.02 by Streamline Technologies was utilized to prepare simulations of the existing infrastructure conditions as well as analyze proposed solutions. Information collected in the data gathering phase was input into the existing condition

model and design storms were routed to then compare results to real-world conditions and improvements from proposed solutions. LIDAR information was key in the delineation of the major stormwater basins across the City. Where available, recent stormwater models created for minor basins and sub-basins in support of development and infrastructure improvement projects in the region were incorporated into the model developed for this study. For areas with no or limited stormwater system data, this information was collected in the field or interpreted/estimated from online sources.

LEVEL OF DETAIL

Of all the information gathered for the development of the computer model, only the most accurate information was utilized. The level of detail sought for data used in model development generally increased in the level of accuracy as the conveyance systems and components progressed downstream. This prioritized the accuracy of the infrastructure data for the systems and components that serve the largest drainage areas and therefore have the greatest influence on the model results for upstream watersheds. This also focused the efforts of the engineering team allowing this study to be completed in the time frame desired by the City.

Special emphasis was also placed on model accuracy in areas where significant stormwater related issues were known to exist. This allowed the study to not only provide a City-wide analysis useful for long-term planning, but to also serve as justification for prioritizing improvements in areas which have a history of drainage problems.

The highest level of accuracy for model input data was sourced from surveyed information. Field survey data provided the elevations and dimensional measurements of primary flow channels, drainage structures and culverts. It should be noted that surveys of the flow channels, specifically, still do not represent a complete representation of actual field conditions. Cross sections of channels were provided at appropriate intervals to model these conveyances, however the sections include ground surface elevations only. Excessive debris and vegetation growth within the flow channels were observed throughout most of the drainage systems, even prior to Hurricane Michael. Presence of these flow restrictions are not fully incorporated into the model, therefore performance of these conveyance systems in the model is anticipated to be better than actual field conditions.

DESIGN STORM EVENTS

For each of the major stormwater basins identified in the City, the 25-year and 100-year frequency storm events were analyzed for the 8- and 24-hour durations to review the performance of the modeled stormwater systems. These storm events were selected because they best represent the intensity and duration of events that have resulted in historic flooding throughout the City. Rainfall distributions for each of these storm events were sourced from the Florida Department of Transportation (FDOT) Drainage Connection Permit Handbook (September 2017 edition).

MAJOR BASINS

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MAJOR BASINS

LIDAR data sourced from Bay County's GIS department was utilized to delineate 3 major stormwater basins within the City of Lynn Haven. These are furthermore referred to in this report as the West Basin, North Basin and East Basin. An overall map indicating the extents of each basin is located on the next page and a large print of this map is located in Appendix A. Each of the 3 major basins discharge to North Bay, the ultimate receive water for all stormwater runoff from Lynn Haven.

WEST BASIN

The West Basin is approximately 1,500 acres and discharges to North Bay via a several systems of interconnected pipes and open channels. The primary discharge routes through this basin include the SR 77 drainage systems, open ditches along the old railroad R/W and the Harrison Ditch system. Several of these flow paths converge on the south side of SR 390 where a single ditch conveys flows under SR 390 and north to the Lynn Haven Bayou. Other, lesser outfall systems within this basin also collect runoff from smaller drainage areas, primarily via roadside drainage systems, and also discharge to Lynn Haven Bayou.

NORTH BASIN

The North Basin is generally located north of 16th Street and between Lynn Haven Bayou and Beatty Bayou. Total basin area is approximately 1,200 acres. The primary discharge routes through this basin include the SR 77 drainage systems and the existing roadside drainage infrastructure that serve this predominantly residential area. This basin discharges to North Bay via numerous direct connections, but also through outfalls at Anderson Bayou.

EAST BASIN

The East Basin is approximately 2,900 acres and, similar to the West Basin, discharges to North Bay via several systems of interconnected pipes, ditches and canals. The primary discharge routes through this basin include two major ditch systems with other open ditch conveyance systems connecting throughout the basin. The westernmost ditch system originates north of Baldwin Road and is joined by another ditch south of 26th Street. A major second conveyance joins this system north of the Mowat Highlands Subdivision and the final major conveyance system joins north of SR 390 and west of the Britton Woods Subdivision before the ultimate discharge to Beatty Bayou under CR 389. The easternmost system originates adjacent to the City of Lynn Haven Sports Complex and continues north beyond the Derby Woods Subdivision, where it discharges into Beatty Bayou.

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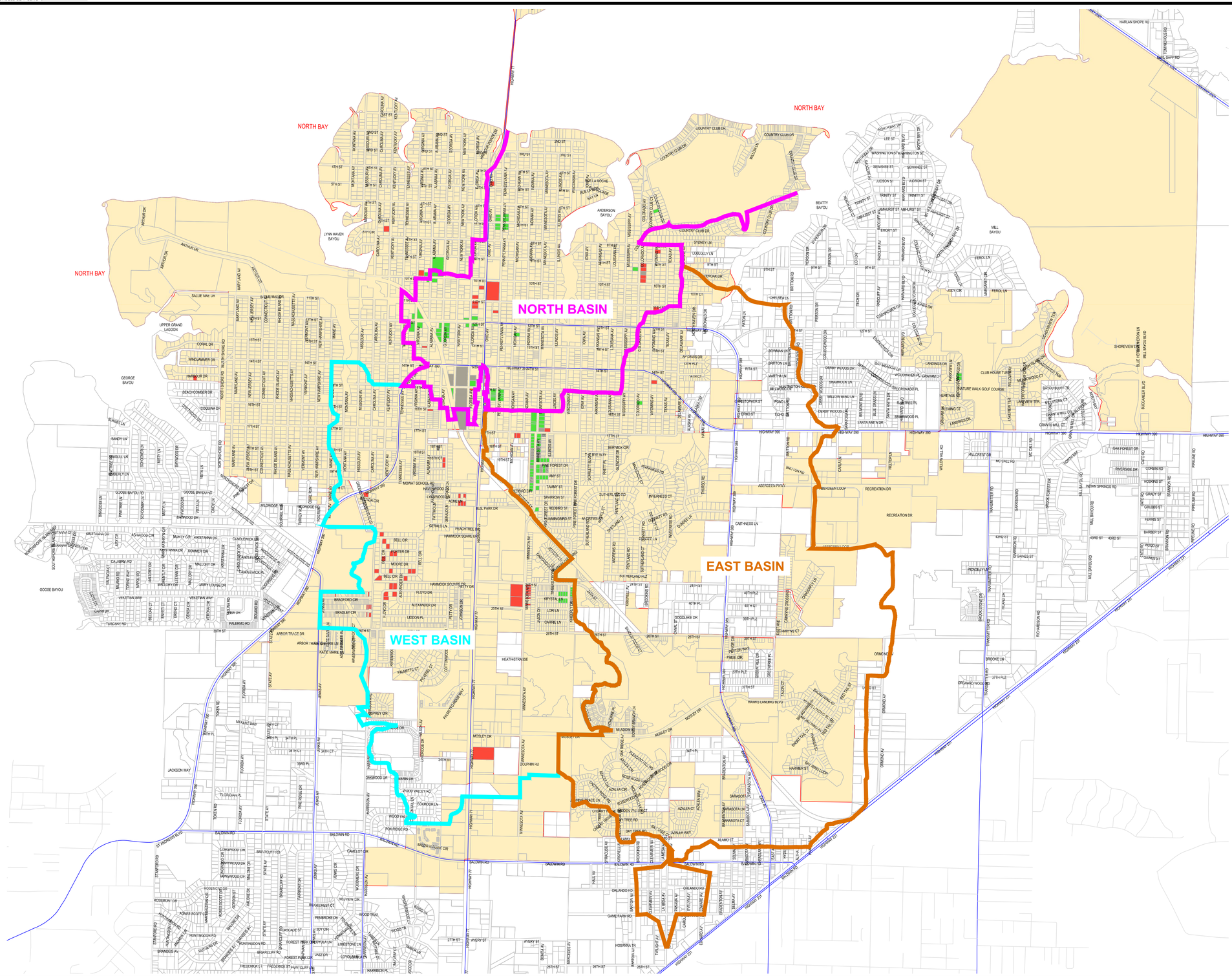

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NOT RELEASED FOR CONSTRUCTION BY: DATE:

SCALE:	AS NOTED
DESIGNED BY:	JDC
DRAWN BY:	jdm
REVIEWED BY:	JDC
ISSUE DATE:	JANUARY 2019
ACAD FILE NAME:	Recommended Improvements Map Appendix I.dwg

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OVERALL BASIN MAP
STORMWATER MASTER PLAN

LYNN HAVEN, FLORIDA

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PROJECT NUMBER
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14412 STORMWATER MASTER PLAN OVERALL BASIN MAP Sheet I

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KNOWN PROBLEM AREAS

KNOWN PROBLEM AREAS

The City has identified specific areas and properties that have experienced poor drainage and has shared this information for incorporation into this study. In the last 5 years, the region has experienced several significant storm events which resulted in flooded roadways, houses and commercial properties across the City. Two of these storm events were particularly notable due to the extremely high water elevations in area waterways and roadways and the damaging effects to property due to flooding. These storm events occurred on July 4, 2013 and May 2, 2014. The City received notice of structural flooding in numerous locations during each of these storms. These reported locations are indicated in maps provided in the Appendix section of this report. A detailed map of the flooded properties from the July 4, 2013 storm is included in Appendix D while a similar map of the flooded properties from the May 2, 2014 storm is included in Appendix E. Both of these maps were overlaid to create the Recommended Improvements Map in Appendix I for the purpose of identifying the specific localized areas to be addressed in the report sections below. Please refer to this map for locations of the problem areas noted herein.

In addition to the 2013 and 2014 storms noted above, Bay County was severely impacted by Hurricane Michael which made landfall on October 10, 2018. Although recorded rainfall was less than 12" (over 24 hours) for most of the area, wind speeds in excess of 150 mph were responsible for the deposition of an extreme amount of debris in the region's stormwater conveyance systems, resulting in a further reduction in flow and storage capacity.

GENERAL LOCALIZED FLOODING

There are several low lying areas and regions of very flat topography which experience varying degrees of localized flooding, even during short duration storm events. The depth of pooling water and duration of drawdown depend largely upon the existing drainage infrastructure and the capacity to convey stormwater to downstream receiving waters. For many of these areas the existing drainage infrastructure is incapable of discharging stormwater runoff at a rate that prevents short to moderate periods of localized flooding. This is due primarily to the existing drainage systems being undersized for the needed flow capacity, the lack of positive drainage in the system elevations and/or the need for repairs and maintenance. Please refer to the photos in Appendix H for typical examples of existing drainage facilities in need of maintenance, repair, or replacement. These typical examples are found throughout the entire City of Lynn Haven and are a contributing cause for several of the known areas of localized flooding. These examples were noted prior to Hurricane Michael.

WEST BASIN

ACME LANE - Numerous residents at the eastern terminus of Acme Ln. have reported flooding in their homes, with water elevations in excess of 2' above the finish floor after Hurricane Michael. The finish floor elevations of these homes are very near the road elevation, however the lack of proper drainage to this area results in significant flooding which has taken 24 hours or more to subside according to one affected homeowner.

BELAIRE ESTATES - Several homeowners in and around the Belaire Estates neighborhood have reported structural flooding. These homes all appear to have finish floor elevations very near the road elevation making them vulnerable to flooding. The drainage systems in the affected area consist of ditch bottom inlets and shallow pipes which appear to be undersized for the area served. This neighborhood drains to the northern segment of the Harrison Ditch which conveys stormwater runoff north to the SR 390 culvert.

BRADLEY CIRCLE - Numerous residents at the eastern terminus of Bradley Circle have reported structural flooding. This roadway is extremely flat and has no curb, gutter or roadside ditches. Because the road is crowned and the homes have finish floors very near the road elevation, these lots are susceptible to flooding.

MINNESOTA AVENUE - Several residents along Minnesota Ave., between 24th Street and 26th Street, have also reported structural flooding. This segment of Minnesota Ave. is served by a roadside ditch on the west side and an inlet and pipe system on the east side. These homes all have finish floor elevations below the elevation of Minnesota Ave., making them particularly prone to flooding.

KRYSTAL LANE - Homeowners in the immediate vicinity of the intersection of Krystal Lane and Kimberly Drive have reported flooding. These homes have finish floor elevations near the elevation of the adjacent roadway, which has no curb, gutter, or roadside ditch. This area of the neighborhood is served by sparsely placed ditch bottom inlets and a connecting pipe system.

NORTH BASIN

10TH STREET - Several residential properties near the intersection of 10th Street and Alabama Ave. have reported structural flooding. The homes on these lots appear to all have finish floor elevations very near the adjacent road elevation, making them vulnerable to water intrusion from even minor roadway flooding.

VIRGINIA AVENUE – There are several properties adjacent to the intersection of Virginia Ave. and 12th Street that have reported flooding. This intersection is a natural low point for the surrounding area and it appears that the downstream conveyance ditch is incapable of discharging stormwater at a rate that prevents temporary flooding in the area of this intersection.

GEORGIA AVENUE – The homes along Georgia Ave., between 12th and 13th Streets, have reported flooding. It appears that this segment of Georgia Ave. is inadequately served by the existing roadside drainage system, which has limited capacity for flows and lacks a positive outfall for the lowest portions of the street.

FLORIDA AVENUE - There are multiple commercial and residential properties in the vicinity of the 12th Street and Florida Ave. intersection which have reported flooding. It appears, generally, that the cause of this flooding is due to an inadequate roadside drainage system.

11TH STREET - It has been documented that SR 77, in the vicinity of 11th Street, has flooded by as much as one foot above the road elevation. This flooding has extended from SR 77 out to adjacent properties. The First Baptist Church of Lynn Haven, Williams Gun and Pawn and several commercial and residential properties near the intersection of 11th Street and Florida Ave. have reported structural flooding. In response to these reports

the Florida Department of Transportation (FDOT) commissioned a drainage study to analyze the cause of this flooding and determine what improvements would be necessary to reduce the risk of flooding. The report concluded that several existing pipe segments were undersized and recommended that larger pipes be installed. An excerpt of this drainage study is provided in Appendix F. It is unclear if FDOT has plans to fund this project.

15TH STREET - There is a cluster of adjacent residential and commercial properties located east of the old railroad R/W, between 17th Street and 14th Street, which have reported structural flooding. One of these properties is the Havenwood Garden Apartments, which has 56 units and no on-site stormwater management system. It appears that this area is lower in elevation than the surrounding properties and therefore collects a significant amount of runoff. The existing drainage system in this area is undersized and incapable of discharging stormwater at the rates necessary to prevent flooding.

PENNSYLVANIA AVENUE – Multiple residential lots along Pennsylvania Avenue, between 15th Street and 16th Street have experienced structural flooding. Many of these homes have finish floor elevations close to the road elevation and the existing roadside drainage system is broken and inadequately sized. These factors combine to elevate the risk of flooding along this segment of roadway.

1103 WYOMING AVENUE - Another known flooding issue is in the vicinity of the residential lot located at 1103 Wyoming Avenue. The current property owner has confirmed that the home on this lot has received flooding above the finish floor elevation on multiple occasions since they purchased the home in 2014. Nearby residents have confirmed similar flooding conditions at this home prior to the purchase by the current homeowner. The subject property is lower in elevation than surrounding properties and the roadside drainage system serving the immediate area is in need of improvements to allow this property to drain sufficiently to avoid future flooding.

7TH STREET – The residential lots in the immediate vicinity of the intersection of 7th Street and Pennsylvania Avenue have reported flooding. Most of the affected homes have finish floor elevations close to the adjacent road elevation and the existing roadside drainage system is inadequately sized and in need of maintenance. These factors combine to elevate the risk of flooding for these homes.

COLORADO AVENUE - The area with the most notable history of repeated flooding in the North Basin is the block of residential lots located on Colorado Avenue, between 9th and 10th Streets. During the July 4, 2013 flood event these properties reported flooding depths up to 15" above existing grade which lead to water intrusion in the associated houses. The cause of flooding has been determined to be the convergence of multiple drainage flow paths in the center of this block of homes and the insufficient capacity of the downstream drainage system. From Colorado Avenue, this major drainage system contains a system of ditches and pipes that ultimately outfall to the Anderson Bayou after passing through an existing control structure on the south side of 8th Street. West of Colorado Avenue, this drainage system is in need of significant improvements to prevent future flooding of this area.

EAST BASIN

24TH STREET - The main conveyance crossing 24th Street (south of Mowat Highlands subdivision) has been reported as an area of localized flooding by surrounding property owners. This has occurred frequently during past high-intensity storms, including the July 4, 2013 flood event. While no structural flooding was reported as a result of this event, the adjacent properties and 24th Street experienced flooding. Upon field reconnaissance and analysis of the model results, it appears that this is a low-lying area in comparison to the elevation of surrounding properties and 24th Street. Based on site inspection, it appears that the existing corrugated metal pipe culvert crossing 24th Street is in disrepair and may be a source of potential failure in the future. The conveyance system in this area was analyzed to determine if improvements will reduce flooding during design

storm events. However, this area will continue to be a flood risk in the future due to the low-lying nature of the properties on the south side of 24th Street.

DUNDEE LANE - The Dundee Lane crossing within the Mowat Highlands Subdivision has been reported as an area of flooding concern by citizens in the vicinity, but no structural flooding was reported during the July 4, 2013 storm event. This area was analyzed in the model and improvements to storm routing were realized via recommended actions noted later in this report.

PINE FOREST ESTATES – The Pine Forest Estates Subdivision, located off of Minnesota Avenue, experiences roadway and structural flooding, as reported to the City following the July 4, 2013 storm event. This subdivision has an existing roadside collection and piping system, but has minimal surface flow gradient to get stormwater runoff to the inlets. Additionally, a number of the homes in this area are at or near the elevation of the roadway, making them susceptible to structural flooding.

ABERDEEN PARKWAY - Aberdeen Parkway and Britton Road are both areas that experience roadway flooding during intense storm events. No specific structural flooding has been reported in this immediate vicinity, but this is a critical area that will be expected to receive increased runoff rates in the future due to the potential for development south of the Industrial Park. Lowering the hydraulic grade line in the existing condition will help to mitigate impacts of future development.

MOSLEY DRIVE - The area surrounding Mosley Drive (near the intersection of CR 389) is one that is frequently reported as flooding during intense storm events. This roadway flooding is also experienced immediately to the south at E. 34th Place, Bradenton Avenue, and Sarasota Avenue. However, for the purposes of this analysis, these areas have been combined into a single area of concern. Improvements to the crossings of CR 389 and Mosley Drive in this area were analyzed to determine what improvements can be made to improve the existing condition.

DERBY WOODS - North of the Lynn Haven Sports Complex is an area that regularly floods during intense storm events. Of specific concern are roadway flooding of SR 390 (a major arterial highway that connects to U.S. Highway 231), flooding along Carla Lane (location of a City lift station that regularly has flooding issues), and the area surrounding the Derby Woods Subdivision. SR 390 appears to act as a large weir and contributes to the flooding in this area. The existing conveyance system, while not as extensive as the ditch system originating north of Baldwin Road, receives runoff from a large area that has potential for future development. This area was analyzed to determine if improvements to the existing drainage network will accomplish a reduction of the hydraulic grade line elevation to prevent flooding of key City infrastructure and surrounding property. FDOT is currently performing the PD&E study for the future 6-lane widening of SR 390 in this area. During the design phase it is expected that FDOT will address the flooding problem in this area.

INDIANA AVENUE – Roadway and structural flooding has been reported along the stretch of Indiana Ave., between 16th and 17th Streets. This section of roadway is substantially lower than the elevation of 17th Street to the south. This roadway is served by a shallow ditch system that extends across multiple driveways with undersized and partially clogged culverts. There is also an undersized (12” CMP) cross drain under Indiana Ave., just north of 17th Street.

MODEL RESULTS

City of Lynn Haven Stormwater Masterplan April 2019

MODEL RESULTS

Computer models simulating existing conditions were generated for the primary stormwater outfall paths in each of the City's three major stormwater basins. Design storms similar to the intensity and duration of prior storm events that resulted in the flooding of roadways and buildings throughout the City were routed in the models to analyze the performance of these primary conveyance systems. The results of these models indicated that flooding in various areas around the City are to be expected during high intensity storm events due to stage elevations in the outfall paths. Although the models are not detailed enough to predict the risk of flooding for any specific property or area of the City, they did provide the data necessary to understand what regions may experience drainage issues, where there are restrictions to flow and the timing of drawdown of flood waters.

WEST BASIN

The preliminary model of the current conditions, called the "existing conditions" model, indicated that numerous areas throughout the West Basin experience water overtopping the banks of stormwater channels and flooding local streets. This was most prevalent in the 8-hour duration design storms where overtopping occurred in most of the nodes across the model. This indicates that the system has poorer performance when given less time for drawdown, which is typical when experiencing short duration, high intensity storm events. These results are due in large part because of the low grades and flat slopes across the basin, including the main drainage channels.

The West Basin was also modeled to include both the current conditions of its main outfalls and the conditions resulting from a couple pending improvements that are currently under construction. These include the new culverts associated with the SR 390 widening project as well as the 17th Street drainage improvements project. The model was further modified to analyze options for proposed improvements. The goal of these improvements was to address known drainage issues and flood prone areas.

NORTH BASIN

The analysis of the North Basin was focused on the drainage system serving the general area of Colorado, Wyoming and Texas Avenues, between 9th and 10th Streets. This drainage system serves the area of the North Basin with the most significant risk of flooding. The 25-year and 100-year storm events were routed to compare results to the conditions reported after the 2013 flood event. Model results reflected flooding conditions consistent with reported flooding from the 2013 event. The existing conditions model was then modified to analyze several potential solutions.

EAST BASIN

All major drainage conveyances and crossings within the East Basin were modeled to determine the behavior of the stormwater system during the 25-year and 100-year storm events. All internal collection/conveyance systems were not modeled, rather this analysis was focused on accomplishing as much hydraulic grade line reduction as possible throughout the primary drainage channels. This will also have a positive impact on the

staging of these intermittent, internal conveyance systems. The existing conditions model results reflected flooding in the locations that were reported by citizens and City staff alike in prior storm events. However, the existing conditions model also showed the intermediate areas where flooding can be expected during these storms. While these areas may not be reported flooding concerns at this time due to lower levels of development and traffic, it is important to identify these areas along with the reported problem areas for purposes of long-term capital improvements.

During the data collection and modeling of the existing conditions, there were several locations identified where the existing conveyance ditches were inefficient in terms of routing runoff downstream. Several reasons were identified as the source of this inefficiency. Due to the age of the majority of the ditch systems, the conveyance ditches do not have a uniform cross-sectional area. Some ditches have a non-level bottom cross-slope that impacts capacity and various portions of the ditch system do not match the cross-sectional capacity of segments that are upstream. These issues cause restrictions in the conveyance system which result in increases to the hydraulic grade line for the "trunk" of the City's East Basin. Key locations where this may be remedied are detailed in the following recommendations section.

Due to the large contributing areas routed through the City's existing drainage channels and the systematic relationship between all elements of the network, elements of the East Basin were analyzed iteratively to determine what improvements could be made to achieve substantive reductions in flood staging. In some cases, further improvements beyond those detailed in the following section produced minimal improvements (0.10' or less), making them impractical for the City to pursue.

RECOMMENDATIONS

City of Lynn Haven Stormwater Masterplan April 2019

RECOMMENDATIONS

GENERAL RECOMMENDATIONS

In addition to the specific improvements suggested below for each major basin, there are several other general recommendations for consideration to assist with a longer-term approach to addressing the City's drainage issues. These include several policy, procedural and enforcement suggestions that will place additional priority on the importance of stormwater management systems, drainage ways, and flood protection. These general recommendations are as follows:

- Remove debris generated by Hurricane Michael from all of the City's major drainage ways. The total cost for this effort is estimated to be $7.5M, however 75% of this cost is reimbursable from the NRCS Emergency Watershed Protection (EWP) program. See Appendix K for a copy of the Damage Survey Reports submitted to NRCS for reimbursement funding.
- Revise the City's Land Development Code to prohibit all upstream and downstream impacts to existing drainage ways and documented floodplains and require "cup for cup" compensating storage for all proposed floodplain impacts.
- Purchase property or obtain easements along all major drainage ways which serve the general public. Make improvements to these drainage ways as necessary to ensure access for future maintenance.
- Implement a ditch and driveway culvert rehabilitation program to re-establish the capacity of existing roadside ditches and driveway culverts throughout the City. The estimated cost to perform this work city-wide is $6.5M.
- Establish minimum standards for roadside drainage systems and implement a comprehensive plan to improve these existing systems where they are under capacity. This pertains to infill residential lots as well.
- Enhance the enforcement of codes that address the functionality of public drainage systems (driveway culverts, lot grading, landscaping and other improvements in public R/W, blockages in roadside drainage systems, etc.).
- Establish a source of funding for improvements as well as enhanced maintenance and repairs of existing public drainage systems.

See the Recommended Improvements Map in Appendix I for an illustration of locations where specific improvements are recommended in the report sections below.

WEST BASIN

RAILROAD DITCH SYSTEM - One improvement that would have far-reaching benefits across the City is the establishment of a new continuous primary drainage way. This new outfall path could be easily provided by improving the existing ditch system along both sides of the old railroad right-of-way. Because this rail line traverses through the heart of the City and leads directly to North Bay, it has the potential to provide a cost effective drainage benefit that could significantly increase the conveyance and discharge of stormwater

runoff. The existing ditch system is currently in need of improvements to provide adequate capacity and positive drainage flow, however most of the needed culverts at road crossings are already present and sufficiently sized. It is recommended that the City perform a detailed review of the railroad ditch system and improve the ditch's capacity north of 26th Street such that it could be connected to by other nearby drainage systems, thus creating an all-new primary drainage outfall for the City. Benefits from the implementation of this improvement are self-evident, especially where it is recommended that this ditch system be relied upon to provided localized relief of flooding for the nearby areas mentioned below. Note that this work could be performed concurrently with the proposed Rails to Trails project and thereby reduce numerous duplicate costs associated with construction (mobilization, general conditions, erosion control, etc.). The estimated cost for this recommendation is **$500,000**.

ACME LANE – The properties near the terminus of Acme Lane appear to be underserved by the existing drainage system. This produces a flooding risk that is further complicated by the proximity of the residential finish floor elevations to the road elevation. It is recommended that the existing drainage system be replaced with a new ditch and pipe system with a positive connection to the drainage channel on the east side of Mowat Middle School property. Improvements include new roadside ditches along Acme Lane which connect to the Mowat drainage channel via appropriately sized and sloped storm pipes. The estimated cost for these improvements is **$235,000**.

BELAIRE ESTATES - The Belaire Estates Subdivision appears to be underserved by the existing drainage system. It is recommended that the existing system be cleaned and flushed then video inspected to determine if further improvements are needed to enhance the level of service of this existing drainage system. The estimated cost for this recommendation is **$100,000**. This does not include the cost of any repairs identified by the video inspection.

BRADLEY CIRCLE – The homes near the terminus of Bradley Circle appear to flood due to the lack of elevation above the road grade and the lack of a formal drainage system. It is recommended that a roadside drainage system be constructed and connected to the primary outfall ditch to the east. The estimated cost for these improvements is **$235,000**.

MINNESOTA AVENUE – The homes on the east side of Minnesota Avenue, between 25th and 26th Streets are lower than the road grade and therefore have a high risk of flooding should there be any issue with the existing drainage infrastructure (pipe and inlet system). It is suggested that this existing system be cleaned and flushed then video inspected to determine if further improvements are needed to increase the level of service of this existing drainage system. The estimated cost for this recommendation is **$90,000**. This does not include the cost of any repairs identified by the video inspection.

KRYSTAL LANE – It appears that the residential lots in the vicinity of the intersection of Krystal Lane and Kimberly Drive are underserved by the existing drainage system. It is recommended that the existing drainage system be cleaned and flushed then video inspected to determine if further improvements are needed to increase the level of service of this existing drainage system. The estimated cost for this recommendation is **$30,000**.

NORTH BASIN

10TH STREET – This area of the neighborhood has no roadside drainage system, which is the root cause of flooding in this region. To address the risk of flooding for these properties (vicinity of the intersection of 10th Street and Alabama Ave.) it is recommended that a roadside drainage system be constructed to convey

stormwater to the nearest primary outfall. In this case the nearest outfall would be the above recommended improvements to the existing railroad ditch system. The estimated cost for these improvements is **$135,000**.

VIRGINIA AVENUE – The area surrounding the intersection of 12th Street and Virginia Ave. is a natural low point, which, during heavy rainfall, is unable to discharge water at a rate that prevents flooding. Because this area is adjacent to the headwaters of the Lynn Haven Bayou, the recommended solution is to rehabilitate the existing ditch along the unimproved right-of-way of Virginia Avenue to the north all the way to the culvert that crosses Tennessee Avenue. Limited clearing and earthwork would be needed for this solution, as well as a new stormwater easement across the private property between Virginia and Tennessee Avenues. The estimated cost for these improvements is **$60,000**.

GEORGIA AVENUE – Like Area 2A above, the segment of Georgia Ave. between 12th and 13th Streets is a natural low point, with limited capacity for stormwater discharge. There is an existing roadside ditch system in this area, however it is in need of rehabilitation. The existing driveway and roadway culverts are suspected of being partially clogged and in some cases undersized. The recommended solution is to increase the size of the driveway culverts to 15" and excavate the roadside ditches along Georgia Ave. to match the culvert flow capacity. It is also recommended that this segment of Georgia Ave. discharge to a new piped drainage system along the south side of 12th Street to tie into the existing railroad ditch system to the west. The estimated cost for this recommendation is **$140,000**.

FLORIDA AVENUE – This area includes the private lots surrounding the intersection of 12th Street and Florida Avenue. This area is served by a closed drainage system (i.e. pipes and roadside inlets). A field inspection was not able to determine the cause of flooding in this area, especially given that this intersection is higher in elevation than the surrounding properties to the north, west, and south. The recommended solution is to clean and flush the existing storm pipe system, from this intersection to the ultimate outfall, and perform a video inspection of the system. Upon review of this information it is anticipated that the cause of flooding can be determined and a detailed solution developed. The estimated cost for this recommendation is **$9,000**.

11TH STREET – Structural flooding in the area of the 11th Street and State Road 77 intersection is well documented (see cover photo of this report). Staging of stormwater in this vicinity has been brought to the attention of FDOT since the primary drainage outfall for the nearby segment of SR 77 travels westward along 11th Street towards the Lynn Haven Bayou. Reports of flooding across all four lanes or SR 77 resulted in FDOT commissioning a drainage study of their drainage system to determine what improvements would be necessary to reduce the risk of flooding in this area. The study recommended various pipe size increases to enhance flow capacity. An excerpt of this study and its recommendations can be found in Appendix F. A review of this study was completed and it is recommended that the City pursue the suggested improvements to the stormwater trunk line that runs along 11th Street. This improvement should be discussed with FDOT to determine opportunities for partial or full funding by FDOT. The estimated cost for construction is **$650,000**.

15TH STREET – This area covers approximately 5 City blocks and is underserved by the existing drainage system. The affected apartment community is absent of any type of stormwater management system and has no formal collection or conveyance infrastructure. This community relies solely on surface flow across the site to the roadside ditch system. It is recommended that the existing drainage system along 15th Street be rehabilitated between Florida Ave. and the railroad R/W. This can be accomplished by enlarging the existing ditches along 15th Street, west of Florida Avenue, and cleaning out all of the roadway culverts, which are partially blocked with debris and silt. The apartment community should develop, at their own cost, a formal drainage system to control stormwater on their property. The estimated cost for these improvements is **$20,000**.

PENNSYLVANIA AVENUE – This segment of Pennsylvania Ave., between 15th and 16th Streets requires additional flow capacity to relieve flooding in this area. The recommended solution is to increase the size of

the driveway culverts to 15" and excavate the roadside ditches to match the culvert flow capacity. The estimated cost for this recommendation is **$80,000**.

1103 WYOMING AVENUE - Further improvements to the existing roadside drainage system are required to prevent future flooding of the home located at 1103 Wyoming Avenue. The construction of a closed (i.e. piped) drainage system is recommended to replace the existing ditch system. This new piping system should lead from the low point on the south side of 11th Street to the nearest outfall located on Colorado Avenue, between 9th and 10th Streets (see above recommendation). This piping system should be designed with a positive drainage slope from 11th Street to Colorado Avenue and should be sized to accommodate anticipated flows from the appropriate design storm. Sufficient inlets will be required along this pipe route to replace the current ditch system. The estimated cost for these improvements is **$320,000**.

7TH STREET – To reduce the risk of flooding for the affected homes near the intersection of 7th Street and Pennsylvania Ave., the recommendation is to construct a new roadside drainage system along 7th Street, from Pennsylvania Ave. to the ultimate outfall at Anderson Bayou. This will provide an unbroken, positive outfall path and will serve to enhance the level of service for the affected area, including the residential properties along 7th Street, between Pennsylvania Ave. and Anderson Bayou, which currently rely on an undersized and under-maintained ditch system. The estimated cost for these improvements is **$470,000**.

COLORADO AVENUE - The primary focus of the North Basin improvements centered around the relief of flooding along Colorado Ave., between 9th and 10th Streets. Of the potential solutions studied, one option stood out as providing the most benefit for the least cost and impact to the affected homeowners. This solution involves the construction of a new 24" drainage pipe along the south side of 8th Street to divert flows and bypass a portion of the existing drainage system that runs through several residential lots between Colorado and Mississippi Avenues. It also includes modifications to the outfall structure on the south side of 8th Street. The modeling of the before and after scenarios suggest this improvement will decrease the peak flood water stage elevation between 6"-24" during the 100-year storm event (varies by location along Colorado Ave.). This significant improvement paired with the reduced cost and impact to homeowners (compared to other options) resulted in the selection of this recommendation. Because this area was considered a critical priority due to the history of structural flooding, the design of these improvements has already begun. Please refer to Appendix G for a copy of the current construction drawings for these improvements. The estimated cost for construction is **$225,000**.

EAST BASIN

24TH STREET - As identified during field reconnaissance and data gathering, the reported flooding in the vicinity of 24th Street appears to be caused by the elevation of the low-lying residential areas in comparison to the roadway and conveyance system elevations. Additionally, the existing culvert crossing is in a state of disrepair and should be addressed to prevent further degradation of flow capacity. For modeling purposes, the existing three (3) 48" corrugated metal pipes were increased to four (4) 48" pipes, which reduced the headwater elevation (south side of 24th Street) by 0.3'. While no structural flooding has been reported in the area, this change represents a significant decrease in property flooding. Since it is recommended that the existing three (3) 48" corrugated metal pipes be replaced with reinforced concrete pipes for resiliency purposes, the addition of fourth 48" pipe represents a relatively cost-efficient improvement to the upstream stormwater system. Finally, the channel between 24th Street and Dundee Lane should be cleared of excessive vegetation growth and widened to a uniform 15' width to achieve full effectiveness of the recommended culvert improvements. The estimated cost for these improvements is **$410,000**.

DUNDEE LANE - The Dundee Lane crossing within the Mowat Highlands subdivision consists of three (3) 42" pipes in the existing condition. This culvert was changed to four (4) 48" pipes and the upstream and downstream channels were widened to accommodate the new overall crossing width. This recommendation

was modeled due to the difference in water elevation upstream and downstream of Dundee Lane in the existing model. The result of this culvert improvement, in conjunction with the other modeled improvements, was a reduction in flood stage elevation of 0.46'. The estimated cost for these improvements is **$185,000**.

PINE FOREST ESTATES - As mentioned in the existing conditions section of this report, the current stormwater conveyance system in the Pine Forest Estates Subdivision appears to be deficient in a couple of respects. The surface conveyance for Pine Forest Drive, Amy Street, Tammy Street, and Sparrow Street is accomplished by the roadway surface. There appears to be a minimal asphalt gutter that collects the water from the crowned roadway and conveys it to the sparsely placed inlets, however the flow line is inconsistent, causing ponding along the roadways. This, combined with the relatively low elevation of the homes in this area, causes structural flooding during intense storm events. The recommendation for this area is to improve the roadside ditch cross section along Minnesota Ave., from 16th Street to 17th Street, to a consistent 4' width and install new 15" driveway culverts. This improvement, in conjunction with the other recommendations contained in this report, reduced the hydraulic grade line in this area by 0.3'. To obtain further performance benefits for the flood-prone homes in the Pine Forest Estates subdivision it is suggested that the existing stormwater collection and conveyance system be replaced with one of sufficient capacity to serve the affected area. This includes the removal of the existing system and replacement with new pipes and inlets of sufficient number and size to reduce roadway (and subsequently structural) flooding during design storm events. The estimated cost for this recommendation is **$1,380,000**.

ABERDEEN PARKWAY - The area of Aberdeen Parkway and Britton Road receives flow from a significant portion of undeveloped land that will likely be developed in the future. As such, reductions in hydraulic grade line in this area are recommended. Starting at Aberdeen Parkway, the piped crossing was changed from three (3) 36" pipes to four (4) 36" pipes. Additionally, the immediate downstream portion of conveyance ditch did not match the cross-sectional capacity of the next ditch section. Therefore, the "NORTH ABERDEEN" ditch was widened to 12' to be consistent with the downstream ditch section. Similarly, the cross drain under Britton Road was found to be inadequate in the existing conditions model. This cross drain was increased from four (4) 42" pipes to four (4) 48" pipes. Accompanying this increase in size, the section of ditch east of Britton Road was widened to 16'. These improvements, in conjunction with other systematic improvements, showed a resulting decrease in hydraulic grade line of 2.71' for Aberdeen Parkway and 1.44' for Britton Road. The estimated cost for these improvements is **$290,000**.

MOSLEY DRIVE - The Mosley Drive (and 34th/Bradenton/Sarasota/Hawk's Landing) area was also shown to have stormwater staging issues in the existing conditions model. Specifically, there are two crossings under Mosley Drive that were analyzed for improvement since all of the area to the south travels north across Mosley Drive. The first crossing (the westernmost) was upsized from three (3) 36" pipes to four (4) 42" pipes. The second crossing (easternmost nearer to CR 389) was upsized from two (2) 24" pipes to four (4) 24" pipes. These changes had the effect of reducing the hydraulic grade line immediately upstream of Mosley Drive by 0.98', reducing the staging at 34th Place by 1.1', and the wetland system behind The Hammocks Subdivision by 0.76'. It is important to note that these changes were made in conjunction with the previous recommendations as a system. Therefore, reductions in this location (due to greater conveyance capabilities) mean that stages downstream may increase. These downstream areas were checked for adverse impacts and none were found in the model. However, the immediate hydraulic grade line reductions at downstream areas may be more significant without the upstream improvements. The estimated cost for these improvements is **$190,000**.

DERBY WOODS - The area north of the Lynn Haven Sports Complex (SR 390, Carla Lane, and Derby Woods Subdivision) was found to be extremely deficient in terms of conveyance capability. This system receives runoff from significantly sized properties adjacent to the sports complex that have the potential for high development densities in the future. This system has less connections than the westernmost part of the East Basin and is generally closer to the outfall location. However, iterative improvements to this conveyance system did not

converge into a single recommendation. The ditch system and piping along SR 390, along with the piping system extending north, adjacent to Derby Woods, was continuously enhanced to the point where the improvements may not be cost-effective (i.e. changing conveyance along SR 390 to multiple 48" pipes and the piping system adjacent to Derby Woods to 60" pipes). However, each improvement showed significant reductions in flood event staging. Because FDOT intends to widen this segment of SR 390 (from SR 77 to US 231) they may already be engaged in a drainage study and therefore planning future stormwater improvements that could partially address the current drainage issue. Therefore, the recommendation for this area is to coordinate with FDOT, obtain a copy of their drainage study (once completed) and determine what improvements may be necessary, beyond the SR 390 widening project, to adequately relieve the risk of flooding for this region of the City. Because no improvements are included with this recommendation, there is no associated cost.

INDIANA AVENUE – This section of Indiana Ave., between 16th and 17th Streets, requires additional flow capacity to relieve flooding in this area. The recommended solution is to increase the size of the driveway culverts to 15" and excavate the roadside ditches to match the culvert flow capacity. Additionally, the 12" cross drain at the south end of Indiana Ave. should be replaced with a 14"x23" elliptical pipe (18" round equivalent). The estimated cost for these improvements is **$120,000**.

Other Recommended Improvements - In addition to the improvements in the known problem areas specified above, additional suggested improvements were modeled in other locations throughout the City to provide regional increases in overall system performance. Since the subject drainage networks are controlled by hydraulic grade line, water stage reductions in areas that were not previously identified as problem areas can have a positive impact on the identified problem areas and are reflected in the hydraulic grade line reductions mentioned above. Here are the additional recommended improvements that contributed to the flood elevation reductions noted above:

1. Culvert under SR 390 between Hawaii Avenue and Alaska Avenue upsized from 7'x5' box culvert to 9'x5' box culvert. This contributes to improvements noted for Areas 2, 3, and 5 above. It is anticipated that improvements to this box culvert will be addressed by FDOT with the future widening of SR 390 (i.e. no cost to City).
2. Widen McCain Creek between SR 390 and CR 389 to have 20'-wide (south half) and 30'-wide (north half) bottoms. This contributes to improvements noted for Areas 2, 3, and 5 above. (Estimated cost = **$870,000**).
3. Culvert under SR 390 near Britton Road upsized to two (2) 5'x10' box culverts. This contributes to improvements noted for Area 4 above. It is anticipated that improvements to this box culvert will be addressed by FDOT with the future widening of SR 390 (i.e. no cost to City).

Please note that these specific recommendations have the intent of increasing flow capacity in the areas specified and that this can be accomplished with alternative options which also present the same benefit. Should any of these recommendations be pursued by the City, it will be determined during the design phase which option for each recommendation provides the most cost-effective solution to reach the targeted flow capacity and/or reduction in flood stage elevation. For example, replacing an existing culvert with a larger one may not be as cost effective as adding a new smaller culver next to the existing culvert(s). The design engineer for each improvement will ultimately be responsible for choosing the most cost-effective solution among the viable options.

OPERATION AND MAINTENANCE

In addition to the specific improvements noted in this report, it is also recommended that the City implement a well-defined Stormwater Management Operation and Maintenance Plan. This plan should identify all of the City's major stormwater infrastructure and outline the specific operational and maintenance needs for each

major component (ponds, swales, control structures, culverts, ditches, etc.). Regular inspections of these facilities should occur as well as before and after each significant rainfall event. Inspection reports should be used to develop and communicate the timing and extent of routine maintenance and emergency repairs.

This plan should also be used for the development of a checklist for the City to reference for pre-storm preparations in the days leading up to the landfall of a named storm in the City's vicinity. Pre-event inspections of the City's primary storm infrastructure could identify unknown problems that may otherwise severely impact the system's ability to convey runoff to downstream receiving waters during the storm.

REPORT LIMITATIONS

City of Lynn Haven Stormwater Masterplan April 2019

REPORT LIMITATIONS

The information and recommendations provided in this report result from research, field investigations and surveying, the application of industry standard methodologies and the analysis of information provided from various sources. The best available data was used in the preparation of the various stormwater system analysis performed for the development of this report, however the referenced stormwater computer models to not reflect the true conditions of all the infrastructure analyzed.

Field data used in the development of the stormwater models was obtained prior to the landfall of Hurricane Michael on October 10, 2018. Some of the City's primary outfall paths, especially open channel ditches and canals, may have been altered as a result of this hurricane. It is also anticipated that these outfall paths have received a significant amount of debris as a result of this storm. Any changes to channel geometry or flow capacity reductions due to this hurricane have not been reflected in the stormwater models or this report.

The storm events used for this study are standardized for duration and intensity, however actual storm events vary widely across all measured parameters. The applied storm events are those accepted for flood protection analysis across numerous local and state agencies and are appropriate for use in this study.

The models created for the analysis of storm events were also developed for the purpose of analyzing the primary outfall paths that serve the major drainage basins across the City of Lynn Haven. While more detailed information was used to simulate these outfall paths, data for the basins and upstream stormwater systems were estimated and aggregated to align with the scope of this study. Therefore, this study is not intended to address all flooding problems within the City, known or unknown. Because of the flat terrain and condition of existing infrastructure, it is anticipated that areas of localized flooding will occur within the study area even after recommended improvements are implemented. Areas of localized flooding not directly improved by the recommendations in this report should be addressed on a case-by-case basis with detailed analysis and design specific to the immediate area in question.

Recommendations provided herein are intended to guide decisions for the design and implementation of suggested improvements. The information in this report is not intended for construction. Recommended improvements should be executed upon completion of detailed design and subsequent permitting, where necessary. The data and recommendations provided herein are for informational purposes only.

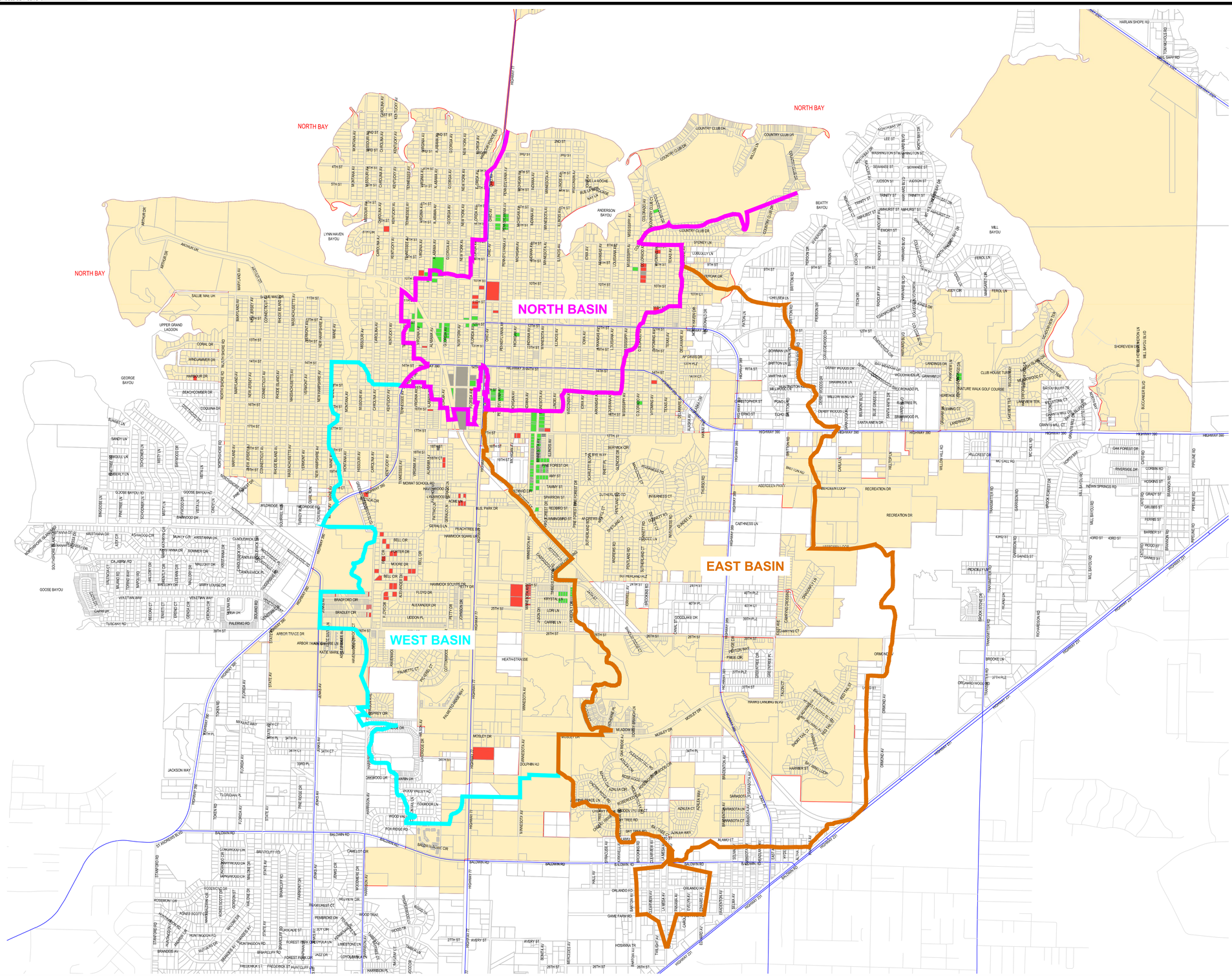
It should also be noted that significant portions of the City fall within numerous flood-prone areas identified by the Federal Emergency Management Agency (FEMA) as having a 1% chance of flooding each year. The recommendations in this report attempt to address known drainage issues throughout the City, however their implementation does not change the floodplain delineations established by FEMA nor will it guarantee protection from future flooding in these or any other areas.

Costs noted herein for associated recommendations and improvements are order-of-magnitude only and do not represent the ultimate costs for these items. These costs should be used for planning purposes only as well as for the establishment of a stormwater funding mechanism.

Appendix A

Overall Basin Map

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG



REV	DATE	BY	REVISIONS

NOT RELEASED FOR CONSTRUCTION BY: DATE:

SCALE:	AS NOTED
DESIGNED BY:	JDC
DRAWN BY:	jdm
REVIEWED BY:	JDC
ISSUE DATE:	JANUARY 2019
ACAD FILE NAME:	Recommended Improvements Map Appendix I.dwg

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OVERALL BASIN MAP
STORMWATER MASTER PLAN

LYNN HAVEN, FLORIDA

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DPR CERTIFICATION #EB-7806

SHEET NUMBER
I

PROJECT NUMBER
14412

14412 STORMWATER MASTER PLAN OVERALL BASIN MAP Sheet I

Date: Monday, April 15, 2019 3:03:27 PM ID: jdm File: P:\14412 Stormwater Master Plan\1 CIVIL\3DFolder\Drawings\Recommended Improvements Map Appendix I.dwg

Appendix B

NRCS Soil Report
(Lynn Haven Region)

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 Bay County, Florida

September 5, 2018

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

alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.

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 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.

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: Bay County, Florida
Survey Area Data: Version 17, Sep 19, 2017

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

Date(s) aerial images were photographed: Apr 5, 2010—Mar 7, 2015

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
1	A/D	Albany sand, 0 to 2 percent slopes	459.1	5.0%
2		Albany sand, 2 to 5 percent slopes	4.8	0.1%
3		Blanton fine sand, 0 to 5 percent slopes	31.1	0.3%
12		Leefield sand, 0 to 2 percent slopes	5.9	0.1%
13	A/D	Leon sand, 0 to 2 percent slopes	1,451.6	15.9%
20		Foxworth sand, 0 to 5 percent slopes	345.3	3.8%
21		Foxworth sand, 5 to 8 percent slopes	10.4	0.1%
22	A/D	Pamlico-Dorovan complex	954.0	10.5%
23	A	Chipley sand, 0 to 5 percent slopes	587.5	6.5%
25	A	Hurricane sand, 0 to 2 percent slopes	720.9	7.9%
26		Centenary sand, 0 to 5 percent slopes	33.2	0.4%
27		Mandarin sand, 0 to 2 percent slopes	64.2	0.7%
29	A/D	Rutlege sand, 0 to 2 percent slopes	969.6	10.7%
30		Pottsburg-Pottsburg, wet, sand, 0 to 2 percent slopes	12.3	0.1%
31	A/D	Osier fine sand	1,331.8	14.6%
32	A/D	Plummer sand	494.6	5.4%
38		Pansey loamy sand	57.6	0.6%
39		Pantego sandy loam	21.0	0.2%
40		Arents, 0 to 5 percent slopes	124.3	1.4%
41		Dirego muck	40.4	0.4%
43		Urban land	55.9	0.6%
46		Sapelo-Sapelo, wet, sand, 0 to 2 percent slopes	10.8	0.1%
47		Pits	73.3	0.8%
52		Bayvi loamy sand	163.6	1.8%
99		Water	1,079.0	11.9%
Totals for Area of Interest			**9,102.2**	**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.

Bay County, Florida

1—Albany sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: brt9
Elevation: 10 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Albany and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Albany

Setting

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

Typical profile

Ap - 0 to 8 inches: sand
E - 8 to 54 inches: sand
Bt1 - 54 to 60 inches: sandy loam
Bt2 - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
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: Very low (about 2.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Minor Components

Blanton

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Bonifay

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Foxworth

Percent of map unit: 2 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Chipley

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hurricane

Percent of map unit: 2 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Leefield

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lakeland

Percent of map unit: 1 percent
Landform: Hills on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear

Hydric soil rating: No

Stilson

Percent of map unit: 1 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

2—Albany sand, 2 to 5 percent slopes

Map Unit Setting

National map unit symbol: brtm
Elevation: 10 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Albany and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Albany

Setting

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

Typical profile

Ap - 0 to 7 inches: sand
E - 7 to 48 inches: sand
Bt1 - 48 to 60 inches: sandy loam
Bt2 - 60 to 80 inches: sandy clay loam

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None

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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Minor Components

Blanton

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Chipley

Percent of map unit: 2 percent
Landform: Rises on marine terraces, knolls on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Foxworth

Percent of map unit: 2 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Stilson

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lakeland

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, hills on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Leefield

Percent of map unit: 2 percent

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Bonifay

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

3—Blanton fine sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: brtz
Elevation: 10 to 350 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Blanton and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Blanton

Setting

Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 4 inches: fine sand
E - 4 to 60 inches: fine sand
Bt - 60 to 80 inches: fine sandy loam

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 54 to 66 inches

Frequency of flooding: None
Frequency of ponding: None
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: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G152AA121FL)
Hydric soil rating: No

Minor Components

Bonifay

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Albany

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lakeland

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, hills on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Foxworth

Percent of map unit: 3 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Troup

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

12—Leefield sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2tsy9
Elevation: 100 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Leefield and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leefield

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 28 inches: sand
Bt - 28 to 36 inches: sandy loam
Btv - 36 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
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 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D

Forage suitability group: Sandy over loamy soils on rises and knolls of mesic uplands (G152AA231FL)
Hydric soil rating: No

Minor Components

Alapaha
Percent of map unit: 5 percent
Landform: Depressions on marine terraces, drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear, convex
Across-slope shape: Concave, linear
Ecological site: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: Yes

Stilson
Percent of map unit: 4 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

Pelham, non-hydric
Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

Albany
Percent of map unit: 2 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

Chipley
Percent of map unit: 1 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

Foxworth
Percent of map unit: 1 percent
Landform: Ridges on marine terraces

Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

13—Leon sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2rz0s
Elevation: 0 to 300 feet
Mean annual precipitation: 60 to 69 inches
Mean annual air temperature: 63 to 72 degrees F
Frost-free period: 252 to 306 days
Farmland classification: Not prime farmland

Map Unit Composition

Leon and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Leon

Setting

Landform: Marine terraces, flatwoods
Landform position (three-dimensional): Tread, talf
Down-slope shape: Linear, convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 18 inches: sand
Bh - 18 to 26 inches: sand
E' - 26 to 65 inches: sand
B'h - 65 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 2 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
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 5.6 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: sandy soils on flats of mesic or hydric lowlands (G133AA141FL)
Other vegetative classification: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

Minor Components

Leon, hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Tread, talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: Yes

Pottsburg

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hurricane

Percent of map unit: 4 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Mandarin

Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Pickney

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Concave, linear
Across-slope shape: Concave, linear
Other vegetative classification: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: Yes

Rutlege

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip

Down-slope shape: Concave
Across-slope shape: Concave
Other vegetative classification: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: Yes

20—Foxworth sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ttkk
Elevation: 20 to 250 feet
Mean annual precipitation: 59 to 68 inches
Mean annual air temperature: 63 to 72 degrees F
Frost-free period: 209 to 295 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Foxworth

Setting

Landform: Ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 6 inches: sand
C - 6 to 67 inches: sand
Cg - 67 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Negligible
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 42 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
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 4.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A
Ecological site: Longleaf Pine-Turkey Oak Hills (R133AY002FL)
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G133AA121FL)
Hydric soil rating: No

Minor Components

Lakeland

Percent of map unit: 4 percent
Landform: Hills on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R133AY002FL)
Hydric soil rating: No

Chipley

Percent of map unit: 1 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

21—Foxworth sand, 5 to 8 percent slopes

Map Unit Setting

National map unit symbol: 2w4g7
Elevation: 20 to 300 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Foxworth

Setting

Landform: Ridges on marine terraces
Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve, side slope, tread
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Eolian or sandy marine deposits

Typical profile

A - 0 to 8 inches: sand
C - 8 to 80 inches: sand

Properties and qualities

Slope: 5 to 8 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Moderately well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 to 50.00 in/hr)
Depth to water table: About 42 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
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 3.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G133AA121FL)
Hydric soil rating: No

Minor Components

Blanton

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (two-dimensional): Summit, shoulder
Landform position (three-dimensional): Interfluve, side slope, tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Bonifay

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope, tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lakeland

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, hills on marine terraces
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, side slope, tread

Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Troup

Percent of map unit: 3 percent
Landform: Ridges on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Side slope, interfluve, tread
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

22—Pamlico-Dorovan complex

Map Unit Setting

National map unit symbol: brtq
Elevation: 0 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Pamlico and similar soils: 40 percent
Dorovan and similar soils: 35 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pamlico

Setting

Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa - 0 to 32 inches: muck
2Cg - 32 to 72 inches: 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): Moderately high to high (0.60 to 6.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Frequent

Frequency of ponding: Frequent
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: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: A/D
Forage suitability group: Organic soils in depressions and on flood plains (G152AA645FL)
Hydric soil rating: Yes

Description of Dorovan

Setting

Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Organic material

Typical profile

Oa - 0 to 60 inches: muck
2Cg - 60 to 80 inches: 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): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: Frequent
Frequency of ponding: Frequent
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: Very high (about 22.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B/D
Forage suitability group: Organic soils in depressions and on flood plains (G152AA645FL)
Hydric soil rating: Yes

Minor Components

Rutlege

Percent of map unit: 10 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave

Across-slope shape: Concave
Hydric soil rating: Yes

Plummer

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pottsburg, hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pantego

Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pansey

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Rains

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Alapaha

Percent of map unit: 2 percent
Landform: Flats on marine terraces, depressions on marine terraces, drainageways on marine terraces
Landform position (three-dimensional): Talf, dip
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

23—Chipley sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2ttks
Elevation: 30 to 150 feet
Mean annual precipitation: 62 to 70 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 232 to 262 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Chipley

Setting

Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: sand
C - 6 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
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 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
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: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G133AA131FL)
Hydric soil rating: No

Minor Components

Foxworth
Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Longleaf Pine-Turkey Oak Hills (R133AY002FL)
Hydric soil rating: No

Lakeland
Percent of map unit: 5 percent
Landform: — error in exists on —
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope, interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: Longleaf Pine-Turkey Oak Hills (R133AY002FL)
Hydric soil rating: No

25—Hurricane sand, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2ttkn
Elevation: 20 to 400 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition
Hurricane and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Hurricane

Setting
Landform: Flats, rises
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 51 inches: sand
Bh1 - 51 to 55 inches: loamy sand
Bh2 - 55 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: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 24 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: A
Ecological site: North Florida Flatwoods (R133AY004FL)
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Minor Components

Foxworth

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Chipley

Percent of map unit: 5 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

26—Centenary sand, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: 2w4g5
Elevation: 10 to 300 feet
Mean annual precipitation: 59 to 69 inches
Mean annual air temperature: 63 to 72 degrees F
Frost-free period: 252 to 295 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Centenary

Setting

Landform: Rises on marine terraces, knolls on marine terraces
Landform position (two-dimensional): Shoulder, summit
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 9 inches: sand
E - 9 to 73 inches: sand
Bh - 73 to 80 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 42 to 60 inches
Frequency of flooding: None
Frequency of ponding: None
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: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3s
Hydrologic Soil Group: A

Forage suitability group: Sandy soils on rises, knolls, and ridges of mesic uplands (G133AA121FL)
Hydric soil rating: No

Minor Components

Lakeland
Percent of map unit: 6 percent
Landform: Hills on marine terraces
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Longleaf Pine-Turkey Oak Hills (R133AY002FL)
Hydric soil rating: No

Chipley
Percent of map unit: 4 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

27—Mandarin sand, 0 to 2 percent slopes

Map Unit Setting
National map unit symbol: 2w4g9
Elevation: 10 to 70 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition
Mandarin and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Mandarin

Setting
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 7 inches: sand
E - 7 to 25 inches: sand
Bh - 25 to 57 inches: sand
C - 57 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: Very low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 18 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
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 5.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Forage suitability group: Sandy soils on rises and knolls of mesic uplands (G152AA131FL)
Hydric soil rating: No

Minor Components

Chipley

Percent of map unit: 5 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Hurricane

Percent of map unit: 4 percent
Landform: Rises on marine terraces, flats on marine terraces
Landform position (three-dimensional): Interfluve, rise, talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Foxworth

Percent of map unit: 3 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve, riser
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Resota

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve, riser, rise
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

29—Rutlege sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2ttkm
Elevation: 0 to 450 feet
Mean annual precipitation: 59 to 69 inches
Mean annual air temperature: 63 to 72 degrees F
Frost-free period: 223 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Rutlege and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rutlege

Setting

Landform: Marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy marine deposits and/or fluviomarine deposits

Typical profile

A - 0 to 22 inches: sand
Cg - 22 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Ecological site: North Florida Flatwoods (R138XY004FL)
Forage suitability group: Sandy soils on stream terraces, flood plains, or in depressions (G152AA145FL)
Hydric soil rating: Yes

Minor Components

Pickney

Percent of map unit: 5 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Ecological site: North Florida Flatwoods (R138XY004FL)
Hydric soil rating: Yes

Plummer

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R138XY004FL)
Hydric soil rating: No

Scranton

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Ecological site: North Florida Flatwoods (R138XY004FL)
Hydric soil rating: No

30—Pottsburg-Pottsburg, wet, sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2rz0t
Elevation: 10 to 150 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Pottsburg and similar soils: 65 percent

Pottsburg, wet, and similar soils: 25 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pottsburg

Setting

Landform: Flatwoods, marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex, concave
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 60 inches: sand
Bh - 60 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
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 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: No

Description of Pottsburg, Wet

Setting

Landform: Marine terraces, flatwoods
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy marine deposits

Typical profile

A - 0 to 5 inches: sand
E - 5 to 60 inches: sand
Bh - 60 to 80 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained

Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
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 4.2 inches)

Interpretive groups

Land capability classification (irrigated): 4w
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G152AA141FL)
Other vegetative classification: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: Yes

Minor Components

Leon, non-hydric

Percent of map unit: 6 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Hydric soil rating: No

Chipley

Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Allanton

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex, linear
Across-slope shape: Linear
Other vegetative classification: North Florida Flatwoods (R152AY004FL)
Hydric soil rating: Yes

31—Osier fine sand

Map Unit Setting

National map unit symbol: brv1
Elevation: 0 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Osier and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Osier

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Sandy alluvium

Typical profile

Ap - 0 to 8 inches: fine sand
AC - 8 to 34 inches: fine sand
C - 34 to 80 inches: fine sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: Frequent
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 3.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: A/D

Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G152AA141FL)
Hydric soil rating: Yes

Minor Components

Mandarin
Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Pottsburg, hydric
Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Albany
Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Leon, non-hydric
Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Chipley
Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Allanton
Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Rutlege
Percent of map unit: 2 percent

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pamlico

Percent of map unit: 1 percent
Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

32—Plummer sand

Map Unit Setting

National map unit symbol: brv2
Elevation: 0 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Plummer and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Plummer

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 7 inches: sand
Eg - 7 to 48 inches: sand
Btg1 - 48 to 59 inches: sandy loam
Btg2 - 59 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)

Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
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: Moderate (about 6.6 inches)

Interpretive groups
Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G152AA141FL)
Hydric soil rating: Yes

Minor Components

Pelham, hydric
Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Rutlege
Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Albany
Percent of map unit: 3 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Pottsburg, hydric
Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Rains
Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: Yes

38—Pansey loamy sand

Map Unit Setting

National map unit symbol: brv6
Elevation: 10 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Pansey and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pansey

Setting

Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Loamy fluviomarine deposits

Typical profile

A - 0 to 7 inches: loamy sand
E - 7 to 18 inches: loamy sand
Btg1 - 18 to 26 inches: sandy clay loam
Btg2 - 26 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: None
Frequency of ponding: None
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: Moderate (about 7.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C/D

Forage suitability group: Loamy and clayey soils on flats of hydric or mesic lowlands (G152AA341FL)
Hydric soil rating: Yes

Minor Components

Pelham, hydric
Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pantego
Percent of map unit: 3 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Alapaha
Percent of map unit: 3 percent
Landform: Depressions on marine terraces, drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Leefield
Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Albany
Percent of map unit: 2 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Plummer
Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

39—Pantego sandy loam

Map Unit Setting

National map unit symbol: brv7
Elevation: 0 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Pantego and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pantego

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Loamy marine deposits

Typical profile

A - 0 to 18 inches: sandy loam
Btg1 - 18 to 32 inches: sandy clay loam
Btg2 - 32 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: Frequent
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: High (about 10.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: B/D
Forage suitability group: Loamy and clayey soils on stream terraces, flood plains, or in depressions (G152AA345FL)

Hydric soil rating: Yes

Minor Components

Pansey

Percent of map unit: 4 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Alapaha

Percent of map unit: 2 percent
Landform: Depressions on marine terraces, drainageways on marine terraces, flats on marine terraces
Landform position (three-dimensional): Dip, talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Pelham, hydric

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Albany

Percent of map unit: 2 percent
Landform: Flats on marine terraces, rises on marine terraces, knolls on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Leefield

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Rutlege

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pamlico

Percent of map unit: 1 percent
Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf

Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

40—Arents, 0 to 5 percent slopes

Map Unit Setting

National map unit symbol: brv9
Elevation: 10 to 350 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

A - 0 to 10 inches: sand
C1 - 10 to 32 inches: sand
C2 - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Very high (20.00 to 50.06 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
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: Very low (about 2.4 inches)

Minor Components

Centenary

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Leon, non-hydric

Percent of map unit: 3 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Albany

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Pottsburg, non-hydric

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lakeland

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, hills on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Foxworth

Percent of map unit: 2 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Blanton

Percent of map unit: 2 percent
Landform: Knolls on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Side slope, interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Kureb

Percent of map unit: 2 percent
Landform: Dunes on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

41—Dirego muck

Map Unit Setting

National map unit symbol: brvb
Elevation: 0 to 450 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Dirego and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dirego

Setting

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

Typical profile

Oa - 0 to 28 inches: muck
2C1 - 28 to 36 inches: mucky fine sandy loam
2C2 - 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 (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Salinity, maximum in profile: Strongly saline (16.0 to 115.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 55.0
Available water storage in profile: High (about 11.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A/D
Forage suitability group: Forage suitability group not assigned (G152AA999FL)
Hydric soil rating: Yes

Minor Components

Osier

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pottsburg, hydric

Percent of map unit: 2 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Pickney

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Bayvi

Percent of map unit: 2 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Dorovan

Percent of map unit: 2 percent
Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

Rutlege

Percent of map unit: 2 percent
Landform: Depressions on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

Pamlico

Percent of map unit: 2 percent
Landform: Flood plains on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Concave
Hydric soil rating: Yes

Leon, non-hydric

Percent of map unit: 1 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

43—Urban land

Map Unit Setting

National map unit symbol: brvd
Elevation: 10 to 300 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 75 percent
Minor components: 25 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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

Minor Components

Kureb

Percent of map unit: 5 percent
Landform: Dunes on marine terraces, ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Pottsburg, non-hydric

Percent of map unit: 5 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Foxworth

Percent of map unit: 5 percent
Landform: Ridges on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Leon, non-hydric

Percent of map unit: 5 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Chipley

Percent of map unit: 3 percent
Landform: Knolls on marine terraces, flats on marine terraces, rises on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lakeland

Percent of map unit: 2 percent
Landform: Ridges on marine terraces, hills on marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

46—Sapelo-Sapelo, wet, sand, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: 2w4gv
Elevation: 10 to 450 feet
Mean annual precipitation: 49 to 57 inches
Mean annual air temperature: 64 to 72 degrees F
Frost-free period: 262 to 292 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Sapelo

Setting

Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand
E - 6 to 11 inches: sand
Bh - 11 to 20 inches: sand
E' - 20 to 68 inches: sand
Btg - 68 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 6 to 18 inches
Frequency of flooding: None
Frequency of ponding: None
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 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G152AA141FL)
Hydric soil rating: No

Description of Sapelo, Wet

Setting

Landform: Sloughs on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Sandy and loamy marine deposits

Typical profile

A - 0 to 6 inches: sand

E - 6 to 11 inches: sand
Bh - 11 to 20 inches: sand
E' - 20 to 68 inches: sand
Btg - 68 to 80 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 0 to 6 inches
Frequency of flooding: None
Frequency of ponding: None
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 3.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Forage suitability group: Sandy soils on flats of mesic or hydric lowlands (G152AA141FL)
Hydric soil rating: Yes

Minor Components

Albany

Percent of map unit: 4 percent
Landform: Knolls on marine terraces, rises on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve, talf
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Ocilla

Percent of map unit: 3 percent
Landform: Rises on marine terraces
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Plummer

Percent of map unit: 3 percent
Landform: Flats on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Concave, linear
Across-slope shape: Linear
Hydric soil rating: Yes

47—Pits

Map Unit Composition

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

Description of Pits

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluve, dip
Down-slope shape: Linear
Across-slope shape: Linear

52—Bayvi loamy sand

Map Unit Setting

National map unit symbol: brvp
Elevation: 0 feet
Mean annual precipitation: 61 to 69 inches
Mean annual air temperature: 63 to 70 degrees F
Frost-free period: 252 to 282 days
Farmland classification: Not prime farmland

Map Unit Composition

Bayvi and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bayvi

Setting

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

Typical profile

A1 - 0 to 8 inches: loamy sand
A2 - 8 to 28 inches: sand
C - 28 to 80 inches: loamy 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 (6.00 to 20.00 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Very frequent
Frequency of ponding: None
Salinity, maximum in profile: Slightly saline to strongly saline (4.0 to 32.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 70.0
Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A/D
Forage suitability group: Forage suitability group not assigned (G152AA999FL)
Hydric soil rating: Yes

Minor Components

Hydraquents

Percent of map unit: 14 percent
Landform: Tidal marshes
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

99—Water

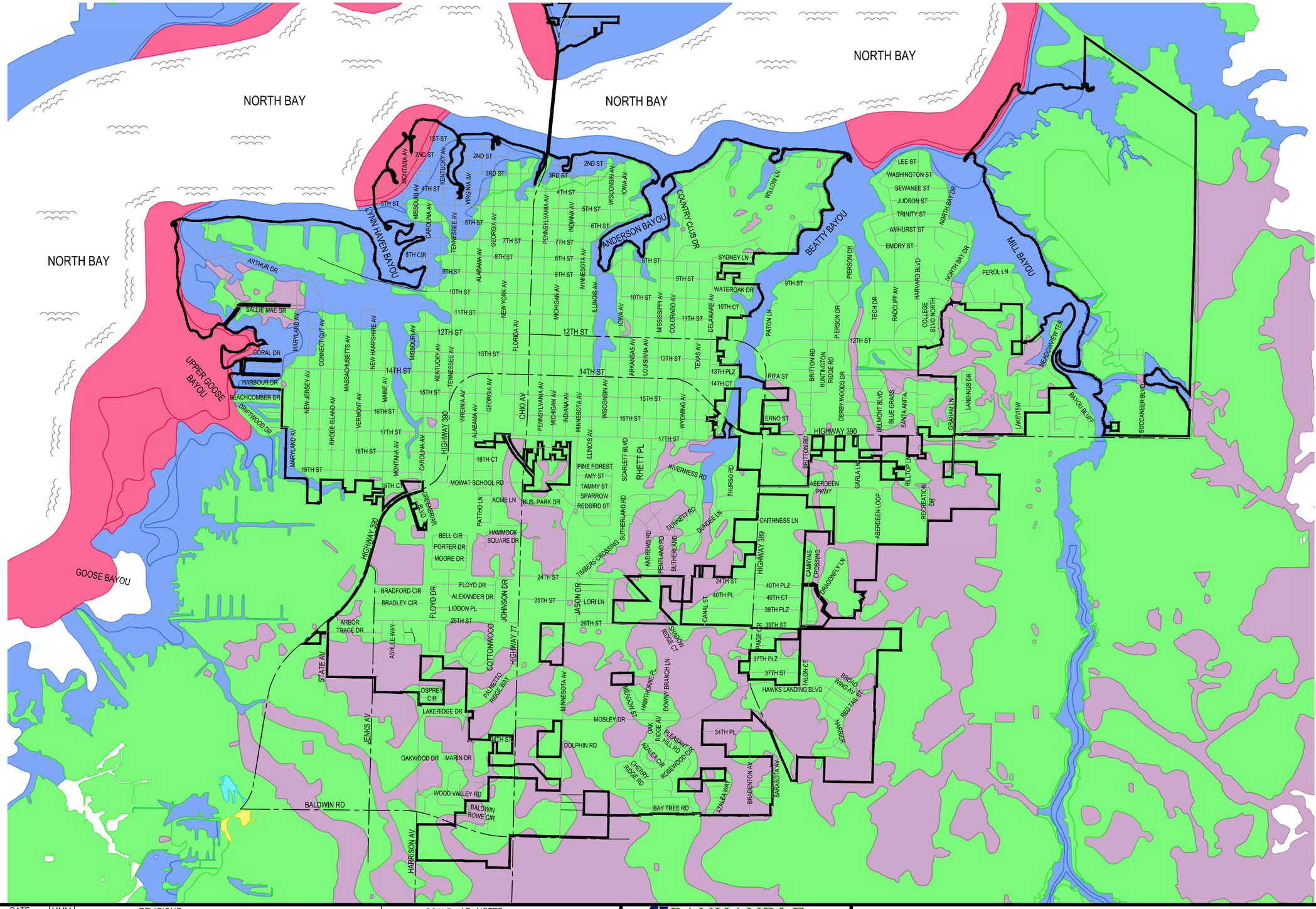
Map Unit Composition

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

Appendix C

FEMA Flood Maps

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG



SCALE 1"=1/2 MILE

LEGEND

ZONE: A	
ZONE: AE	
ZONE: AH	
ZONE: AO	
ZONE: VE	
ZONE: X	
CITY LIMITS:	

REV	DATE	MMM	REVISIONS
NOT		RELEASED FOR CONSTRUCTION	BY: DATE:

SCALE: AS NOTED
DESIGNED BY: JDC
DRAWN BY: SPL
REVIEWED BY: JDC
ISSUE DATE: DECEMBER 2018
ACAD FILE NAME: 145802-LH_Flood Zone Map.dwg

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CITY OF LYNN HAVEN
FEMA FLOOD ZONES
BAY COUNTY, FLORIDA

DPR CERTIFICATION No: EB-7806
SHEET NO: 1 OF 1
PROJECT NUMBER: 145802

Date: Thursday, December 6, 2018 7:27:31 AM ID: Sonny P Lucio File: P:\145802 LH Hurricane Michael LTR\1 CIVIL3DFolder\Drawings\145802-LH_Flood Zone Map.dwg

Appendix D

July 4, 2013
Flood Event Map

City of Lynn Haven
Florida

July 4th Flood Event
July 18, 2013

79 Residential Units
9 Commercial Units

Legend

- <all other values>
- Major Road
- Minor Road
- July_4th_flooding_com
- July_4th_flooding
- bay_county
- lakes
- Parcels
- railroads
- CityLimits

N
W E
S

Appendix E

May 2, 2014
Flood Event Map

City of Lynn Haven
Florida

Flooding Map
May 2, 2014

Legend

- PublicBuildings
- Road_Flooding_050214
- Creeks
- Roads
- Parcels
- Flooding_050214

N
W E
S

0 1,250 2,500 5,000 Feet

CITY OF LYNN HAVEN, FL

Appendix F

11th Street Drainage Study Excerpt (FDOT)

Drainage Basin Study
SR 77 11th Street Outfall
Lynn Haven, Florida

Prepared for:

Florida Department of Transportation – District 3

Prepared by:

Catalyst Engineering, LLC
2064 Trescott Drive
Tallahassee, FL 32308
CA No. 28244

October 2018

Jennifer L. Menendez, State of Florida, Professional Engineer, License No. 68431

This item has been electronically signed and sealed by:

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.

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LIST OF APPENDICES

Drainage Report Narrative

Overview

The purpose of this project is to study flooding on SR 77 by looking at the adequacy of the storm drain system along SR 77 from CR 390/ 14th Street to 9th Street, as well as the capacity of the system outfall along 11th Street. During heavy rainfall events, SR 77 (Ohio Avenue) experiences significant flooding. Video footage was provided from a rainfall event in July 2013 showing the roadway under what looks to be at least a foot of water in some places. Ben Janke from the City of Lynn Haven reports to have seen SR 77 underwater on at least two other occasions since then. A daycare on the south side of 11th Street, just west of SR 77 along the outfall pipe also has reported flooding problems. Also, the northeast corner of 11th and SR 77 has flooding problems in large events, and reports from First Baptist Church on east block of SR 77 between 11th Street and 10th Street tell of water coming into the sanctuary.

CR 390/ 14th Street is under construction to become an urban six lane typical section with a closed drainage system. In the present condition it is a rural two lane typical section with an open drainage system. The 11th street outfall is within the project limits. Final construction plans, the drainage report, the ICPR model, as well as any other available information were obtained from this project and incorporated in to the analysis. Much of the offsite area affected by the CR 390 development will continue to pass through to the 11th Street outfall, and the project is not expected to provide significant relief to the subject system.

Survey was obtained for pipe sizes and flow lines along SR 77 and 11th Street as well as cross sections in the 11th Street ditch to approximate ditch capacity. To determine basin areas, data and information obtained included one foot contours from the Bay County GIS department, Lidar data from the CR 390 project, existing SR 77 storm drain calculations, FEMA flood map data, existing permitted site plans, and field review on October 25, 2017.

The data gathered was used to create two models. An ICPR model was created to model the outfall ditch system, and a Geopak Drainage model was created to model the SR 77 storm drain system.

Existing Conditions

Within the study limits, SR 77 is a 5-lane undivided urban typical section with a center two-way turn lane. Runoff is collected in a curb and gutter storm drain system and conveyed to 11th Street where it is piped until it empties into a ditch system south of Alabama Avenue. The ditch system crosses under the railroad in a 48" cross drain and crosses under Tennessee Avenue in a 4'x6' box culvert where it enters Lynn Haven Bayou and continues to the North Bay. The system seems to become tidally influenced after the box culvert. NOAA data shows the MHW at 0.78 ft.

According to the existing storm tabs and current Zone 1 IDF curves, the SR 77 system was designed to something between a 2 year and 3 year event capacity. The IDF curves have been updated since the calculations were made in March 1971, so it was probably designed to a 3 year capacity at the time.

The outfall along 11th Street ranges from 36" to 48" pipe and is located midway in the basin. The trunkline to the south ranges from 15" to 24" pipe where it meets the 36" outfall pipe. The trunkline to the north ranges from 15" to 30" pipe. Along SR 77, the trunkline is a system of manholes with curb inlets and DBI's stubbing in from both sides. There are adversely sloped pipes in multiple locations along the system.

The drainage area for the entire area studied is 189 Acres (14 of these acres are routed through SR 390 ponds). The area is very flat with lots of ditches and side drains at variable elevations allowing water to stage up and provide storage. The soils in the drainage area are all classified as an A or A/D Hydraulic Soil Group. A Type A Hydraulic Soil Group was used for the A/D soils based on the following:

- The area is mostly developed with storm drain systems and ditches throughout providing conveyance to drain the area
- During the field investigation, the ditches were dry until the elevation gets very low near the bay. This is not a wetland area
- The borings taken for the 17th Street outfall project show the water table two to three feet below the ditch bottom, and the design water level in the SR 390 ponds appears to be 3-4 feet below the existing ground, with the SHWT estimated 1-2' above this elevation for the 3 ponds in the drainage basin.

Model Development

Using the data described above, an ICPR model of the outfall ditch was developed from the end of the SR 77 storm drain system to the end of the box culvert under Tennessee Avenue. The FEMA map shows a Flood Zone AE, Elevation 6 for the area west of Tennessee Avenue with the words "Flooding Effects from North Bay." None of the drainage area is in a FEMA flood zone until it passes under Tennessee Avenue. Since the west end of the Tennessee Avenue box culvert is tidally influenced, this point was chosen as the end point of the system. It provides a good starting point for the model at the Mean High Water level. The model consists of stage area nodes at each upstream and downstream end of a pipe with very small areas. The area is very flat with lots of ditch storage, so a shape factor of 323 was used in the model instead of the typical 484 for a developed area.

The proposed SWMF's from the CR 390 ICPR model, along with their corresponding areas and outfall structures, were included in the 11th Street model as the existing condition. Pond 3 has two different outfall structures. One is routed north to the railroad ditch and continues to the 11th Street outfall, and one goes to a storm drain system discharging to the bay in a different location. The pond with both outfalls was included in the model to get an accurate representation of the water coming to 11th Street. Pond 4 also outfalls to the 11th street outfall via the railroad ditch. A new node was created for the railroad ditch at CR 390 and the CR 390 ICPR model was copied upstream of this point and forced to discharge to this node. A link of the railroad ditch connects this new node to 101, which is the node upstream of the box culvert at Tennessee Street. Pond 5's drainage area contains area previously coming to the 11th Street outfall, but in the CR 390 design, this pond will outfall to the east, away from the 11th Street outfall. Pond 5 was not included in the 11th Street model.

Geopak Drainage was used to create a model of the storm drain system on SR 77. Since the system was likely designed for a 3 year storm event and that is the recommendation in the drainage manual, that is the event used in the model. The model was also checked for a 10 year event since the outfall contains multiple DBI's, which fits the Drainage Manual guidance for a ditch replaced by pipes. One of the obstacles encountered in this

model was that Geopak Drainage will not allow a pipe with an adverse slope. The pipes with adverse slopes were edited by raising the upstream end to create a minimal downstream slope. The tailwater on the system was chosen by looking at the stages of the ICPR model at the upstream node, and guidance from the FDOT Drainage Manual. Since the ICPR model tailwater was less than the crown of the pipe in all scenarios considered, the crown of the pipe was used for the tailwater elevation.

The existing model shows HGL clearance issues, which is consistent with the flooding reports. In order to correct these issues and bring the system up to an acceptable level of service (3 year event along SR 77, and 10 year along the 11th Street outfall), the system was broken down into three sections for analysis: the 11th Street outfall, the northern system (SR 77 north of 11th Street), and the southern system (SR 77 south of 11th Street).

To begin the analysis, the 11th Street section was adjusted. Pipes were first upsized to provide a continuous 48" outfall. Inverts were adjusted to be realistic/constructable as well as pipe sizes. Node S-113 is the DBI at the daycare with the flooding problems. The model shows no flooding anywhere along the 11th Street outfall in the 3 year event. In the 10 year event, there was significant flooding at multiple inlets along the 11th Street outfall. The outfall pipes were adjusted to 54" pipes. This solved the flooding in the 10 year event along 11th Street. Since the purpose of this project is to alleviate the known flooding problems, the 54" outfall pipe size was used for the rest of the analysis.

The analysis of the southern system showed that upsizing one of the 18" trunkline pipes to 24" pipes brought the HGL below the edge of pavement. The northern system's flooding was more complicated to solve. A summary of the scenario that provides the design level of service for the system is shown below and an exhibit has been included at the end of this section.

Results

Geopak Drainage

Here are the recommendations to bring the system up to an acceptable level of service for the 3 year frequency along SR 77 and the 10 year frequency along 11th Street. Note that in the 10 year, there is some flooding along SR 77, but not in the DBI's along 11th Street. On the east side of SR 77 at 11th Street, the stage should be near the top of ditch.

- **11th Street**: Upsize the trunkline pipes along 11th Street to 54" pipe (existing pipe is approximately 82' of 48", 1085' of 42" pipe, and 312' of 36" pipe)
- **Southern System**: Upsize trunkline pipe SS-130 from 18" pipe to 24" pipe. (approx. 276')
- **Northern System**:
    - Upsize SS-139 and SS-140 from 24" pipe to 30" pipe (77 ft.). These pipes carry offsite runoff from 27 Ac. to the south, and cross it under SR 77 on the south side of 11th street.
    - Upsize SS-141 and SS-142 from 15" pipe to 30" pipe (75 ft.). These pipes cross runoff under SR 77 from a DBI on the NE corner of the 11th Street intersection. This is an area of reported flooding.
    - Upsize 585 ft. of the trunkline beginning at the junction of the 11th Street outfall pipe:
        - SS-143, SS-145 from 30" to 36" (357 ft.)
        - SS-156 from 18" to 24" (228 ft.)
    - Upsize SS-152 from 18" to 24" (66 ft.)

Stormtabs showing the Geopak Drainage results are included in Appendix B for the following scenarios:

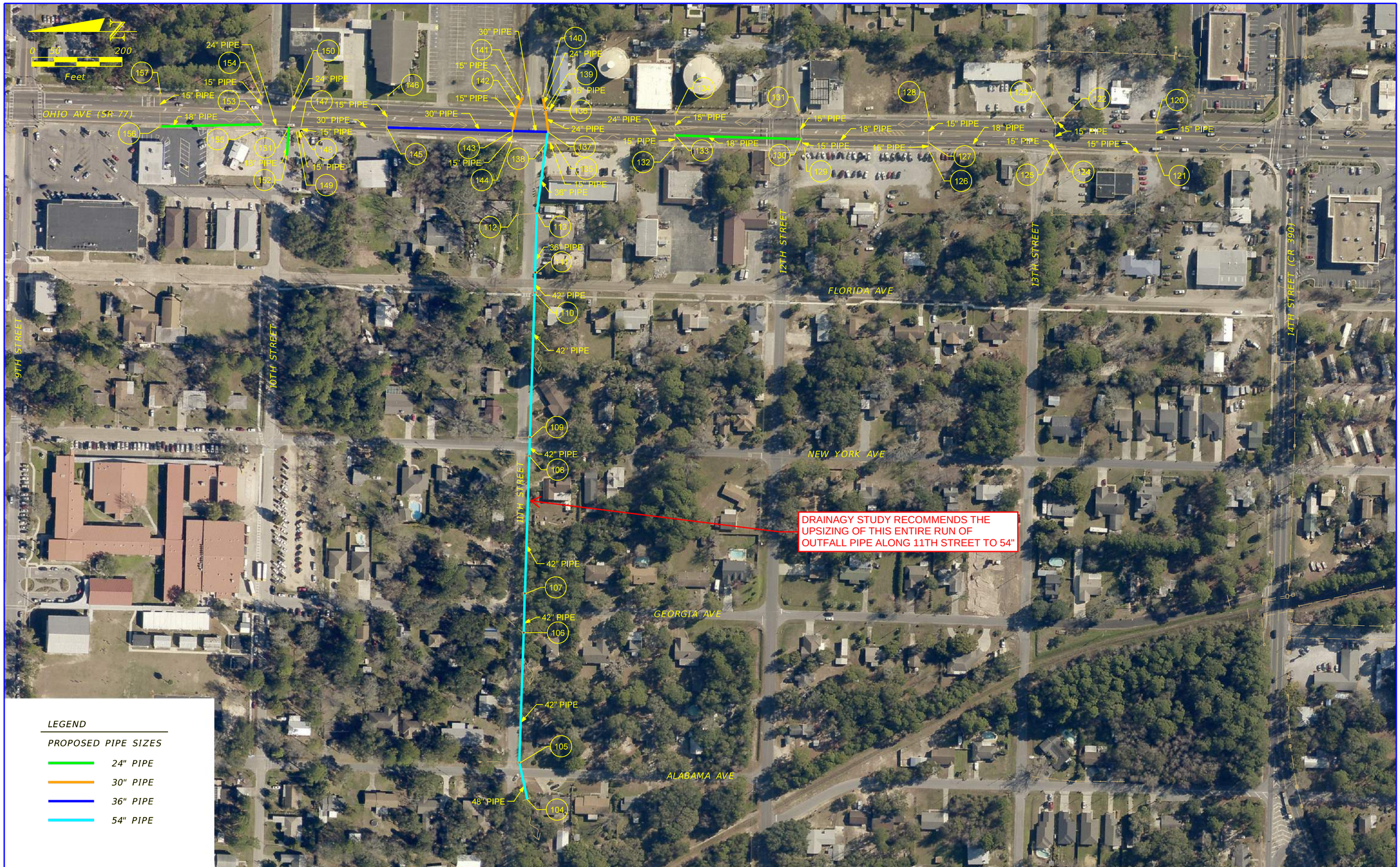
- The 3 year existing condition
- The 11th Street outfall pipe upsized to a 48" pipe for the 3 year and the 10 year events
- The 11th Street outfall pipe upsized to a 54" pipe for the 3 year and the 10 year events
- The 11th Street entire network upsized to LOS with the 54" outfall pipe; 3 and 10 year events.

ICPR

In addition to modeling the existing condition, the 48” cross drain under the railroad tracks was upsized to a 54” pipe due to the storm drain system being proposed as a 54” pipe. Results are summarized in the following table. Node 101 is the upstream end of the box culvert and Node 102 is the upstream end of this ditch segment. Increasing the size of the cross drain under Tennessee Avenue does slightly raise the stage in the ditch segment downstream of the pipe by 0.01 ft., which is 1/8 of an inch.

Input and output from the two models are included in Appendix C.

ICPR Results Summary				
			Existing 48	54
Node	Event	Max Stage	Stage	
101	2 year	6.3	2.52	2.52
102		9.0	3.26	3.26
103		9.0	3.30	3.29
104		10.0	3.91	3.91
101	5 year	6.3	3.68	3.68
102		9.0	4.09	4.09
103		9.0	4.40	4.17
104		10.0	4.75	4.62
101	10 year	6.3	4.34	4.33
102		9.0	4.67	4.67
103		9.0	5.37	5.01
104		10.0	5.58	5.30
101	25 year	6.3	5.07	5.07
102		9.0	5.34	5.34
103		9.0	6.52	6.05
104		10.0	6.65	6.24
101	50 year	6.3	5.76	5.77
102		9.0	6.01	6.01
103		9.0	7.92	7.18
104		10.0	7.99	7.30
101	100 year	6.3	6.18	6.19
102		9.0	6.44	6.45
103		9.0	9.01	8.04
104		10.0	9.06	8.13



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JENNIFER L. MENENDEZ, P.E.
P.E. LICENSE NUMBER 68431
CATALYST ENGINEERING, LLC
2064 TRESCOTT DRIVE
TALLAHASSEE, FLORIDA 32308
CERTIFICATE OF AUTHORIZATION 28244

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
77	BAY	

STORM DRAIN SYSTEM PROPOSED IMPROVEMENTS

SHEET NO.

0 100 400

Feet

DRAINAGE AREA	ACRES
DA 102	83.10
DA 104	5.70
DA 105	9.41
DA 106	0.69
DA 107	0.82
DA 108	6.27
DA 109	7.21
DA 110	2.65
DA 111	10.13
DA 112	3.37
DA 113	1.18
DA 120	0.23
DA 121	0.16
DA 122	0.42
DA 125	0.51
DA 126	0.45
DA 128	0.38
DA 129	0.32
DA 131	0.84
DA 132	0.33
DA 134	0.29
DA 135	0.63
DA 136	0.77
DA 140	26.39
DA 141	4.68
DA 142	0.23
DA 144	0.25
DA 146	0.80
DA 149	0.40
DA 150	0.77
DA 152	2.60
DA 154	0.34
DA 155	0.66
DA 156	1.53
DA 157	0.32
DA 390-3	7.48
DA 390-4	6.51
TOTAL	188.82

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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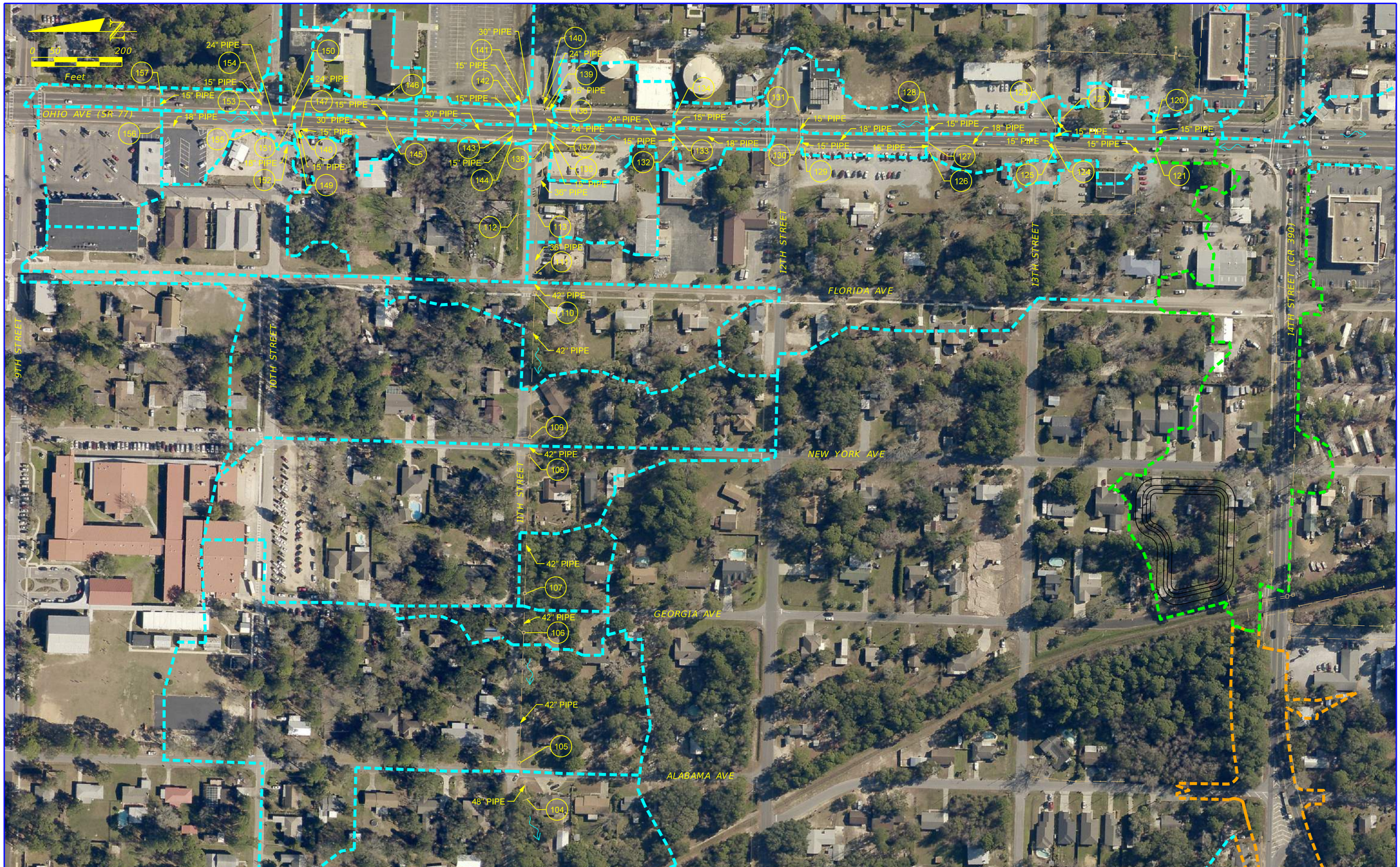
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
77	BAY	

DRAINAGE MAP
11TH STREET OUTFALL

SHEET NO.



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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
77	BAY	

DRAINAGE MAP
STORM DRAIN SYSTEM

SHEET NO.

Jennifer 7/31/2018 8:24:56 AM C:\Users\Jennifer\Documents\Catalyst\Projects\Districtwide Drainage Lochner\Lynn Haven

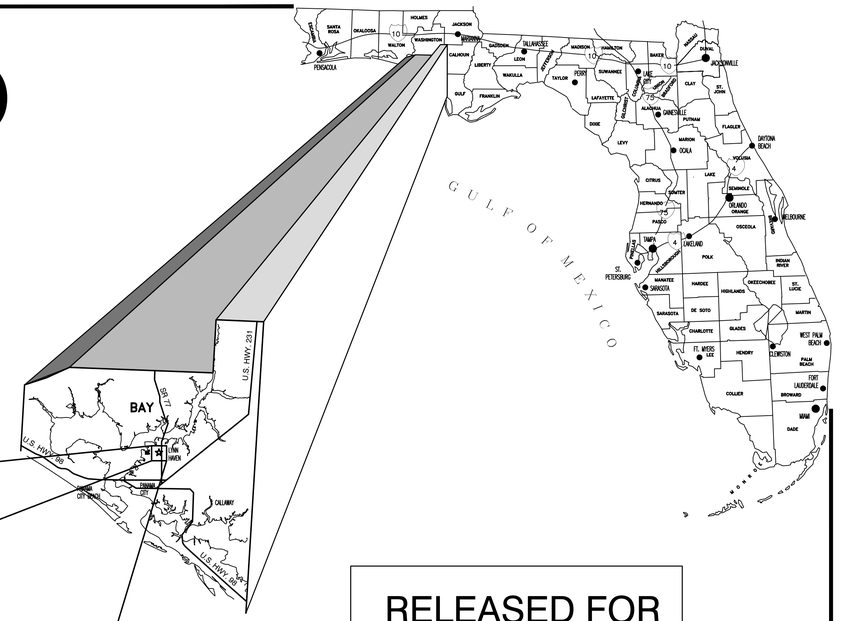
Appendix G

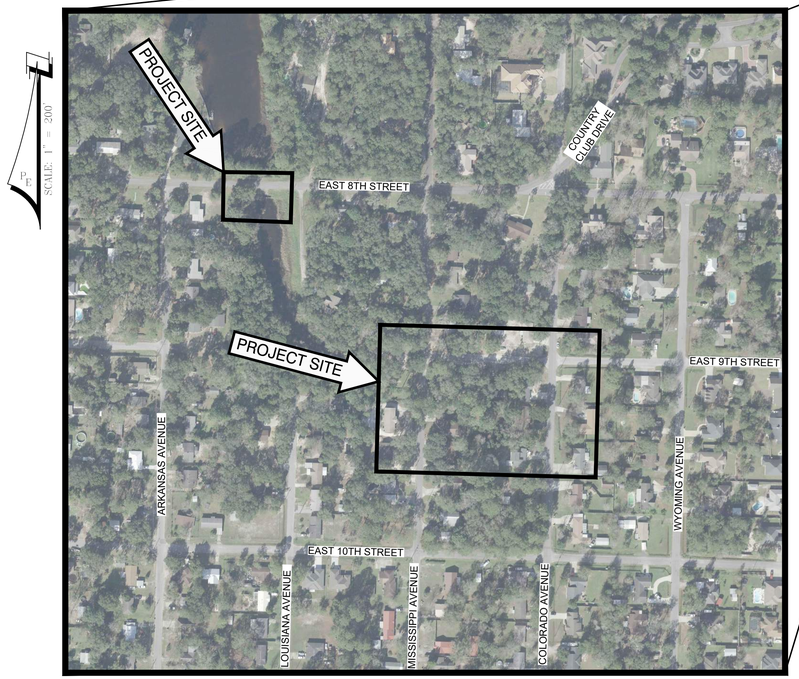
Colorado & Mississippi Ave Construction Drawings

MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS

LYNN HAVEN, FLORIDA

1/2 CENT DESIGN-BUILD CONTRACT





LAT ~ 30° 14' 40"
LONG ~ 85° 38' 11"

VICINITY MAP

0' 100' 200' 400'

SCALE: 1" = 200'

RELEASED FOR CONSTRUCTION

APRIL 2019
PROJECT No. 14460

PREPARED FOR:

CITY OF LYNN HAVEN, FL

825 OHIO AVENUE
LYNN HAVEN , FLORIDA 32444
PHONE:(850) 265-2121
FAX:(850) 265-8931

CITY OFFICIALS:

MAYOR	MARGO ANDERSON
COMMISSIONER	JUDY TINDER
COMMISSIONER	ANTONIUS BARNES
COMMISSIONER	DAN RUSSELL
COMMISSIONER	RODNEY FRIEND
CITY MANAGER	MICHAEL WHITE
PUBLIC WORKS DIRECTOR	BOBBY BAKER

DRAWING INDEX

PREPARED BY:

PANHANDLE ENGINEERING, INC.
ENVIRONMENTAL ENGINEERS ● CIVIL ENGINEERS ● LAND PLANNERS
3005 South Highway 77 Lynn Haven, Florida 32444
(850)763-5200 Fax (850)769-0730 www.panhandleengineering.com

Phoenix Construction SERVICES, INC.

ENGINEER OF RECORD CHRIS FOREHAND, P.E. No. 58028

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS COVER SHEET

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG

LYNN HAVEN GENERAL NOTES:

EXISTING SITE RELATED ITEMS:

1. THE LOCATION OF UTILITIES SHOWN ON THE PLANS MAY NOT BE ACCURATE AND ALL UTILITIES MAY NOT BE SHOWN. THE LOCATIONS OF UNDERGROUND UTILITIES HAVE NOT BEEN PHYSICALLY LOCATED BY THEIR OWNER OR PANHANDLE ENGINEERING, INC.
2. THE EXACT LOCATION AND ELEVATION OF EXISTING STRUCTURES, UTILITIES, AND PIPING SHALL BE PHYSICALLY VERIFIED IN THE FIELD BY THE CONTRACTOR BEFORE CONSTRUCTION BEGINS. THESE DRAWINGS DO NOT INTEND TO SHOW IN COMPLETE DETAIL ALL EXISTING STRUCTURES, UTILITIES, OR PIPING. THE CONTRACTOR SHALL EXAMINE ALL AVAILABLE RECORDS AND MAKE ALL EXPLORATIONS AND EXCAVATIONS AS REQUIRED TO DETERMINE THE LOCATION OF EXISTING STRUCTURES, UTILITIES, AND PIPING, WHENEVER NECESSARY. THE OWNER RESERVES THE RIGHT TO CHANGE LOCATION OF LINES TO AVOID CONFLICT WITH EXISTING STRUCTURES, UTILITIES, OR PIPING.
3. THE CONTRACTOR SHALL VISIT THE SITE PRIOR TO BIDDING. THE SURVEY MAY NOT SHOW ALL OBJECTS WITHIN THE PATH OF THE NEW UTILITIES. IF OBJECTS ARE NOT SHOWN ON THE SURVEY, THE CONTRACTOR SHALL NOTIFY THE ENGINEER SEVEN DAYS PRIOR TO THE BID DATE. CONTRACTOR WILL BE RESPONSIBLE FOR REPLACEMENT OF ALL OBJECTS NOT SHOWN ON THE SURVEY.
4. STATIONING ON THE PLANS RELATES TO THE "2D PLAN VIEW" CENTERLINE OF ALL ROADWAYS/ RIGHT-OF-WAYS AND SHALL BE USED FOR LOCATION PURPOSES ONLY. CONTRACTOR SHALL NOT USE STATIONING WHEN CALCULATING PIPE OR ROADWAY LENGTHS. ACTUAL LENGTH MAY DIFFER DUE TO VERTICAL ELEVATION CHANGES AND HORIZONTAL OFFSETS.
5. THE CONTRACTOR SHALL PHYSICALLY EXAMINE THE ENTIRE PROJECT SITE AND INFORM HIMSELF FULLY IN REGARD TO ALL CONDITIONS PERTAINING TO THE PLACE WHERE THE WORK IS TO BE PERFORMED FOR PURPOSE OF DETERMINING THE COST TO PERFORM THE WORK. THE CONTRACTOR SHOULD PAY SPECIAL ATTENTION TO AREAS INVOLVING CLEARING AND GRUBBING, EXISTING FACILITIES REMOVAL AND REPLACEMENT, SUPPORT ON RELOCATION, AND WORK INVOLVED IN WETLAND AREAS.
6. THE CONTRACTOR SHALL CHECK PLANS FOR CONFLICTS AND DISCREPANCIES PRIOR TO CONSTRUCTION. THE CONTRACTOR SHALL NOTIFY THE OWNER OR OWNER'S ENGINEER OF ANY CONFLICT BEFORE PERFORMING ANY WORK IN THE AFFECTED AREA.
7. THE CONTRACTOR SHALL VIDEO THE ENTIRE ROUTE PRIOR TO CONSTRUCTION AND PROVIDE A COPY TO THE ENGINEER PRIOR TO CONSTRUCTION.
8. THE CONTRACTOR SHALL EXERCISE EXTREME CAUTION IN AREAS OF BURIED UTILITIES AND SHALL PROVIDE AT LEAST 48 HOURS NOTICE TO THE VARIOUS UTILITY COMPANIES IN ORDER TO PERMIT MARKING THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES IN ADVANCE OF CONSTRUCTION.
9. THE CONTRACTOR IS RESPONSIBLE FOR REPAIRING ANY DAMAGE TO EXISTING FACILITIES ABOVE OR BELOW GROUND THAT MAY OCCUR AS A RESULT OF WORK CALLED FOR IN THESE CONTRACT DOCUMENTS.
10. THE CONTRACTOR SHALL BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT OCCUR DUE TO THE CONTRACTORS FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

CONSTRUCTION REGULATIONS AND PERMITS RELATED ITEMS:

11. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO LEARN, KNOW, AND COMPLY WITH THE REGULATIONS, ORDINANCES, PERMIT AND INSPECTION REQUIREMENTS OF THE VARIOUS GOVERNMENTAL AGENCIES HAVING JURISDICTION. IT WILL BE THE RESPONSIBILITY OF THE CONTRACTOR TO REVIEW AND COMPLY WITH THE CONDITIONS OF THE VARIOUS PERMITS OF THE GOVERNMENTAL AGENCIES. THE CONTRACTOR SHALL SCHEDULE THE REQUIRED INSPECTIONS AND APPROVALS IN ACCORDANCE WITH THE REQUIREMENTS OF THE PERMIT CONDITIONS. THE CONTRACTOR SHALL NOTIFY THE NECESSARY AGENCIES OF CONSTRUCTION COMMENCEMENT.
12. ALL SPECIFICATIONS AND DOCUMENTS REFERRED TO SHALL BE OF LATEST ISSUE AND SHALL BE CONSIDERED A PART OF THESE DOCUMENTS AS THOUGH INCLUDED.
13. CONTRACTOR SHALL HAVE COPIES OF ALL PERMITS IN POSSESSION AT ALL TIMES DURING CONSTRUCTION. ANY INDIVIDUAL CREW OR INDIVIDUAL PERSON WORKING ON THE INSTALLATION OF ANY PART OF THIS PROJECT SHALL HAVE A SET OF PLANS AND SPECIFICATIONS WITH THEM AT ALL TIMES.
14. THE CONTRACTOR SHALL FOLLOW ALL CONDITIONS OF THE PERMIT REQUIREMENTS. SEE SPECIFICATIONS FOR COPY OF PERMITS.
15. CONTRACTOR SHALL FOLLOW ALL LOCAL, STATE, AND FEDERAL REQUIREMENTS FOR CONSTRUCTION.
16. CONTRACTOR SHALL FOLLOW ALL OSHA REQUIREMENTS FOR CONSTRUCTION.

CONSTRUCTION & SITE RESTORATION RELATED ITEMS:

17. WHERE IT BECOMES NECESSARY TO TEMPORARILY REMOVE, REPOSITION, OR SUPPORT EXISTING FACILITIES, UTILITY POLES, ETC. THIS WORK SHALL BE PERFORMED AT THE CONTRACTOR'S EXPENSE AND IN ACCORDANCE WITH REQUIREMENTS OF THE OWNER OF THE EXISTING FACILITY, UTILITY POLE, ETC. THE CONTRACTOR SHALL GIVE PROPER NOTICE TO THE UTILITIES.
18. THE CONTRACTOR SHALL REMOVE AND REPLACE, TO THEIR ORIGINAL NATURE, ALL DISTURBED MATERIALS OR OBJECTS WITHIN THE PATH OF THE NEW UTILITIES AS NECESSARY. ALL REPLACED MATERIALS SHALL BE EQUAL OR BETTER AND SHALL BE APPROVED BY THE ENGINEER. THIS INCLUDES ALL LANDSCAPING WITHIN THE RIGHT OF WAY IN THE PATH OF THE NEW UTILITIES.
19. ALL DISTURBED OBJECTS SUCH AS DRIVEWAYS, CULVERTS, RETAINING WALLS, FENCING, SIGNS, MAILBOXES, LANDSCAPING, ETC. SHALL BE REINSTALLED TO EXISTING OR ACCEPTABLE CONDITION BY THE OWNER AT THE CONTRACTOR'S EXPENSE.
20. ALL PAVEMENT SHALL BE REMOVED AND REPLACED IN ACCORDANCE WITH ENGINEERING PLANS AND SPECIFICATIONS. FOR THE REPLACEMENT OF ASPHALT ROADS AND PAVEMENT DRIVES, THE CONTRACTOR SHALL REMOVE THE EXISTING ASPHALT AND REPLACE AS SHOWN IN DETAILS.
21. CONTRACTOR SHALL TRIM, TACK AND MATCH EXISTING PAVEMENT AT LOCATIONS WHERE PROPOSED PAVEMENT ABUTS.
22. ALL CONCRETE DRIVEWAYS SHALL BE REMOVED AND REPLACED IN ACCORDANCE WITH ENGINEERING PLANS AND SPECIFICATIONS. FOR REPLACEMENT OF CONCRETE CROSSINGS, THE CONTRACTOR SHALL SAW CUT BACK TO THE CLOSEST JOINT AND REPLACE AS SHOWN IN DETAILS.
23. ALL DISTURBED DRIVES SHALL BE CONNECTED TO THE EXISTING PAVEMENT IN A CONDITION EQUAL TO OR BETTER THAN ITS PREVIOUS CONDITION USING THE SAME MATERIALS THAT WERE REMOVED.
24. THE CONTRACTOR SHALL MAINTAIN A REASONABLE ACCESS TO ALL FACILITIES DURING CONSTRUCTION.
25. THE CONTRACTOR SHALL TAKE WHATEVER PRECAUTIONS NECESSARY TO AVOID TRESPASSING AND DAMAGING GOVERNMENT PROPERTY.
23. ALL SPOIL MATERIAL FROM EXCAVATION SHALL BE PLACED ON THE UPLAND SIDE OF ANY SLOPED CONSTRUCTION AREA.
24. ALL EXISTING CONCRETE, ASPHALT, TREES, STUMPS, AND OTHER DELETERIOUS MATERIAL SHALL BE REMOVED FROM THE SITE AND DISPOSED OF IN ACCORDANCE WITH FLORIDA LAWS.
26. A ONE FOOT STRIP OF SOD SHALL BE INSTALLED ON THE EDGE OF ALL ASPHALT OVERLAY AREAS AND AROUND ALL ABOVE GROUND CONCRETE STRUCTURES INCLUDING BUT NOT LIMITED TO VALVE PADS, BLOW OFF VAULTS, AND AIR RELEASE VAULTS.
27. ALL CONSTRUCTION STAKING SHALL BE DONE AT CONTRACTORS EXPENSE
CONTRACTOR IS TO FURNISH "AS BUILT PLANS" INDICATING LOCATIONS OF ALL MANHOLES, FITTINGS, VALVES, AND DEAD END RUNS WITH THREE (3) PHYSICAL FEATURES (LOT CORNERS, TREES, ETC.). THIS IS MANDATORY, NO EXCEPTIONS.

MAINTENANCE OF TRAFFIC AND ROADWAY RELATED ITEMS:

28. IT SHALL BE THE CONTRACTOR'S SOLE RESPONSIBILITY TO MAINTAIN ADEQUATE TRAFFIC CONTROL AND TO PROVIDE DETOURS AROUND CONSTRUCTION ACTIVITIES. NO STREET SHALL REMAIN CLOSED TO TRAFFIC OVERNIGHT.
29. THE CONTRACTOR SHALL INSTALL ALL TRAFFIC CONTROL DEVICES REQUIRED FOR THE PROJECT IN ACCORDANCE WITH THE LATEST EDITION OF THE U.S. DEPARTMENT OF TRANSPORTATION FEDERAL HIGHWAY ADMINISTRATION MANUAL ON UNIFORM TRAFFIC CONTROL.
30. CONTRACTOR SHALL MAINTAIN A REASONABLE ACCESS TO ALL FACILITIES DURING CONSTRUCTION. ALL DRIVEWAYS SHALL BE COMPACTED AND MAINTAINED DURING CONSTRUCTION TO ALLOW ACCESS TO FACILITIES AT ALL TIMES. ALL TEMPORARY STABILIZATION SHALL BE SMOOTH AND LEVEL.

EROSION CONTROL AND DEWATERING ITEMS:

31. PRIOR TO STARTING ANY CONSTRUCTION, THE CONTRACTOR SHALL NOTIFY APPROPRIATE AGENCIES AND SHALL INSTALL EROSION CONTROL MEASURES AS SHOWN ON THE PLANS AND AS IDENTIFIED, STATE, AND LOCAL APPROVAL DOCUMENTS PERTAINING TO THIS PROJECT.
32. THE CONTRACTOR SHALL PROVIDE EROSION AND SEDIMENT CONTROL PER THE GUIDELINES OF THE FLORIDA DEVELOPMENT MANUAL. ALL REQUIRED EROSION AND SEDIMENT CONTROL MEASURES SHALL BE SHALL BE INCLUDED IN COST OF OTHER ITEMS OF WORK.
33. CONTRACTOR SHALL INSTALL ANY REQUIRED SLOPE STABILIZATION, SILT FENCING, BALED HAY BARRIERS, OR TURBIDITY CURTAINS PER CURRENT FDOT DESIGN STANDARDS (FDOT INDEX 100, 101, 102, 103, & 104). LOCATION SHALL BE AS SHOWN ON THE PLANS OR AS DIRECTED IN THE FIELD.
34. THE CONTRACTOR SHALL BE RESPONSIBLE TO CONTROL CONSTRUCTION AND PREVENT SEDIMENTS FROM DISCHARGING TO ADJACENT PROPERTIES, WETLANDS, STORM DRAINAGE SYSTEMS, AND/OR OFF-SITE AREAS, WHETHER SUCH EROSION IS CAUSED BY WATER, WIND, OR DIRECT DEPOSIT. AT NO ADDITIONAL COST TO OWNER, ADDITIONAL EROSION CONTROLS SHALL BE UTILIZED AS NECESSARY AND AS DIRECTED BY THE ENGINEER TO LIMIT SEDIMENTS FROM DISCHARGING TO ADJACENT PROPERTIES, WETLAND OR STORM DRAINAGE SYSTEMS. THERE WILL BE NO DIRECT PAYMENT FOR THIS WORK.
35. ALL CONSTRUCTION AREAS SHALL BE STABILIZED AT THE CLOSE OF EACH CONSTRUCTION DAY. EROSION CONTROLS SHALL BE CHECKED AT THIS TIME AND MAINTAINED OR REINFORCED IF NECESSARY.
36. EROSION CONTROLS SHALL REMAIN IN PLACE AND BE MAINTAINED FOR THE DURATION OF THE PROJECT TO LIMIT THE MOVEMENT OF SILTATION AND SEDIMENTS FROM ENTERING EXISTING DRAINAGE SYSTEMS OR FROM LEAVING THE CONSTRUCTION SITE. ANY ACCUMULATED SEDIMENTS ARE TO BE REMOVED FROM THE EROSION CONTROLS AND DISPOSED TO PROPERLY. ADDITIONALLY, ALL EROSION CONTROLS ARE TO BE INSPECTED AFTER A STORM EVENT AND THE CONTROLS REPLACED OR ARMORED AS NECESSARY AND ACCUMULATED SEDIMENTS REMOVED.
37. TEMPORARY STOCKPILING OF MATERIALS RELATED TO THE CONSTRUCTION ACTIVITIES ARE TO BE PROPERLY STABILIZED, PROTECTED AND DEMARCATED TO LIMIT MATERIAL MOVEMENT AND EROSION FROM DEPOSITING INTO ADJACENT PROPERTIES, WETLAND OR STORM DRAINAGE SYSTEMS.
38. THE INSTALLATION OF ALL CONCRETE STRUCTURES, GRAVITY SEWER, FORCE MAINS, WATER MAINS, ETC. SHALL BE INSTALLED IN DRY CONDITIONS. DEWATERING MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER. COMPREHENSIVE PLANS FOR DEWATERING OPERATIONS, IF USED, SHALL BE SUBMITTED BY THE CONTRACTOR TO ENGINEER PRIOR TO INSTALLATION.
39. THE CONTRACTOR SHALL UTILIZE APPROPRIATE DEWATERING SYSTEMS AND TECHNIQUES TO MAINTAIN THE EXCAVATED AREA SUFFICIENTLY DRY FROM GROUNDWATER AND/OR SURFACE RUNOFF SO AS NOT TO ADVERSELY AFFECT CONSTRUCTION PROCEDURES OR CAUSE EXCESSIVE DISTURBANCE OF UNDERLYING NATURAL GROUND.
40. WATER FROM TRENCHES AND EXCAVATIONS SHALL NOT BE DISCHARGED INTO ANY SANITARY SEWER SYSTEM.
41. WATER FROM TRENCHES AND EXCAVATIONS SHALL NOT BE DISCHARGED DIRECTLY TO STORM DRAIN SYSTEMS. PROPER TREATMENT TO A SEDIMENTATION AREA IS TO TAKE PLACE PRIOR TO DISCHARGE TO ANY DRAINAGE SYSTEMS.
42. WATER FROM THE TRENCHES AND EXCAVATIONS SHALL BE DISPOSED OF IN SUCH A MANNER AS TO AVOID PUBLIC NUISANCE, INJURY TO PUBLIC HEALTH OR THE ENVIRONMENT, DAMAGE OR PUBLIC OR PRIVATE PROPERTY, OR DAMAGE TO PUBLIC OR PRIVATE PROPERTY, OR DAMAGE TO THE WORK COMPLETED OR IN PROGRESS. SILTATION BARRIERS SHALL BE UTILIZED AS NECESSARY.
43. THE CONTRACTOR SHALL REPAIR ANY DAMAGE RESULTING FROM THE FAILURE OF THE DEWATERING OPERATIONS OR FROM FAILURE TO MAINTAIN ALL THE AREAS OF WORK IN SUITABLE DRY CONDITION.
44. PRECAUTIONS SHALL BE TAKEN TO PROTECT NEW WORK FROM FLOODING DURING STORMS OR FROM OTHER CAUSES. GRADING IN THE AREAS SURROUNDING ALL EXCAVATIONS SHALL BE PROPERLY SLOPED TO PREVENT WATER FROM RUNNING INTO THE EXCAVATED AREA OR TO ADJACENT PROPERTIES. WHERE REQUIRED, TEMPORARY DITCHES SHALL BE PROVIDED FOR DRAINAGE. UPON COMPLETION OF THE WORK AND WHEN DIRECTED, ALL AREAS SHALL BE RESTORED IN A SATISFACTORY MANNER AND AS DIRECTED.

LYNN HAVEN UTILITY CONSTRUCTION NOTES:

WATER MAIN INSTALLATION RELATED ITEMS:

1. ALL WATER MAINS SHALL BE INSTALLED ACCORDING TO ENGINEERING PLANS AND SPECIFICATIONS
2. ALL VALVES AND MATERIALS SHALL COMPLY WITH AWWA (AMERICAN WATER WORKS ASSOCIATION) STANDARDS, LATEST EDITION.
3. ALL PVC WATER MAINS SIZES 4" TO 12" SHALL BE AWWA C900 DR 18, COLOR BLUE. ALL PVC WATER MAINS SIZES 3" AND LESS SHALL BE ASTM D2241 SDR 21, COLOR BLUE. ALL WATER SERVICE SIZES 2" AND LESS SHALL BE PE FLEXIBLE TUBING PE4710 SDR 9 CTS, COLOR BLUE. ALL DUCTILE IRON WATER MAINS SHALL BE SIZES 4" TO 12" SHALL BE AWWA C151 CLASS 350 WITH CEMENT LINING.
4. ALL MAIN LINE VALVES (2"-16") SHALL BE RESILIENT SEATED GATE VALVES.
5. ALL WATER MAINS SHALL HAVE A MINIMUM OF 36" COVER. IN DITCH BOTTOMS, WATER MAINS AND SERVICE LINES SHALL BE A MINIMUM OF 5.0' BELOW THE BOTTOM.
6. ALL MAINS AND SERVICE LINES SHALL BE DISINFECTED IN ACCORDANCE WITH AWWA C651. PRESSURE TESTING SHALL BE IN ACCORDANCE WITH AWWA C600. CONTRACTOR SHALL NOTIFY CITY'S ENGINEER WITHIN 48 HOURS OF PRESSURE TESTING. NO EXCEPTIONS. CITY'S ENGINEER SHALL BE PRESENT DURING BACTERIOLOGICAL SAMPLING AND PRESSURE TESTING. ALL WATER MAINS SHALL BE FLUSHED @ 3 FT PER SECOND AND 6 TIMES THE PIPE VOLUME SHALL BE FLUSHED.
7. ALL VALVE BOXES SHALL BE INSTALLED PER DETAIL SHOWN AND SET FLUSH TO FINISH GRADE. PRE-CAST VALVE PADS SHALL NOT BE USED. ALL VALVE BOX RISERS SHALL BE DUCTILE IRON AND NOT PVC.
8. ALL PIPE AND BACKFILL SHALL BE INSTALLED IN DRY CONDITIONS. WELL POINTING OR AWWA TYPE 5 PIPE EMBEDMENT MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER.
9. WHERE THERE IS LESS THAN 12" CLEARANCE BETWEEN PVC/DI PIPE AND OTHER PIPE OR SPECIFIED AREAS, THE PIPE SHALL BE CONCRETE ENCASED WITH 6" THICKNESS AROUND THE PIPE AND 6" CLEARANCE EACH WAY IN THE AXIAL DIRECTION.
10. THE CONTRACTOR SHALL USE RESTRAINED JOINT PIPE FOR ALL BENDS, TEES, VALVES, AND TRANSITION FITTINGS.
11. ALL WATER MAIN SHALL BE INSTALLED WITH INSULATED 10 GA. TRACER WIRE AND LOCATOR TAPE SHALL ON TOP OF ALL PIPE, WHICH INCLUDES SERVICE CONNECTIONS. ALL LOCATING WIRE SHALL BE CONNECTED AND SHALL TERMINATE IN VALVE BOXES AND METER BOXES AS SHOWN IN THE DETAILS. LOCATOR TAPE SHALL BE MARKED "POTABLE WATER BELOW" AND INSTALLED 12" TO 18" ABOVE THE PIPE
12. THE CONTRACTOR SHALL PROVIDE ALL FITTINGS, SLEEVES AND TRANSITION ADAPTERS AS NECESSARY TO COMPLETE THIS PROJECT.
13. CONTRACTOR SHALL BE RESPONSIBLE FOR TEMPORARY WATER SERVICE.

SANITARY SEWER FORCE MAIN INSTALLATION RELATED ITEMS:

1. ALL SANITARY SEWER FORCE MAINS SHALL BE INSTALLED ACCORDING TO ENGINEERING PLANS AND SPECIFICATIONS
2. ALL VALVES AND MATERIALS SHALL COMPLY WITH AWWA (AMERICAN WATER WORKS ASSOCIATION) STANDARDS, LATEST EDITION.
3. ALL PVC PIPE LESS THAN 4" SHALL BE ASTM D2241 SDR-21 (200PSI). ALL PVC PIPE SIZES 4" TO 8" SHALL BE AWWA C900 DR 18 (PC 235). ALL PVC PIPE SIZES 10" TO 12" SHALL BE AWWA C900 DR25 (PC 165). ALL PVC PIPE GREATER THAN 12" SHALL BE AWWA C905 DR25 (PC 160).
4. ALL HDPE PIPE LESS THAN 4" SHALL BE AWWA C901 SDR9 IPS. ALL HDPE PIPE LARGER THAN 4" SHALL BE AWWA C906 SDR11 IPS.
5. ALL SANITARY SEWER FORCE MAINS SHALL BE COLOR GREEN.
6. ALL FORCE MAIN VALVES (4"-12") SHALL BE EPOXY COATED RESILIENT SEATED GATE VALVES.
7. ALL SANITARY SEWER FORCE MAINS SHALL HAVE A MINIMUM OF 36" COVER. IN DITCH BOTTOMS, WATER MAINS AND SERVICE LINES SHALL BE A MINIMUM OF 5.0' BELOW THE BOTTOM.
8. ALL FORCE MAINS SHALL BE HYDROSTATICALLY TESTED PER AWWA STANDARD C600 (LATEST EDITION) AT 100 PSIG (MINIMUM) FOR TWO HOURS. CONTRACTOR SHALL NOTIFY CITY'S ENGINEER WITHIN 48 HOURS OF PRESSURE TESTING. NO EXCEPTIONS.
9. ALL FORCE MAINS SHALL BE FLUSHED @ 3 FT PER SECOND AND 6 TIMES THE PIPE VOLUME (MINIMUM).
10. ALL VALVE BOXES SHALL BE INSTALLED PER DETAIL SHOWN AND SET FLUSH TO FINISH GRADE. PRE-CAST VALVE PADS SHALL NOT BE USED. ALL VALVE BOX RISERS SHALL BE DUCTILE IRON AND NOT PVC.
11. ALL PIPE AND BACKFILL SHALL BE INSTALLED IN DRY CONDITIONS. WELL POINTING OR CLASS I PIPE EMBEDMENT MATERIAL (#67 CRUSHED OR GRATED LIMEROCK OR APPROVED EQUAL) MAY BE REQUIRED AT THE DIRECTION OF THE ENGINEER.
12. THE CONTRACTOR SHALL USE RESTRAINED JOINT PIPE FOR ALL BENDS, TEES, VALVES, AND TRANSITION FITTINGS.
13. ALL FORCE MAIN SHALL BE INSTALLED WITH INSULATED 12 GA. TRACER WIRE AND LOCATOR TAPE SHALL ON TOP OF ALL PIPE. ALL LOCATING WIRE SHALL BE CONNECTED AND SHALL TERMINATE IN VALVE BOXES AS SHOWN IN THE DETAILS. LOCATOR TAPE SHALL BE MARKED "SANITARY SEWER BELOW" AND INSTALLED 12" TO 18" ABOVE THE PIPE
14. THE CONTRACTOR SHALL PROVIDE ALL FITTINGS, SLEEVES AND TRANSITION ADAPTERS AS NECESSARY TO COMPLETE THIS PROJECT.

GRAVITY SEWER INSTALLATION RELATED ITEMS:

1. ALL GRAVITY SEWER PIPE, MANHOLES, SERVICE LATERALS AND PIPE BEDDING SHALL BE INSTALLED ACCORDING TO ENGINEERING DRAWINGS AND SPECIFICATIONS.
2. THE CONTRACTOR SHALL VERIFY HORIZONTAL AND VERTICAL LOCATIONS OF ALL EXISTING SEWER MAINS AND SEWER LATERALS TO BE CONNECTED TO PRIOR TO CONSTRUCTION.
3. ALL GRAVITY SEWER PIPE SHALL BE PVC UNLESS SPECIFIED OTHERWISE. ALL PVC PIPE SIZES 4" TO 15" AND DEPTHS UP TO 10 FEET SHALL BE ASTM D3034 SDR-35, DEPTHS GREATER 10 FEET SHALL BE ASTM D3034 SDR-26. ALL PVC PIPE SIZES 18" TO 27" AND DEPTHS UP TO 10 FEET SHALL BE F679 SDR-35, DEPTHS GREATER 10 FEET SHALL BE F679 SDR-26.
4. ALL SEWER SERVICE LATERAL CONNECTIONS SHALL BE INSTALLED A MINIMUM OF 5 FEET FROM THE NEAREST MANHOLE AND HAVE A 2 FEET MINIMUM SEPARATION BETWEEN MANHOLE. ALL SEWER SERVICE LATERALS CONNECTIONS TO NEW PVC SEWER PIPE SHALL BE MADE WITH GASKETED PVC TEE OR WYE FITTINGS. SADDLE CONNECTIONS SHALL NOT BE ALLOWED.
5. ALL SEWER SERVICE LATERALS SHALL BE 4 INCHES UNLESS NOTED OTHER WISE. THE MINIMUM SEWER SERVICE LATERAL PIPE SLOPE SHALL BE; 4 INCHES=2%; 6 INCHES= 1%; 8 INCHES=0.5%.
6. LOCATOR TAPE SHALL BE INSTALLED 12" TO 18" ABOVE ALL GRAVITY SEWER MAINS AND SERVICE LATERALS AND LOCATER TAPE SHALL BE MARKED "SANITARY SEWER BELOW".
7. ALL CONNECTIONS TO EXISTING SEWER MAINS AND LATERALS OF DISSIMILAR MATERIALS SHALL BE MADE WITH STRONG BACK FLEXIBLE REPAIR COUPLINGS.
8. MANHOLES SHALL BE A MINIMUM FOUR (4) FOOT DIAMETER AND CONSTRUCTED PER THE STANDARDS AND SPECIFICATIONS.
9. MANHOLE RING AND COVERS SHOULD BE 3 INCHES ABOVE GRADE IN UNPAVED AREAS. FIBERGLASS OR STAINLESS STEEL MANHOLE COVER INSERTS ARE REQUIRED AT ALL MANHOLES WITH RIM ELEVATIONS BELOW 7 FEET NGVD.
10. ALL MANHOLE BENCHES SHALL BE REPAIRED OR REPLACED AS NECESSARY TO HAVE SMOOTH TRANSITIONS THROUGH MANHOLE.
11. ALL GRAVITY SEWER PIPING SHALL BE TESTED IN ACCORDANCE WITH UNI-B-6-98, UNIBELL PVC PIPE CORPORATION. CONSTANT PRESSURE OF 4.0 PSIG (GREATER THAN THE GROUNDWATER BACK PRESSURE).
12. ALL GRAVITY SEWER PIPE (MAINS AND LATERALS) SHALL HAVE AIR TEST AND COLOR CCTV INSPECTION COMPLETED AND APPROVED BY THE ENGINEER PRIOR TO ROADWAY RESURFACING.
13. CCTV INSPECTIONS SHALL BE COMPLETED IMMEDIATELY AFTER FLUSHING WITH CLEAN WATER. ANY DEBRIS ENCOUNTERED WILL RESULT IN A FAILED INSPECTION AND PRESSURE TEST.
14. GRAVITY SEWER PIPE SAGS SHALL NOT EXCEED MORE THAN 10% OF THE PIPE DIAMETER.
15. ALL GRAVITY SEWER LINES MUST BE VIDEOED AFTER SYSTEM IS COMPLETE AND REVIEWED AND APPROVED BY THE CITY. VIDEOS MUST BE DIGITAL FORMAT WITH SYSTEM LOCATION MAP AND INCLUDE IDENTIFICATION FOR EACH MANHOLE AND SEGMENT OF PIPE. EACH JOINT SHOULD BE ABLE TO BE VISIBLY INSPECTED THE ENTIRE 360 DEGREES PERIMETER AND ALL LATERAL CONNECTIONS SHOULD BE DRAWN.

LYNN HAVEN UTILITY TRENCHES - TESTING NOTES AND SCHEDULE:

1. COPIES OF TEST REPORTS FOR ASPHALT, SUBGRADE, FILL, AND BACKFILL UNDER ROADWAYS AND STRUCTURES, AND UTILITY TRENCHES SHALL BE PROVIDED DIRECTLY TO THE ENGINEER FOR APPROVAL. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE TESTING AND INSURE THAT ALL APPLICABLE TESTS HAVE BEEN PERFORMED. FAILURE TO OBTAIN TEST RESULTS AT ANY POINT OF CONSTRUCTION WILL REQUIRE THE REMOVAL OF THE IMPROVEMENT AND REPLACEMENT BY THE CONTRACTOR. IT SHOULD BE NOTED THAT THE ENGINEER WILL REQUIRE COMPACTION TESTING IN ACCORDANCE WITH THE TESTING SCHEDULE FOR UTILITY TRENCH FILL AND BACKFILL.
2. TESTING REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE TESTING SCHEDULE CONTAINED WITHIN THESE PLANS. SELECTION AND CONTRACTING WITH THE TESTING FIRMS SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR TO COORDINATE AND SCHEDULE ALL TESTS.

DENSITY TESTING SCHEDULE:

ITEM	DENSITY REQUIREMENT	DENSITY TEST FREQUENCY
UTILITY TRENCH FILL & BACKFILL	90% STANDARD DENSITY	PER SOIL TYPE ONE PER 500 LF HORIZONTAL OR ONE PER 750 SY WITH A MINIMUM OF 3 TESTS, ALTERNATING LIFTS (12") ONE PER SOIL TYPE
FILL & BACKFILL UNDER ROADWAYS AND STRUCTURES	98% OF STANDARD DENSITY	PER SOIL TYPE ONE PER 200 LF HORIZONTAL OR ONE PER 750 SY WITH A MINIMUM OF 3 TESTS (PER SECTION OF WORK), ALTERNATING LIFTS (12") ONE PER SOIL TYPE
SUBGRADE UNDER ROADWAYS AND STRUCTURES	98% OF MAXIMUM DENSITY, MODIFIED PROCTOR	ONE PER SITE OR AT MATERIAL CHANGES PER SOIL TYPE ONE PER 200 LF HORIZONTAL OR ONE PER 750 SY WITH A MINIMUM OF 3 TESTS (PER SECTION OF WORK)
LIMEROCK BASE UNDER ROADWAYS AND STRUCTURES	98% OF MAXIMUM DENSITY, MODIFIED PROCTOR	ONE PER SITE OR AT MATERIAL CHANGES ONE PER 200 LF HORIZONTAL OR ONE PER 1200 SY WITH A MINIMUM OF 3 TESTS (PER SECTION OF WORK)

LYNN HAVEN SPECIAL NOTES:

1. CONTRACTOR SHALL EXCAVATE AND VERIFY THE EXISTING WATER MAIN LOCATIONS AND SIZE PRIOR TO SCHEDULING WATER OUTAGE FOR CONNECTION.
2. CONTRACTOR SHALL CUT AND REMOVE ASPHALT ROADWAYS AS NECESSARY TO INSTALL NEW WATER MAINS, WATER SERVICE LINES AND OTHER REQUIRED UTILITY IMPROVEMENTS.
3. ALL ROADWAYS AND DRIVEWAYS SHALL BE COMPACTED AND MAINTAINED DURING CONSTRUCTION SO RESIDENCE CAN HAVE ACCESS AT ALL TIMES. ALL TEMPORARY STABILIZATION SHALL BE SMOOTH AND LEVEL.
4. PIPE TESTING SHALL BE PERFORMED WITHIN IN ONE WEEK OF COMPLETING UTILITY IMPROVEMENTS IN ANY SECTION. SEE TEST SCHEDULE FOR MORE REQUIREMENTS.
5. ALL ROADWAY, DRIVEWAY AND SIDEWALK RESTORATION SHALL BE COMPLETED WITHIN ONE WEEK OF SUCCESSFUL PIPE TESTING IN ANY SECTION.
6. ALL DISTURBED YARD AND GRASSED AREAS SHALL BE SODDED WITH CENTIPEDE.
7. CONTRACTOR WILL BE RESPONSIBLE FOR REPLACING DAMAGED SECTIONS OF CONCRETE CURB.
8. COST FOR ALL NECESSARY REMOVAL AND REPLACEMENT OF DRIVEWAYS, SIDEWALKS, AND CURBS SPECIFIED ON CONSTRUCTION DRAWINGS SHALL BE INCLUDED IN LUMP SUM BID PRICE FOR EACH SECTION.
9. CONTRACTOR SHALL REMOVE AND REPLACE ALL TREES, SHRUBS AND IRRIGATION DAMAGED DURING CONSTRUCTION. CONTRACTOR SHALL SUBMIT A WORK CHANGE DIRECTIVE PRIOR TO CONSTRUCTION FOR ANY ADDITIONAL COST FOR WORK REQUIRED IN LANDSCAPED AREAS.
10. CONTRACTOR SHALL PROVIDE FITTINGS AS NECESSARY TO MAINTAIN WATER MAIN SEPARATION REQUIREMENTS. CONTRACTOR SHALL RESTRAIN ALL WATER MAINS JOINTS WHERE 6' HORIZONTAL SEPARATIONS CANNOT BE MAINTAINED BETWEEN EXITING SEWER AND STORMWATER UTILITIES.
11. CONTRACTOR SHALL COMPLETE WATER SERVICE CONNECTIONS TO EXISTING METERS AFTER NEW WATER MAINS HAVE BEEN CERTIFIED AND PLACED INTO SERVICE.
12. CONTRACTOR SHALL BE RESPONSIBLE FOR COORDINATION WITH UTILITY OWNER TO STABILIZE POWER POLES AS THEY ARE ENCOUNTERED THROUGHOUT THE ENTIRE PROJECT.
13. REMOVAL AND REPLACEMENT OF EXISTING DRIVEWAYS AND DRIVEWAY CULVERTS SHALL BE INCLUDED IN THE BID PRICE. NEW DRIVEWAYS SHALL MATCH EXISTING MATERIALS.
14. REMOVAL AND REPLACEMENT OF EXISTING SIGNS, MAILBOXES, SODDING, IRRIGATION, LANDSCAPING, STRUCTURES, ETC. SHALL BE INCLUDED IN THE BID PRICE.
15. COMPACTION TESTING SHALL BE PERFORMED AT EACH ROADWAY CUT FOR SERVICE LATERALS AND PER FDOT SPECIFICATIONS FOR ROAD RECONSTRUCTION AND SHALL BE INCLUDED IN THE BID PRICE.
13. BASE AND BACKFILL MATERIALS SHALL BE EITHER OF THE SAME TYPE AND COMPOSITION AS THE MATERIALS REMOVED, OR OF EQUAL OR GREATER STRUCTURAL ADEQUACY. MATERIALS CONTAMINATED WITH DELETERIOUS SUBSTANCES DURING EXCAVATION SHALL NOT BE USED FOR FILL.
14. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EXISTING UTILITIES INCLUDING RECONNECTING ALL WATER AND SEWER SERVICES DAMAGED/BROKEN DURING THE INSTALLATION ON ALL PROPOSED UTILITIES AND OTHER IMPROVEMENTS, WITH NO ADDITIONAL COST TO THE OWNER.
15. THE CONTRACTOR SHALL AVOID OR MINIMIZE THE DISTURBANCE OF EXISTING TREES DURING THE INSTALLATION OF ALL WATER MAINS AND OTHER PROPOSED IMPROVEMENTS WITHIN THE RIGHT OF WAYS AND EASEMENTS. IF TREES ARE DAMAGED OR REQUIRED TO BE MOVED, THEY SHALL BE REPLACED WITH TREES OF SIMILAR SIZE AND SPECIES WITH NO ADDITIONAL COST TO THE OWNER. IF APPLICABLE, THE CONTRACTOR MAY USE THE DIRECTIONAL BORE (FOR PRESSURE PIPE) OR JACK AND BORE (FOR GRAVITY PIPE) METHODS IN LIEU OF OPEN CUTTING TO AVOID IMPACTS AT CONTRACTORS EXPENSE.
16. THE CONTRACTOR SHALL DIRECTIONAL BORE AND INSTALL HDPE PIPE UNDER ROADWAYS, DRIVEWAYS, DITCH CROSSINGS, ETC. AS SHOWN ON THE PLANS. CONTRACTOR SHALL DETERMINE NECESSARY HDPE PIPE LENGTHS, BORE ENTRY/ EXIT POINTS AND BORE PITS TO COMPLETE DIRECTIONAL BORE INSTALLATIONS.
17. CONTRACTOR SHALL REMOVE AND DISPOSE OF ALL EXISTING WATER MAINS AND SERVICE LINES EXCAVATED DURING THE INSTALLATION OF THE PROPOSED WATER SYSTEM IMPROVEMENTS. ALL ABANDONED SECTIONS OF NON-EXCAVATED EXISTING WATER MAIN SHALL BE FLOWABLE FILLED. ALL DEMOLITION AND FLOWABLE FILL WORK SHALL BE INCLUDED IN THE BID PRICE.
18. CONTRACTOR SHALL PROVIDE THE ENGINEER WITH A MAINTENANCE OF TRAFFIC PLAN PRIOR TO COMMENCEMENT OF CONSTRUCTION. SIGNAGE SHALL BE MAINTAINED AT ALL TIMES AND SHALL BE INCLUDED IN THE BID PRICE.
19. CONTRACTOR SHALL BE RESPONSIBLE FOR ALL BY-PASS PUMPING AND SHALL BE INCLUDED IN THE BID PRICE.
20. CONTRACTOR SHALL PROVIDE DE-WATERING AS NECESSARY FOR THE INSTALLATION OF ALL PROPOSED IMPROVEMENTS. ALL DE-WATERING SHALL BE INCLUDED IN THE BID PRICE.
21. CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING THE NPDES PERMIT AND MAINTAINING THE SILT FENCE, INLET PROTECTION, AND ANY OTHER EROSION CONTROL NECESSARY IN THE NPDES PERMIT GUIDELINES.
22. THE CONTRACTOR SHALL VIDEO THE ENTIRE ROUTE PRIOR TO CONSTRUCTION AND PROVIDE A COPY TO THE ENGINEER PRIOR TO CONSTRUCTION.

REV	DATE	BY	REVISIONS
NOT			RELEASED FOR CONSTRUCTION BY: DATE:

SCALE: AS NOTED
DESIGNED BY: JDC
DRAWN BY: JAH
REVIEWED BY: CBF
ISSUE DATE: APRIL 2019
ACAD FILE NAME: 14460e1.dwg

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GENERAL NOTES
MISSISSIPPI AND COLORADO
DRAINAGE IMPROVEMENTS
LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
James M. Southall, P.E. 39637
Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
Jeffrey C. Petermann, P.E. 77540
DPR CERTIFICATION #EB-7806

SHEET NUMBER
C1

PROJECT NUMBER
14460

Date: Apr 09, 2019, 7:51am User ID: jah File: P:\14460 Mississippi & Colorado Drainage Impts\1 CIVIL3DFolder\Drawings\14460e1.dwg

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG

SCALE: 1" = 50'

0' 25' 50' 100'

SCALE: 1" = 50'

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS KEY MAP Sheet C2

REV	DATE	BY	REVISIONS
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KEY MAP
MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
James M. Southall, P.E. 39637
Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
Jeffrey C. Petermann, P.E. 77540

DPR CERTIFICATION #EB-7806

SHEET NUMBER
C2

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14460

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SCALE: 1" = 30'

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS AERIAL WITH EXISTING CONDITIONS SURVEY Sheet C3

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AERIAL WITH EXISTING CONDITIONS SURVEY MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS

LYNN HAVEN, FLORIDA

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SHEET NUMBER
C3

PROJECT NUMBER
14460

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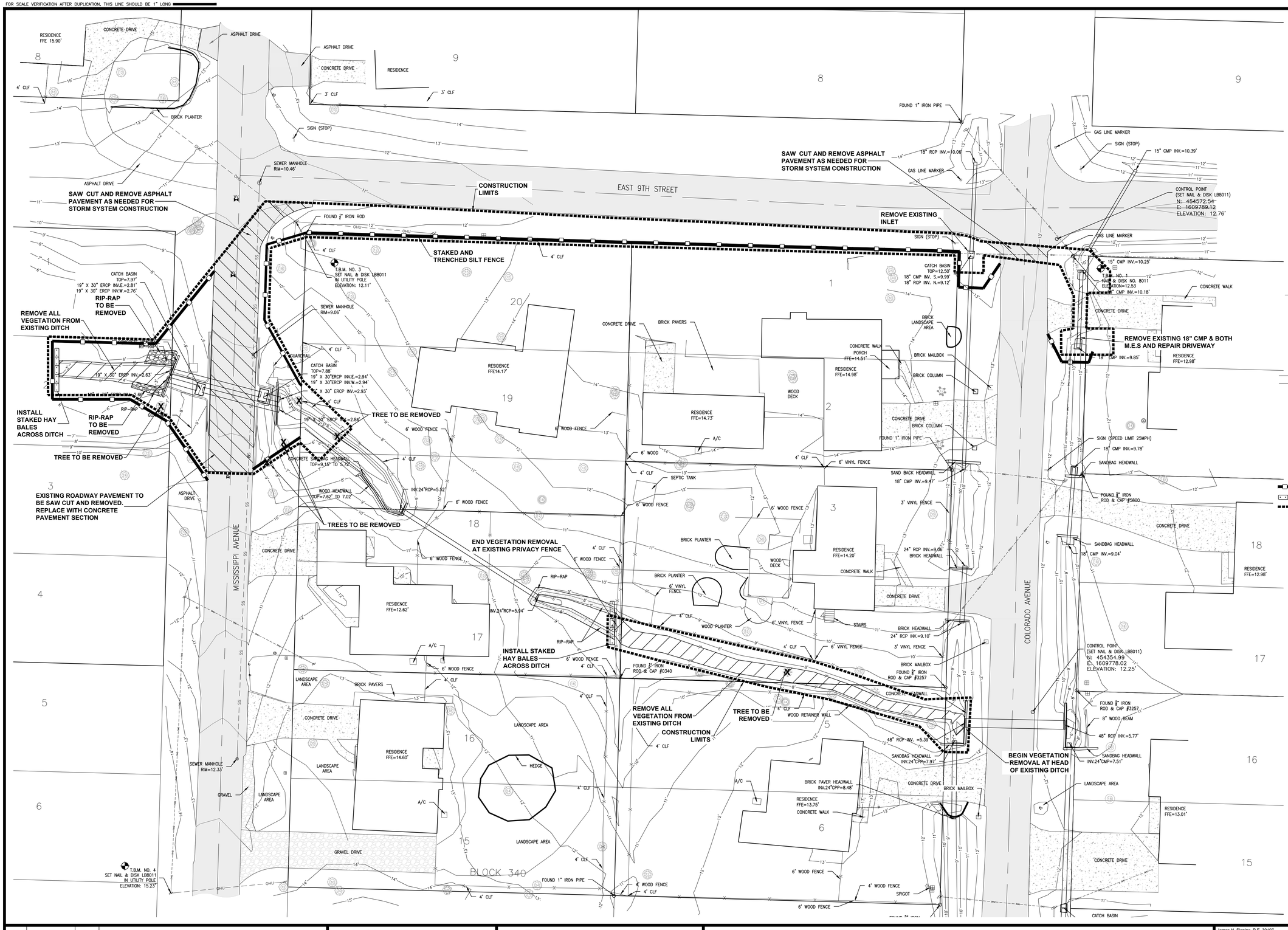

LEGEND

No.	= NUMBER
#	= NUMBER
INV.	= INVERT
ELEV.	= ELEVATION
FFE	= FINISHED FLOOR ELEVATION
PVC	= POLYVINYL CHLORIDE
CMP	= CORRUGATED METAL PIPE
CPP	= CORRUGATED PLASTIC PIPE
RCP	= REINFORCED CONCRETE PIPE
ERCP	= ELLIPTICAL REINFORCED CONCRETE PIPE
A/C	= AIR CONDITIONER
CLF	= CHAIN LINK FENCE
	= LAMP POLE
	= TRAFFIC SIGN
	= BILLBOARD SIGN
	= WATER VALVE
	= WATER METER
	= FIRE HYDRANT
	= SANITARY SEWER VALVE
	= SANITARY SEWER MANHOLE
	= STORM SEWER MANHOLE
	= IRRIGATION CONTROL VALVE
	= CLEANOUT
	= MAILBOX
	= TEMPORARY BENCHMARK
	= CONCRETE BOLLARD / PILING
	= GUY ANCHOR
	= UTILITY POLE
	= TELEPHONE BOX
	= TELEVISION BOX
10.38	= SPOT ELEVATION AT "X"
10'	= CONTOUR ELEVATION AT 1' INTERVALS
	= EXISTING PINE TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING OAK TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING MAGNOLIA TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING CEDAR TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING HOLLEY TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING PALM TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING TREE, TYPE UNKNOWN (DIAMETER SHOWN IN INCHES)
SS	= BURIED SANITARY SEWER GRAVITY LINE
OHU	= OVERHEAD UTILITY LINE
	= EXISTING ASPHALT PAVEMENT
	= EXISTING CONCRETE
	= EXISTING GRAVEL
	= LIMITS OF VEGETATION CLEARING
	= LIMITS OF ASPHALT PAVEMENT REMOVAL
	= SILT FENCE
	= HAY BALES
	= CONSTRUCTION LIMITS

SURVEY PROVIDED BY:
DEWBERRY
203 ABERDEEN PARKWAY
PANAMA CITY, FL 32405
PHONE: (850) 522-0644

SCALE: 1" = 20'

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS EXISTING CONDITIONS, DEMOLITION AND EROSION CONTROL PLAN Sheet C4

REV	DATE	BY	REVISIONS
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SCALE: AS NOTED
DESIGNED BY: JDC
DRAWN BY: JAH
REVIEWED BY: CBF
ISSUE DATE: APRIL 2019
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(850)763-5200 Fax (850)769-0730 pe@panhandleengineering.com

EXISTING CONDITIONS, DEMOLITION AND EROSION CONTROL PLAN
MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
James M. Southall, P.E. 39637
Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
Jeffrey C. Petermann, P.E. 77540

DPR CERTIFICATION #EB-7806

SHEET NUMBER
C4

PROJECT NUMBER
14460

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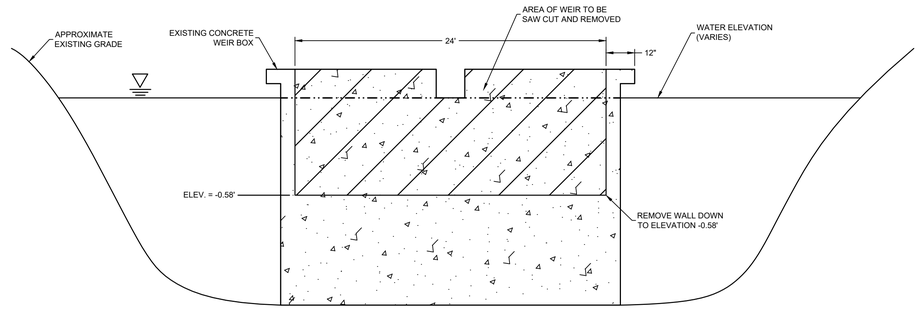
FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG

PLAN VIEW
SCALE: 1" = 10'



SECTION D–D
NOT TO SCALE

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS EXISTING CONDITIONS, DEMOLITION AND EROSION CONTROL PLAN Sheet C5

Date: Apr 09, 2019, 7:52am User ID: jah File: P:\14460 Mississippi & Colorado Drainge Imptst1 CIVIL3D\Folder\Drawings\14460e1.dwg

REV	DATE	BY	REVISIONS
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EXISTING CONDITIONS, DEMOLITION AND EROSION CONTROL PLAN
MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
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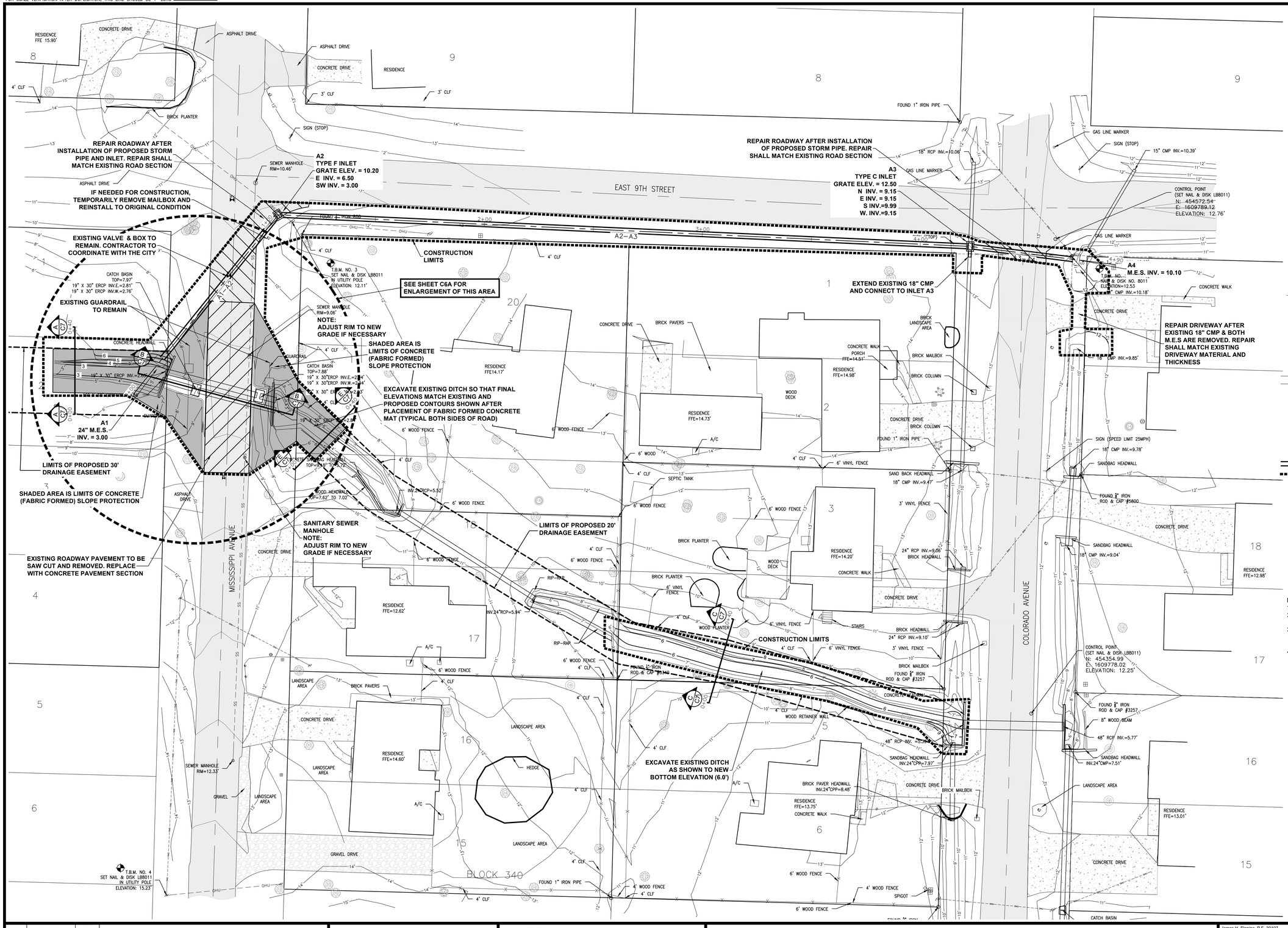
DPR CERTIFICATION #EB–7806

SHEET NUMBER
C5

PROJECT NUMBER
14460

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG



LEGEND

No.	= NUMBER
#	= NUMBER
INV.	= INVERT
ELEV.	= ELEVATION
FFE	= FINISHED FLOOR ELEVATION
PVC	= POLYVINYL CHLORIDE
CMP	= CORRUGATED METAL PIPE
CPP	= CORRUGATED PLASTIC PIPE
RCP	= REINFORCED CONCRETE PIPE
ERCP	= ELLIPTICAL REINFORCED CONCRETE PIPE
A/C	= AIR CONDITIONER
CLF	= CHAIN LINK FENCE
	= LAMP POLE
	= TRAFFIC SIGN
	= BILLBOARD SIGN
	= WATER VALVE
	= WATER METER
	= FIRE HYDRANT
	= SANITARY SEWER VALVE
	= SANITARY SEWER MANHOLE
	= STORM SEWER MANHOLE
	= IRRIGATION CONTROL VALVE
	= CLEANOUT
	= MAILBOX
	= TEMPORARY BENCHMARK
	= CONCRETE BOLLARD / PILING
	= GUY ANCHOR
	= UTILITY POLE
T	= TELEPHONE BOX
TV	= TELEVISION BOX
10.38	= SPOT ELEVATION AT "X"
10'	= CONTOUR ELEVATION AT 1' INTERVALS
	= EXISTING PINE TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING OAK TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING MAGNOLIA TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING CEDAR TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING HOLLEY TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING PALM TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING TREE, TYPE UNKNOWN (DIAMETER SHOWN IN INCHES)
SS	= BURIED SANITARY SEWER GRAVITY LINE
OHU	= OVERHEAD UTILITY LINE
	= EXISTING ASPHALT PAVEMENT
	= EXISTING CONCRETE
	= EXISTING GRAVEL
	= PROPOSED STORM INLET
	= PROPOSED STORM PIPE
	= CONSTRUCTION LIMITS
	= LIMITS OF PROPOSED 4" FABRIC FORMED CONCRETE SLOPE PROTECTION
	= LIMITS OF CONCRETE PAVEMENT
	= LIMITS OF ASPHALT PAVEMENT REPLACEMENT
C / C7	= SECTION ID = SHEET NUMBER

NOTES:
1. SEE SHEET C7 FOR STORM PIPE PROFILE AND CROSS SECTIONS.
2. SEE SHEET C6A FOR ENLARGEMENT DETAIL OF MISSISSIPPI AVENUE IMPROVEMENTS.
3. CONTRACTOR SHALL PROVIDE VIDEO INSPECTION OF ALL INSTALLED STORM PIPING FOR APPROVAL PRIOR TO FINAL PAVING AND GRADING ABOVE.
4. ALL DISTURBED AREAS SHALL BE GRASSED. HYDROSEED ALL AREAS 4:1 AND FLATTER. SOD AREAS STEEPER THAN 4:1. ALL SOD TO BE STAGGERED AND PINNED.

SCALE: 1" = 20'

REV	DATE	BY	REVISIONS

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GRADING AND DRAINAGE PLAN MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS

LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
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Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
Jeffrey C. Petermann, P.E. 77540

DPR CERTIFICATION #EB–7806

SHEET NUMBER C6

PROJECT NUMBER 14460

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS GRADING AND DRAINAGE PLAN Sheet C6

Date: Apr 09, 2019, 7:52am User ID: jah File: P:\14460 Mississippi & Colorado Drainage Imps\s1 CIVIL\3DFolder\Drawings\14460e1.dwg

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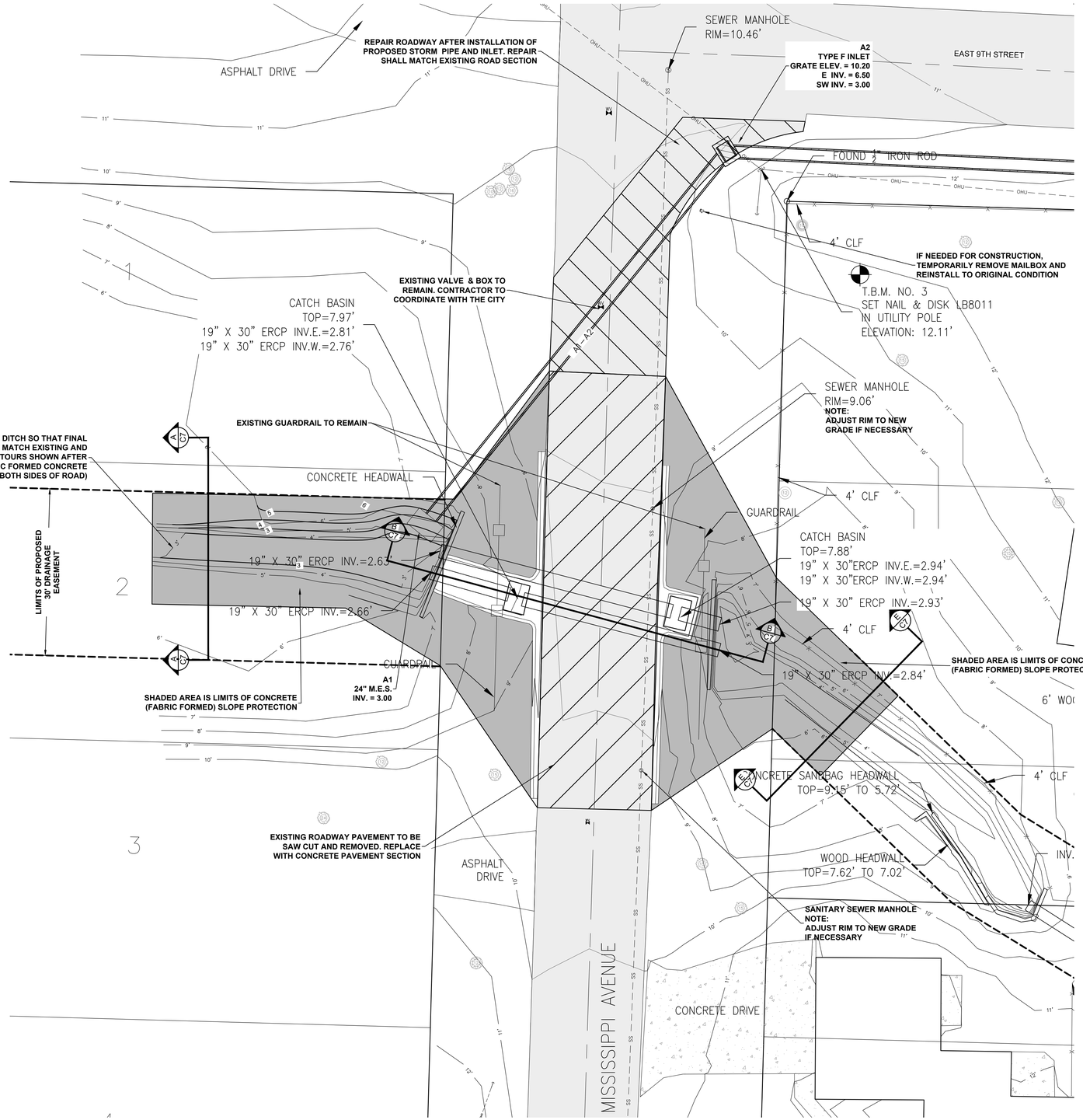

MISSISSIPPI AVENUE ENLARGEMENT PLAN

SCALE: 1" = 10'

LEGEND

No.	= NUMBER
#	= NUMBER
INV.	= INVERT
ELEV.	= ELEVATION
FFE	= FINISHED FLOOR ELEVATION
PVC	= POLYVINYL CHLORIDE
CMP	= CORRUGATED METAL PIPE
CPP	= CORRUGATED PLASTIC PIPE
RCP	= REINFORCED CONCRETE PIPE
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A/C	= AIR CONDITIONER
CLF	= CHAIN LINK FENCE
	= LAMP POLE
	= TRAFFIC SIGN
	= BILLBOARD SIGN
	= WATER VALVE
	= WATER METER
	= FIRE HYDRANT
	= SANITARY SEWER VALVE
	= SANITARY SEWER MANHOLE
	= STORM SEWER MANHOLE
	= IRRIGATION CONTROL VALVE
	= CLEANOUT
	= MAILBOX
	= TEMPORARY BENCHMARK
	= CONCRETE BOLLARD / PILING
	= GUY ANCHOR
	= UTILITY POLE
	= TELEPHONE BOX
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10.38	= SPOT ELEVATION AT "X"
10'	= CONTOUR ELEVATION AT 1' INTERVALS
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	= EXISTING HOLLEY TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING PALM TREE (DIAMETER SHOWN IN INCHES)
	= EXISTING TREE, TYPE UNKNOWN (DIAMETER SHOWN IN INCHES)
SS	= BURIED SANITARY SEWER GRAVITY LINE
OHU	= OVERHEAD UTILITY LINE
	= EXISTING ASPHALT PAVEMENT
	= EXISTING CONCRETE
	= EXISTING GRAVEL
	= PROPOSED STORM INLET
	= PROPOSED STORM PIPE
	= CONSTRUCTION LIMITS
	= LIMITS OF PROPOSED 4" FABRIC FORMED CONCRETE SLOPE PROTECTION
	= LIMITS OF CONCRETE PAVEMENT
	= LIMITS OF ASPHALT PAVEMENT REPLACEMENT
C / C7	= SECTION ID = SHEET NUMBER

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MISSISSIPPI AVENUE ENLARGEMENT PLAN
MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
LYNN HAVEN, FLORIDA

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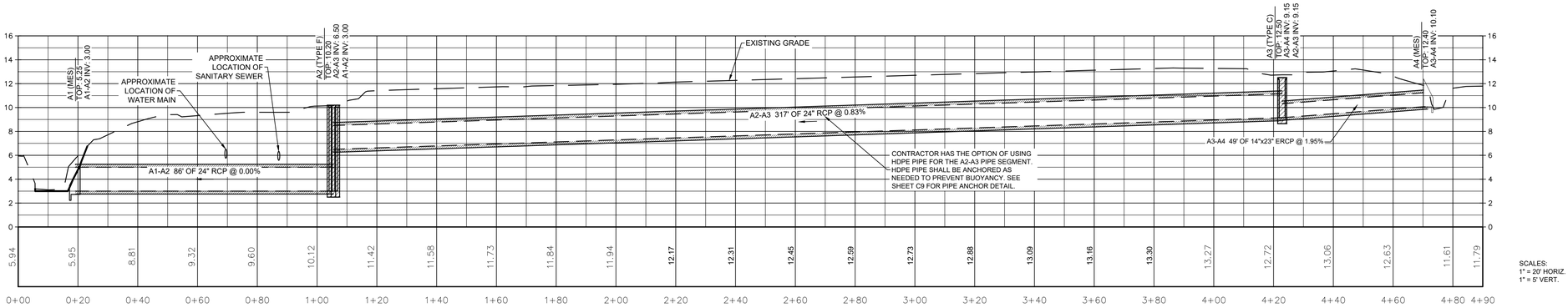
DPR CERTIFICATION #EB-7806

SHEET NUMBER
C6A

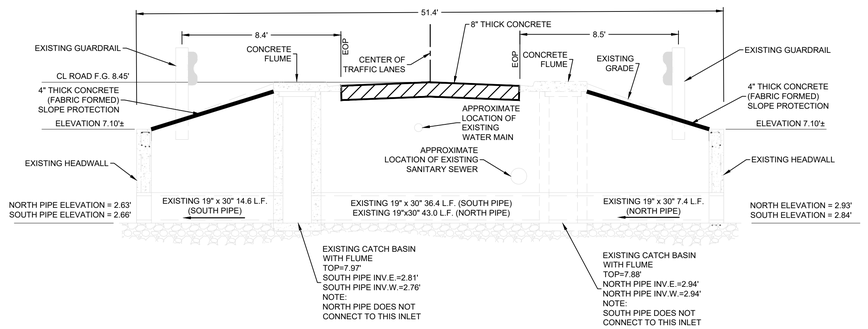
PROJECT NUMBER
14460

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS MISSISSIPPI AVENUE ENLARGEMENT PLAN Sheet C6A

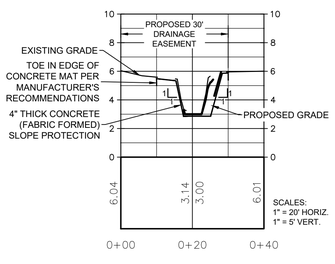
Date: Apr 09, 2019, 7:52am User ID: jah File: P:\14460 Mississippi & Colorado Drainge Impts\1 CIVIL\3D Folder\Drawings\14460e1.dwg



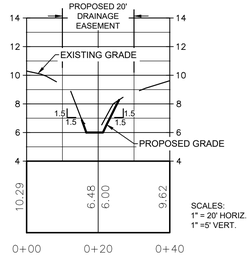
STORM SEWER PROFILE (A1-A4)



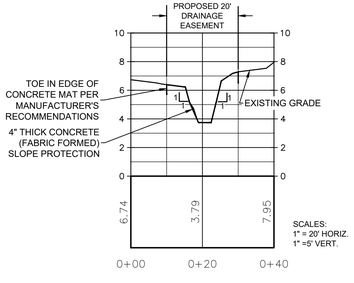
SECTION B-B
NOT TO SCALE



SECTION A-A



SECTION C-C



SECTION E-E

REV	DATE	BY	REVISIONS
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SCALE: AS NOTED
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STORM SEWER PROFILE AND CROSS SECTIONS MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS

LYNN HAVEN, FLORIDA

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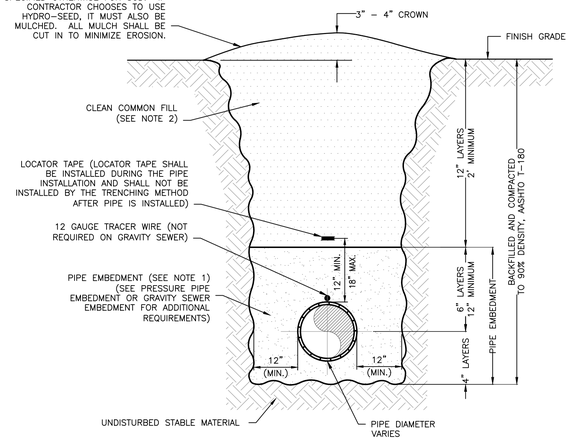
DPR CERTIFICATION #EB-7806

SHEET NUMBER
C7

PROJECT NUMBER
14460

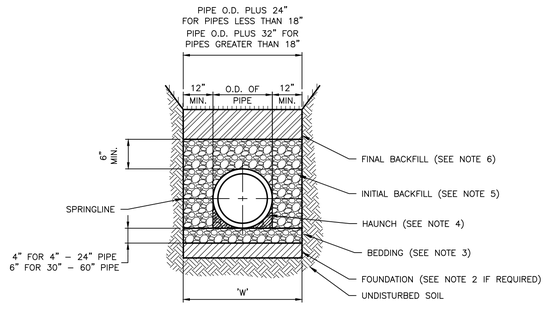
14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS STORM SEWER PROFILE AND CROSS SECTIONS Sheet C7

Date: Apr 09, 2019, 7:52am User ID: jah File: P:\14460 Mississippi & Colorado Drainge Imptst\1 CIVIL3D\Folder\Drawings\14460e1.dwg



NOTES:
1. PRESSURE PIPE EMBEDMENT SHALL BE ASTM CLASS II MATERIAL (MINIMUM), GRAVITY PIPE EMBEDMENT SHALL BE ASTM CLASS I MATERIAL, OR PIPE EMBEDMENT MATERIAL AS SPECIFIED BY ENGINEER. PRESSURE PIPE SHALL BE BEDDED AND COMPACTED IN ACCORDANCE WITH AWWA C605-TYPE 2 BEDDING REQUIREMENTS FOR PVC PIPE AND AWWA C600-TYPE 2 BEDDING REQUIREMENTS FOR DUCTILE IRON PIPE. GRAVITY PIPES SHALL BE BEDDED AND COMPACTED IN ACCORDANCE WITH ASTM D2321.
2. CLEAN COMMON BACKFILL SHALL BE ASTM CLASS III MATERIAL OR BETTER. ASTM CLASS IV OR V MATERIALS SHALL BE USED FOR BACKFILL. CLEAN COMMON BACKFILL SHALL PLACED IN LAYERS NOT TO EXCEED 12 INCH THICKNESS AND EACH LAYER SHALL BE COMPACTED TO 90% STANDARD DENSITY.
3. NO TRASH, RUBBISH, ROCKS OR DEBRIS WILL BE ALLOWED IN TRENCHES.
4. ALL PIPE SHALL BE INSTALLED IN DRY TRENCHES.
5. CONTRACTOR MAY BE REQUIRED BY THE ENGINEER TO DE-WATER PIPE TRENCH, IF NECESSARY.
6. BACK FILL FOR PIPE IN WET TRENCHES SHALL BE ASTM CLASS I MATERIAL (#67 CRUSHED OR GRATED LIMEROCK) AND COMPACTED IN THE TRENCH TO A LEVEL ABOVE THE GROUND WATER.
7. AT THE ENGINEERS DISCRETION, THE CONTRACTOR SHALL SUBSTITUTE SELECT BACKFILL IN LIEU OF NATIVE SOILS FOR A UNIT PRICE SPECIFIED IN THE CONTRACTOR'S BID FORM.
8. THE CONTRACTOR WILL BE COMPENSATED FOR SELECT BACKFILL ONLY IF DIRECTED BY THE ENGINEER IN WRITING. THE ENGINEER MAY ISSUE A FIELD ORDER WITH WRITTEN CONFIRMATION WITHIN 24 HOURS.

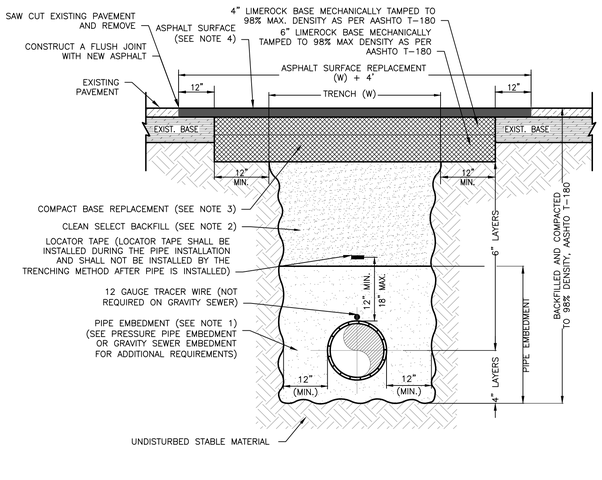
DETAIL TYPICAL PIPE INSTALLATION - UNIMPROVED SURFACE
SCALE: N.T.S.



NOTES:

1. INSTALLATION: ALL PIPE SYSTEMS SHALL BE INSTALLED IN ACCORDANCE WITH THE LATEST EDITION OF ASTM D2321 AND MANUFACTURING INSTALLATION GUIDE.
2. FOUNDATION: UNSTABLE TRENCH BOTTOM MATERIAL AND / OR ROCK SHALL BE EXCAVATED TO A DEPTH SPECIFIED BY THE ENGINEER AND REPLACED WITH A SUITABLE MATERIAL PER THE ENGINEER REQUIREMENTS. IN LIEU OF OVER-EXCAVATION, THE DESIGN ENGINEER MAY SPECIFY THE USE OF GEOTEXTILE TO STABILIZE THE TRENCH BOTTOM.
3. BEDDING: SUITABLE MATERIAL SHALL BE ASTM CLASS I (#67 CRUSHED OR GRATED LIMEROCK). MINIMUM BEDDING THICKNESS SHALL BE 4" FOR 4" - 24" DIAMETER PIPE, AND 6" FOR 30" - 60" DIAMETER PIPE, AND MECHANICALLY COMPACTED TO 95% STANDARD DENSITY.
4. HAUNCH: SUITABLE MATERIAL SHALL BE ASTM CLASS I (#67 CRUSHED OR GRATED LIMEROCK). HAND FILL VOIDS AND COMPACT TO 90% STANDARD DENSITY.
5. INITIAL BACKFILL: SUITABLE MATERIAL SHALL BE ASTM CLASS I (#67 CRUSHED OR GRATED LIMEROCK). INITIAL BACKFILL SHALL BE INSTALLED IN 6" LIFTS AND MECHANICALLY COMPACTED TO 95% STANDARD DENSITY. INITIAL BACKFILL SHALL EXTEND TO NOT LESS THAN 6" ABOVE THE TOP OF THE PIPE.
6. FINAL BACKFILL: SUITABLE MATERIAL SHALL BE CLASS III OR BETTER FOR UNIMPROVED SURFACES AND INSTALLED PER TYPICAL PIPE INSTALLATION DETAIL. SUITABLE MATERIAL SHALL BE ASTM CLASS II OR BETTER FOR ROADWAY SURFACES AND INSTALLED PER DETAIL.
7. WET TRENCHES: SUITABLE MATERIAL SHALL BE ASTM CLASS I (#67 CRUSHED OR GRATED LIMEROCK). BACKFILL SHALL BE INSTALLED IN 6" LIFTS AND MECHANICALLY TAMPED TO 90% MAXIMUM DENSITY AND SHALL EXTEND TO NOT LESS THAN 6" ABOVE THE TO OF THE PIPE OR TO THE CURRENT GROUND WATER LEVEL.
8. MINIMUM COVER: FOR ALL H-25 TRAFFIC BEARING APPLICATIONS, A MINIMUM COVER OF 12" IS REQUIRED FOR 4" - 48" DIAMETER PIPE, AND 24" FOR 60" DIAMETER PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE RIGID PAVEMENT SECTION OR TO THE BOTTOM OF FLEXIBLE PAVEMENT SYSTEM.

DETAIL GRAVITY SEWER PIPE EMBEDMENT
SCALE: N.T.S.

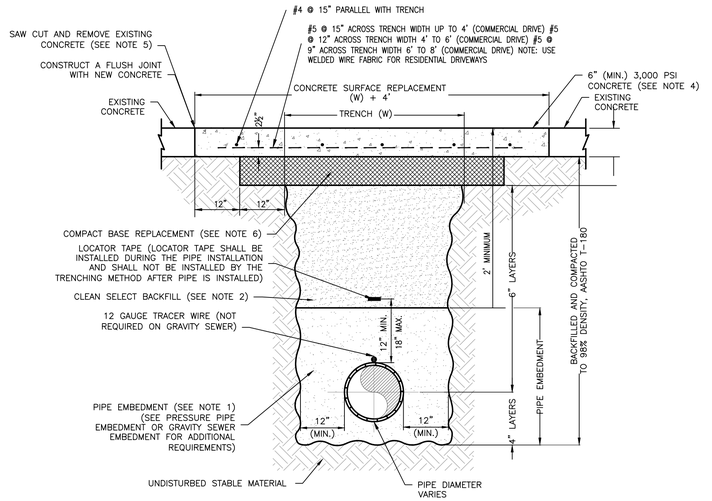


NOTES:
1. PRESSURE PIPE EMBEDMENT SHALL BE ASTM CLASS II MATERIAL (MINIMUM), GRAVITY PIPE EMBEDMENT SHALL BE ASTM CLASS I MATERIAL, OR PIPE EMBEDMENT MATERIAL AS SPECIFIED BY ENGINEER. PRESSURE PIPE SHALL BE BEDDED AND COMPACTED IN ACCORDANCE WITH AWWA C605-TYPE 2 BEDDING REQUIREMENTS FOR PVC PIPE AND AWWA C600-TYPE 2 BEDDING REQUIREMENTS FOR DUCTILE IRON PIPE. GRAVITY PIPES SHALL BE BEDDED AND COMPACTED IN ACCORDANCE WITH ASTM D2321.
2. CLEAN SELECT BACKFILL SHALL BE ASTM CLASS II MATERIAL OR BETTER. ASTM CLASS III, IV, OR V MATERIALS SHALL NOT BE USED, FOR BACKFILL. CLEAN SELECT BACKFILL SHALL BE PLACED IN LAYERS NOT TO EXCEED 6 INCH THICKNESS AND EACH LAYER SHALL BE MECHANICALLY COMPACTED TO 98% STANDARD DENSITY.
3. COMPACT BASE MATERIAL SHALL BE ASTM CLASS I MATERIAL (#67 CRUSHED OR GRATED LIMEROCK). BASE SHALL BE 10" MINIMUM THICKNESS AND MECHANICAL TAMPED TO 98% MAX. MODIFIED PROCTOR DENSITY.
4. ASPHALT SURFACE TO BE SAME TYPE & THICKNESS (1 1/2" MIN.) AS EXISTING PAVEMENT.
5. NO TRASH, RUBBISH, ROCKS OR DEBRIS WILL BE ALLOWED IN TRENCHES.
6. ALL PIPE SHALL BE INSTALLED IN DRY TRENCHES.
7. CONTRACTOR MAY BE REQUIRED BY THE ENGINEER TO DE-WATER PIPE TRENCH, IF NECESSARY.
8. BACK FILL FOR PIPE IN WET TRENCHES SHALL BE CLASS I MATERIAL (#67 CRUSHED OR GRATED LIMEROCK) AND COMPACTED IN THE TRENCH TO A LEVEL ABOVE THE GROUND WATER.
9. AT THE ENGINEERS DISCRETION, THE CONTRACTOR SHALL SUBSTITUTE SELECT BACKFILL IN LIEU OF NATIVE SOILS FOR A UNIT PRICE SPECIFIED IN THE CONTRACTOR'S BID FORM.
10. THE CONTRACTOR WILL BE COMPENSATED FOR SELECT BACKFILL ONLY IF DIRECTED BY THE ENGINEER IN WRITING. THE ENGINEER MAY ISSUE A FIELD ORDER WITH WRITTEN CONFIRMATION WITHIN 24 HOURS.
11. TEMPORARY PATCHES SHALL BE INSTALLED AND MAINTAINED TO PROVIDE A SMOOTH ALL WEATHER SURFACE AT ALL TIMES. PERMANENT REPLACEMENT TO BE MADE AS SOON AS POSSIBLE.

DETAIL REMOVAL AND REPLACEMENT OF ASPHALT
SCALE: N.T.S.

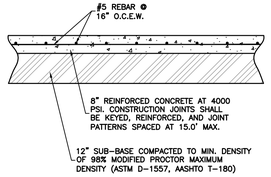
EMBEDMENT MATERIALS (CLASS I, II AND III) SHALL CONFORM TO PARAGRAPHS 6.1.1, 6.1.2 AND 6.1.3, ASTM D-2321 WHICH READS AS FOLLOWS:
1. CLASS I - ANGULAR, 1/4 TO 1-1/2 IN. GRADED STONE, INCLUDING A NUMBER OF FILL MATERIALS THAT HAVE REGIONAL SIGNIFICANCE SUCH AS CRUSHED STONE, CRUSHED GRAVEL, AND CRUSHED SHELLS.
2. CLASS II - COARSE SANDS AND GRAVELS WITH MAXIMUM PARTICLE SIZE OF 1-1/2 IN., INCLUDING VARIOUSLY GRADED SANDS AND GRAVELS CONTAINING SMALL PERCENTAGES OF FINES, GENERALLY GRANULAR AND NON-COHESIVE, EITHER WET OR DRY. SOIL TYPES GW, GP, SW, AND SP ARE INCLUDED IN THIS CLASS.
3. CLASS III - FINE SAND AND CLAYEY GRAVELS, INCLUDING FINE SANDS, SAND-CLAY MIXTURES, AND GRAVEL-CLAY MIXTURES. SOIL TYPES GM, GC, SM AND SC ARE INCLUDED IN THIS CLASS.
4. SOIL CLASSIFICATION IS IN CONFORMANCE WITH UNIFIED SOIL CLASSIFICATION SYSTEM ASTM DESIGNATION D-2487 AND D-2488. NATIVE SOILS MEETING THE REQUIREMENTS FOR CLASS II AND CLASS III MATERIALS MAY BE ACCEPTED BY THE ENGINEER.

SPECIFICATIONS EMBEDMENT MATERIALS
SCALE: N.T.S.

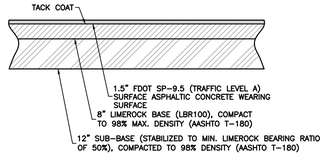


NOTES:
1. PRESSURE PIPE EMBEDMENT SHALL BE ASTM CLASS II MATERIAL (MINIMUM), GRAVITY PIPE EMBEDMENT SHALL BE ASTM CLASS I MATERIAL, OR PIPE EMBEDMENT MATERIAL AS SPECIFIED BY ENGINEER. PRESSURE PIPE SHALL BE BEDDED AND COMPACTED IN ACCORDANCE WITH AWWA C605-TYPE 2 BEDDING REQUIREMENTS FOR PVC PIPE AND AWWA C600-TYPE 2 BEDDING REQUIREMENTS FOR DUCTILE IRON PIPE. GRAVITY PIPES SHALL BE BEDDED AND COMPACTED IN ACCORDANCE WITH ASTM D2321.
2. CLEAN SELECT BACKFILL SHALL BE ASTM CLASS II MATERIAL OR BETTER. ASTM CLASS III, IV, OR V MATERIALS SHALL NOT BE USED, FOR BACKFILL. CLEAN SELECT BACKFILL SHALL BE PLACED IN LAYERS NOT TO EXCEED 6 INCH THICKNESS AND EACH LAYER SHALL BE MECHANICALLY COMPACTED TO 98% STANDARD DENSITY.
3. COMPACT BASE MATERIAL SHALL BE ASTM CLASS I MATERIAL (#67 CRUSHED OR GRATED LIMEROCK). FOR COMMERCIAL DRIVEWAYS AND ASTM CLASS II OR BETTER FOR RESIDENTIAL DRIVEWAYS. BASE SHALL BE 8" MINIMUM THICKNESS AND MECHANICAL TAMPED TO 98% MAX. MODIFIED PROCTOR DENSITY FOR COMMERCIAL AND RESIDENTIAL DRIVEWAYS.
4. CONCRETE THICKNESS TO MATCH EXISTING OR BE 6" MINIMUM, WHICHEVER IS GREATER.
5. IF ANY PART OF SAWCUT REMOVAL COMES WITHIN 5 FT. OF EXISTING JOINT ON EITHER SIDE OF TRENCH, REMOVE AND REPLACE TO EXISTING JOINT.
6. NO TRASH, RUBBISH, ROCKS OR DEBRIS WILL BE ALLOWED IN TRENCHES.
7. ALL PIPE SHALL BE INSTALLED IN DRY TRENCHES.
8. CONTRACTOR MAY BE REQUIRED BY THE ENGINEER TO DE-WATER PIPE TRENCH, IF NECESSARY.
9. BACK FILL FOR PIPE IN WET TRENCHES SHALL BE CLASS I MATERIAL (#67 CRUSHED OR GRATED LIMEROCK) AND COMPACTED IN THE TRENCH TO A LEVEL ABOVE THE GROUND WATER.
10. AT THE ENGINEERS DISCRETION, THE CONTRACTOR SHALL SUBSTITUTE SELECT BACKFILL IN LIEU OF NATIVE SOILS FOR A UNIT PRICE SPECIFIED IN THE CONTRACTOR'S BID FORM.
11. THE CONTRACTOR WILL BE COMPENSATED FOR SELECT BACKFILL ONLY IF DIRECTED BY THE ENGINEER IN WRITING. THE ENGINEER MAY ISSUE A FIELD ORDER WITH WRITTEN CONFIRMATION WITHIN 24 HOURS.
12. TEMPORARY PATCHES SHALL BE INSTALLED AND MAINTAINED TO PROVIDE A SMOOTH ALL WEATHER SURFACE AT ALL TIMES. PERMANENT REPLACEMENT TO BE MADE AS SOON AS POSSIBLE.

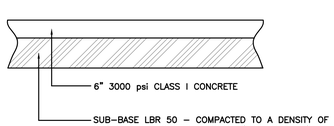
DETAIL REMOVAL AND REPLACEMENT OF CONCRETE DRIVE
SCALE: N.T.S.



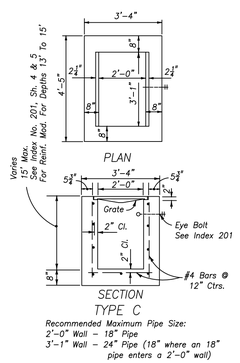
CONCRETE PAVEMENT TYPICAL SECTION
NOT TO SCALE

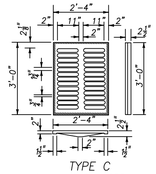


ASPHALTIC PAVEMENT TYPICAL SECTION
NOT TO SCALE

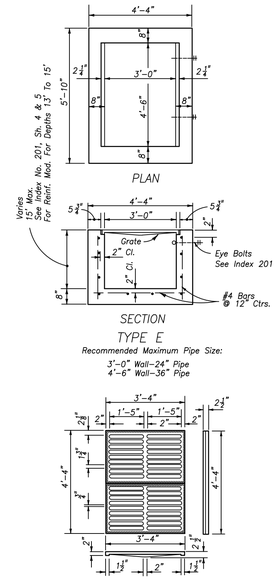


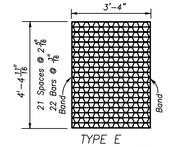
CONCRETE DRIVEWAY TYPICAL SECTION
NOT TO SCALE





FDOT TYPE C INLET
NOT TO SCALE





NOTE:
STRUCTURES C-2, C-3, C-4, C-5, AND D-1 SHOULD REQUIRE A ROUND BOTTOM PER FDOT INDEX 232

FDOT TYPE E INLET
NOT TO SCALE

REV	DATE	BY	REVISIONS
NOT	RELEASED FOR CONSTRUCTION	BY:	DATE:

SCALE:	AS NOTED
DESIGNED BY:	JDC
DRAWN BY:	JAH
REVIEWED BY:	CBF
ISSUE DATE:	APRIL 2019
ACAD FILE NAME:	14460e1.dwg

PANHANDLE ENGINEERING, INC.
ENVIRONMENTAL ENGINEERS • CIVIL ENGINEERS • LAND PLANNERS
3005 South Highway 77 Lynn Haven, Florida 32444
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DETAILS MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
LYNN HAVEN, FLORIDA

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DPR CERTIFICATION #EB-7806

SHEET NUMBER
C8

PROJECT NUMBER
14460

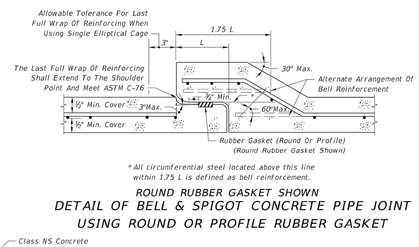
14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS DETAILS Sheet C8

Date: Apr 09, 2019, 7:52am User ID: jah File: P:\14460 Mississippi & Colorado Drainge Imprts\1 CIVIL\3D Folder\Drawings\14460e1.dwg

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG

SCHEDULE OF BELL REINFORCEMENT
Classes II,III,IV,V; Wall A,B,C

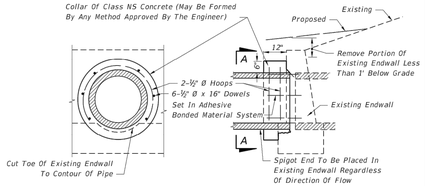
Nominal Pipe Diameter	Design Bell Reinforcement in² per foot	Maximum Reinforcement Under Tolerance in² per foot
15"	0.07	0.010
18"	0.07	0.010
24"	0.09	0.010
30"	0.12	0.010
36"	0.14	0.010
42"	0.16	0.010
48"	0.19	0.011
54"	0.21	0.012
60"	0.23	0.0135
66"	0.26	0.015
72"	0.28	0.0165
78"	0.30	0.018
84"	0.33	0.0195
90"	0.35	0.021
96"	0.37	0.0225
102"	0.40	0.024
108"	0.42	0.0255



* All circumferential steel located above this line within 1.75 L is defined as bell reinforcement.

ROUND RUBBER GASKET SHOWN

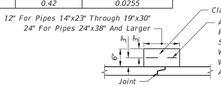
DETAIL OF BELL & SPIGOT CONCRETE PIPE JOINT USING ROUND OR PROFILE RUBBER GASKET



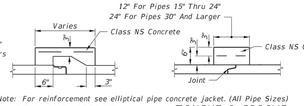
SECTION AA LONGITUDINAL SECTION

Note: Cost for removal and disposal of portions of top and toe of existing endwall and cost of concrete, reinforcing steel and construction of collar to be included in the contract unit price for pipe culvert.

CONCRETE COLLAR FOR EXTENSION OF EXISTING PIPE CULVERTS



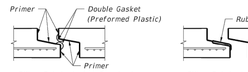
CONCRETE JACKET



Note: For reinforcement see elliptical pipe concrete jacket. (All Pipe Sizes)

BELL AND SPIGOT TONGUE & GROOVE

DISSIMILAR JOINTS



Filter Fabric Jacket Required

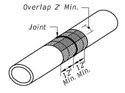
PREFORMED PLASTIC JOINT (BEFORE PULL-UP)

Filter Fabric Jacket Required

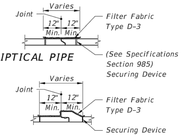
PROFILE RUBBER GASKET (BEFORE PULL-UP)

Cost of concrete jacket or filter fabric jacket to be included in cost of elliptical concrete pipe culverts.

ELLIPTICAL CONCRETE PIPE JOINTS



ELLIPTICAL PIPE SHOWN ISOMETRIC VIEW

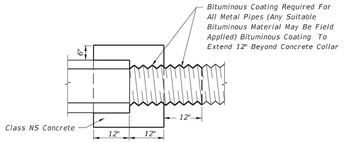


ELLIPTICAL PIPE ROUND PIPE PIPE SECTIONS

Cost of filter fabric jacket to be included in cost of pipe culverts.

FOR ALL PIPE TYPES - CONCRETE PIPE SHOWN

FILTER FABRIC JACKET



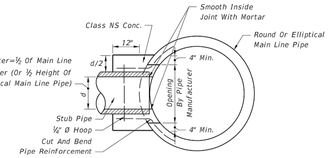
Note: Cost of concrete and bituminous coating to be included in contract unit price for either new pipe or Mitered End Section.

Alternate connection must be approved by the State Drainage Engineer.

A concrete jacket shall not be used to join:
a) metal pipe of dissimilar materials
b) flexible pipe when the minimum cover required in accordance with Index No. 205 cannot be obtained

DISSIMILAR TYPES

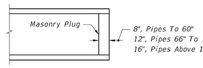
CONCRETE JACKET FOR CONNECTING DISSIMILAR TYPES OF PIPE AND CONCRETE PIPES WITH DISSIMILAR JOINTS



Max. Diameter=½ Of Main Line Pipe Diameter (Or ½ Height Of Elliptical Main Line Pipe)

Cost of concrete and steel to be included in contract unit price for pipe culvert.

CONCRETE COLLAR FOR JOINING MAINLINE PIPE AND STUB PIPE



Note: Unless otherwise called for in the plans, the cost of plugging pipes to be included in contract unit price for new pipe.

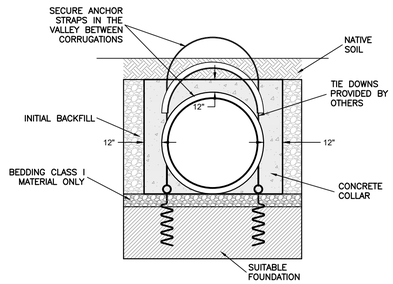
PIPE PLUG

LAST REVISION	DESCRIPTION:	FDOT FY 2017-18 DESIGN STANDARDS	MISCELLANEOUS DRAINAGE DETAILS	INDEX NO.	SHEET NO.
07/01/14	REVISION			280	1 of 3

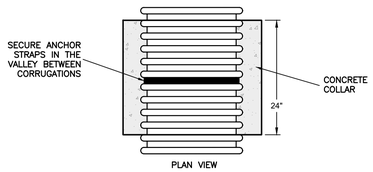
10/17/2016 10:37:28 AM

NOTES:

1. ALL JOINTS SHALL BE ANCHORED AS SHOWN BELOW
2. CONCRETE COLLARS SHALL BE INSTALLED AT EACH JOINT WITH ANCHORS

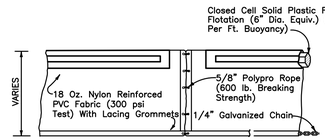


SECTION VIEW



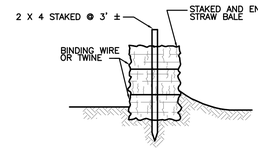
PLAN VIEW

PIPE ANCHORING SYSTEMS DETAIL
NOT TO SCALE

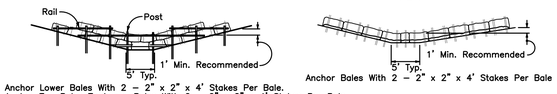


TYPE 1

TURBIDITY CURTAIN DETAILS
REQ'D ON ALL CONTINUOUS FLOW OUTFALLS



STRAW BALE BARRIER INSTALLATION DETAIL
NOT TO SCALE



Anchor Lower Bales With 2 – 2" x 2" x 4' Stakes Per Bale.
Anchor Top Bales To Lower Bales With 2 – 2" x 2" x 4' Stakes Per Bale.

ELEVATION

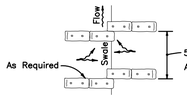
Anchor Bales With 2 – 2" x 2" x 4' Stakes Per Bale

ELEVATION

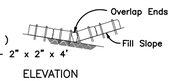
Application and Spacing: The use of Types I & II bale barriers should be limited to the conditions outlined in Chart I, Sheet 1 of 3, Index No. 102

TYPE II TYPE I

BARRIER FOR UNPAVED DITCHES
NOT TO SCALE

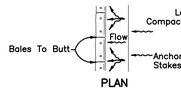


PLAN



ELEVATION

TO BE USED AT SELECTED SITES WHERE THE NATURAL GROUND SLOPES TOWARD THE TOE OF SLOPE

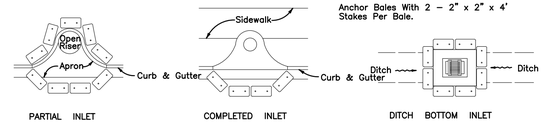


PLAN

ELEVATION

TO BE USED AT SELECTED SITES WHERE THE NATURAL GROUND SLOPES AWAY FROM THE TOE OF SLOPE

BARRIERS FOR FILL SLOPES
NOT TO SCALE



PROTECTION AROUND INLETS OR SIMILAR STRUCTURES
NOT TO SCALE

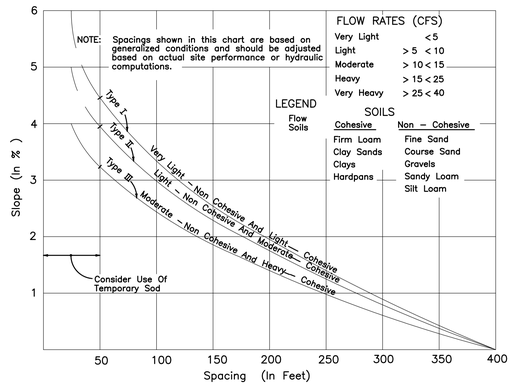
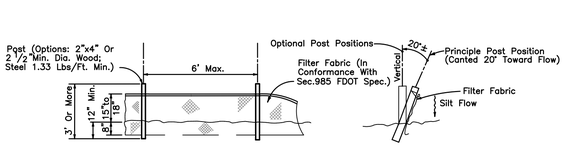


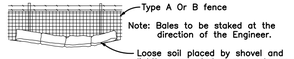
CHART I

RECOMMENDED SPACING FOR TYPE I AND TYPE II HAY BALE BARRIERS, AND TYPE III SILT FENCES

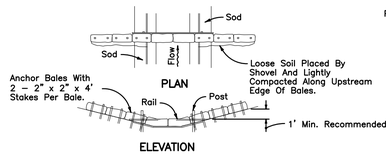


Note: Silt Fence to be paid for under the contract unit price for Staked Silt Fence (LF).

TYPE III SILT FENCE
NOT TO SCALE

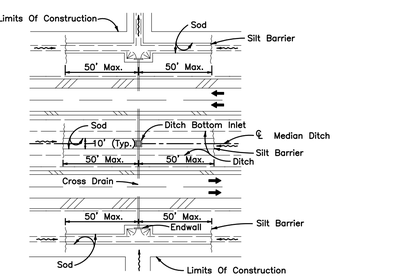


BALES BACKED BY FENCE
NOT TO SCALE



Spacing: Bale barriers for paved ditches should be spaced in accordance with Chart I, Sheet 1 of 3, Index No. 102

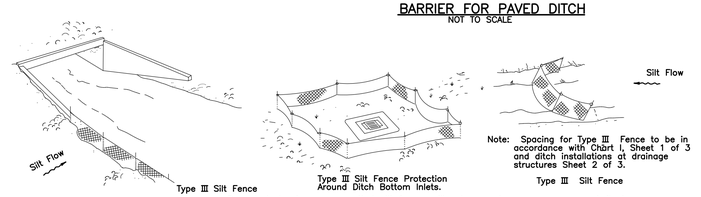
BARRIER FOR PAVED DITCH
NOT TO SCALE



DITCH INSTALLATIONS AT DRAINAGE STRUCTURES
NOT TO SCALE

EROSION CONTROL NOTES:

1. Erosion control measures will be utilized throughout the construction phase of this project to restrict any turbid runoff from leaving the construction site.
2. Control of sediment–laden runoff shall be provided with hay bales and/or geotech style fabrics. All control measures shall be properly located and constructed to prevent sediment transport. The means for retaining the sediments will be maintained by the contractor until permanent improvements are complete.
3. The contractor is responsible for treating all onsite stormwater drainage as required to meet the criteria of 62–3 Florida Administrative Code, F.A.C. prior to discharge.
4. All catch basins, inlets and accesses to underground stormwater systems shall be protected in accordance with the attached details.
5. The contractor is responsible for complying with the terms and conditions of any stormwater permits that may apply (Florida Department of Environmental Protection, Florida Department of Transportation, Bay County, Water Management District, etc.).



Note: Spacing for Type III Fence to be in accordance with Chart I, Sheet 1 of 3 and ditch installations at drainage structures Sheet 2 of 3.

Do not deploy in a manner that silt fences will act as a dam across permanent flowing watercourses. Silt fences are to be used at upland locations and turbidity barriers used at permanent bodies of water.

SILT FENCE APPLICATIONS
NOT TO SCALE

REV	DATE	BY	REVISIONS

NOT RELEASED FOR CONSTRUCTION BY: DATE:

SCALE: AS NOTED
DESIGNED BY: JDC
DRAWN BY: JAH
REVIEWED BY: CBF
ISSUE DATE: APRIL 2019
ACAD FILE NAME: 14460e1.dwg

PANHANDLE ENGINEERING, INC.
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DETAILS MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
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Jeffrey C. Petermann, P.E. 77540

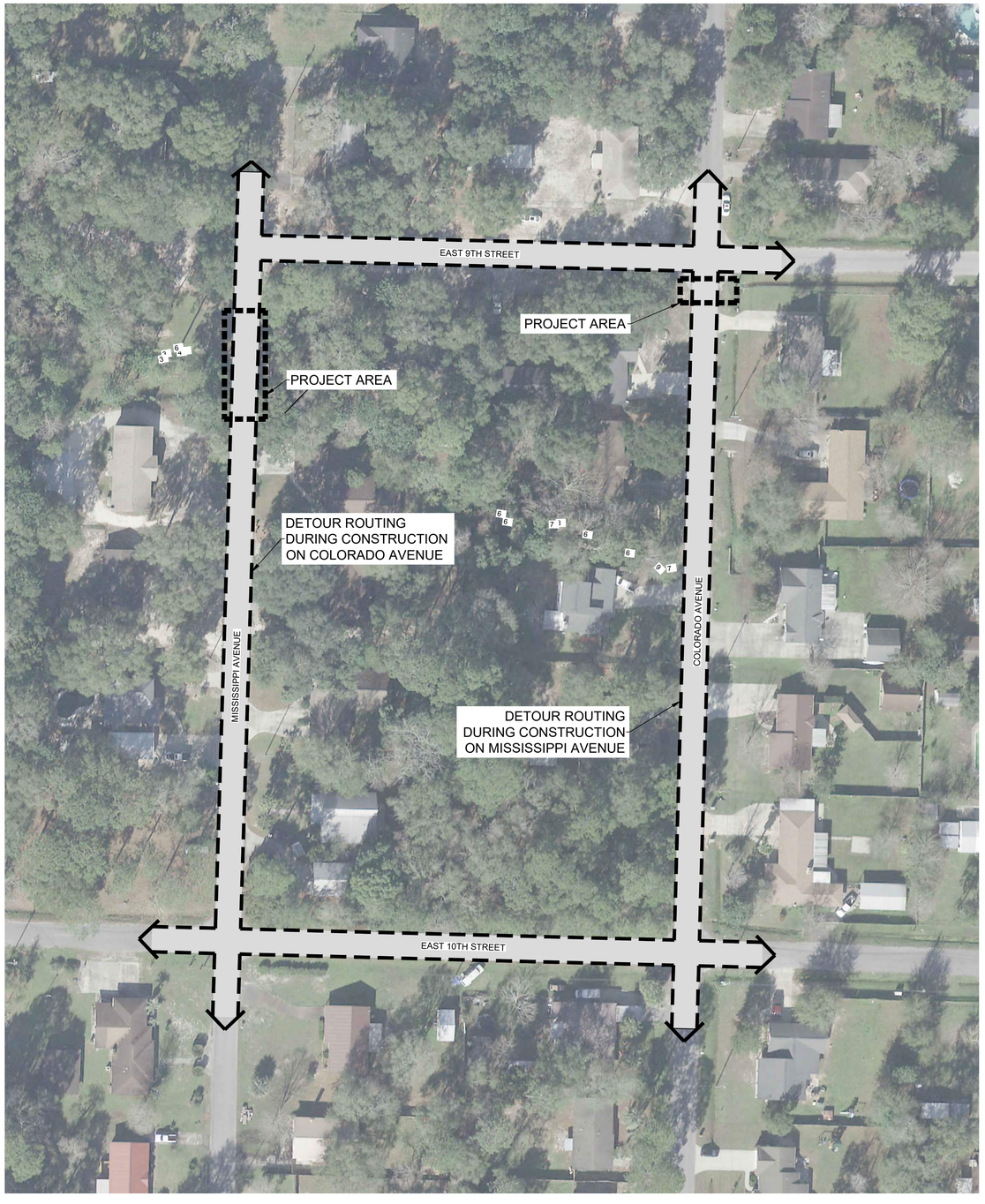
DPR CERTIFICATION #EB–7806

SHEET NUMBER C9

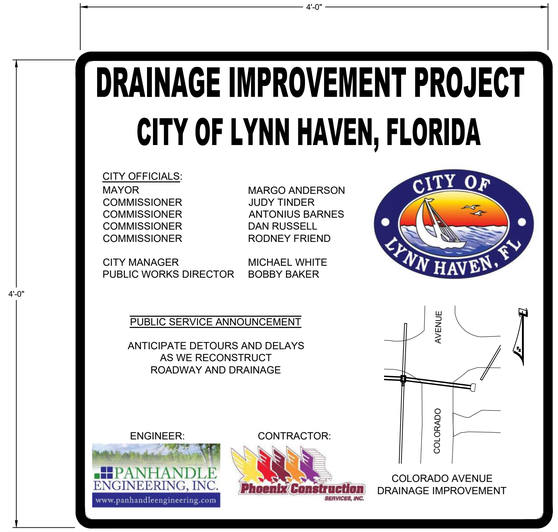
PROJECT NUMBER 14460

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS DETAILS Sheet C9

Date: Apr 09, 2019, 7:52am User ID: jah File: P:\14460 Mississippi & Colorado Drainge Imptst\1 CIVIL\3D Folder\Drawings\14460e1.dwg



DETOUR ROUTING PLAN
NOT TO SCALE



NOTE:
TWO (2) SIGNS TO BE FABRICATED LOCATE WITH 4" x 4" x 10' POSTS (2) AT LOCATIONS SELECTED BY THE ENGINEER.

PROPOSED PROJECT SIGN
NOT TO SCALE

REV	DATE	BY	REVISIONS
NOT	RELEASED FOR CONSTRUCTION	BY:	DATE:

SCALE: AS NOTED
DESIGNED BY: JDC
DRAWN BY: JAH
REVIEWED BY: CBF
ISSUE DATE: APRIL 2019
ACAD FILE NAME: 14460e1.dwg

PANHANDLE ENGINEERING, INC.
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MOT DETOUR AND SIGNAGE PLAN
MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS
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DPR CERTIFICATION #EB–7806

SHEET NUMBER
C10

PROJECT NUMBER
14460

14460 MISSISSIPPI AND COLORADO DRAINAGE IMPROVEMENTS MOT DETOUR AND SIGNAGE PLAN Sheet C10

Date: Apr 09, 2019, 7:53am User ID: jah File: P:\14460 Mississippi & Colorado Drainge Imprts\1 CIVIL3DFolder\Drawings\14460e1.dwg

Appendix H

Example Photographs of Deficient Maintenance


DRIVEWAY CULVERT
CRUSHED AND CLOGGED
WITH SILT AND DEBRIS


ROADWAY CULVERT
PARTIALLY FILLED WITH
SEDIMENT AND DEBRIS


ROADSIDE INLET FILLED WITH SEDIMENT AND DEBRIS


INLET OPENING PARTIALLY BLOCKED WITH VEGETATION


CULVERT EXTENDS INTO FLOW
PATH OF ADJACENT CULVERT


ROADWAY CULVERT PARTIALLY
BLOCKED WITH VEGETATION


PRIMARY DRAINAGE DITCH
IN NEED OF MODERATE
VEGETATION CLEARING


PRIMARY DRAINAGE DITCH IN NEED OF
SIGNIFICANT VEGETATION CLEARING
AND CHANNEL RE-FORMING

Appendix I

Recommended Improvements Map

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG

ACME LANE: RECOMMEND CONSTRUCTION OF ROADSIDE DRAINAGE SYSTEM WITH OUTFALL TO MOWAT DITCH SYSTEM

RAILROAD DITCH SYSTEM: RECOMMEND IMPROVEMENTS FROM 26TH STREET TO NORTH BAY

BELAIRE ESTATES: RECOMMEND FLUSH AND INSPECTION OF EXISTING PIPE SYSTEM SERVING THIS AREA

MINNESOTA AVE.: RECOMMEND FLUSH AND INSPECTION OF EXISTING PIPE SYSTEM SERVING THIS AREA

BRADLEY CIRCLE: RECOMMEND CONSTRUCTION OF ROADSIDE DRAINAGE SYSTEM WITH OUTFALL TO HARRISON DITCH SYSTEM

KRYSTAL LANE: RECOMMEND FLUSH AND INSPECTION OF EXISTING PIPE SYSTEM SERVING THIS AREA

WEST BASIN

SCALE: 1" = 600'

LEGEND

- CITY LIMITS
- 7/4/2013 STRUCTURAL FLOODING
- 4/2/2014 STRUCTURAL FLOODING

REV	DATE	BY	REVISIONS

NOT RELEASED FOR CONSTRUCTION BY: DATE:

SCALE:	AS NOTED
DESIGNED BY:	JDC
DRAWN BY:	jdm
REVIEWED BY:	JDC
ISSUE DATE:	JANUARY 2019
ACAD FILE NAME:	Recommended Improvements Map Appendix I.dwg

PANHANDLE ENGINEERING, INC.
ENVIRONMENTAL ENGINEERS ● CIVIL ENGINEERS ● LAND PLANNERS
3005 South Highway 77 Lynn Haven, Florida 32444
(850)763-5200 Fax (850)769-0730 www.panhandleengineering.com

RECOMMENDED IMPROVEMENTS MAP - WEST STORMWATER MASTER PLAN

LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
James M. Southall, P.E. 39637
Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
J. Doug Crook, P.E. 66556

DPR CERTIFICATION #EB-7806

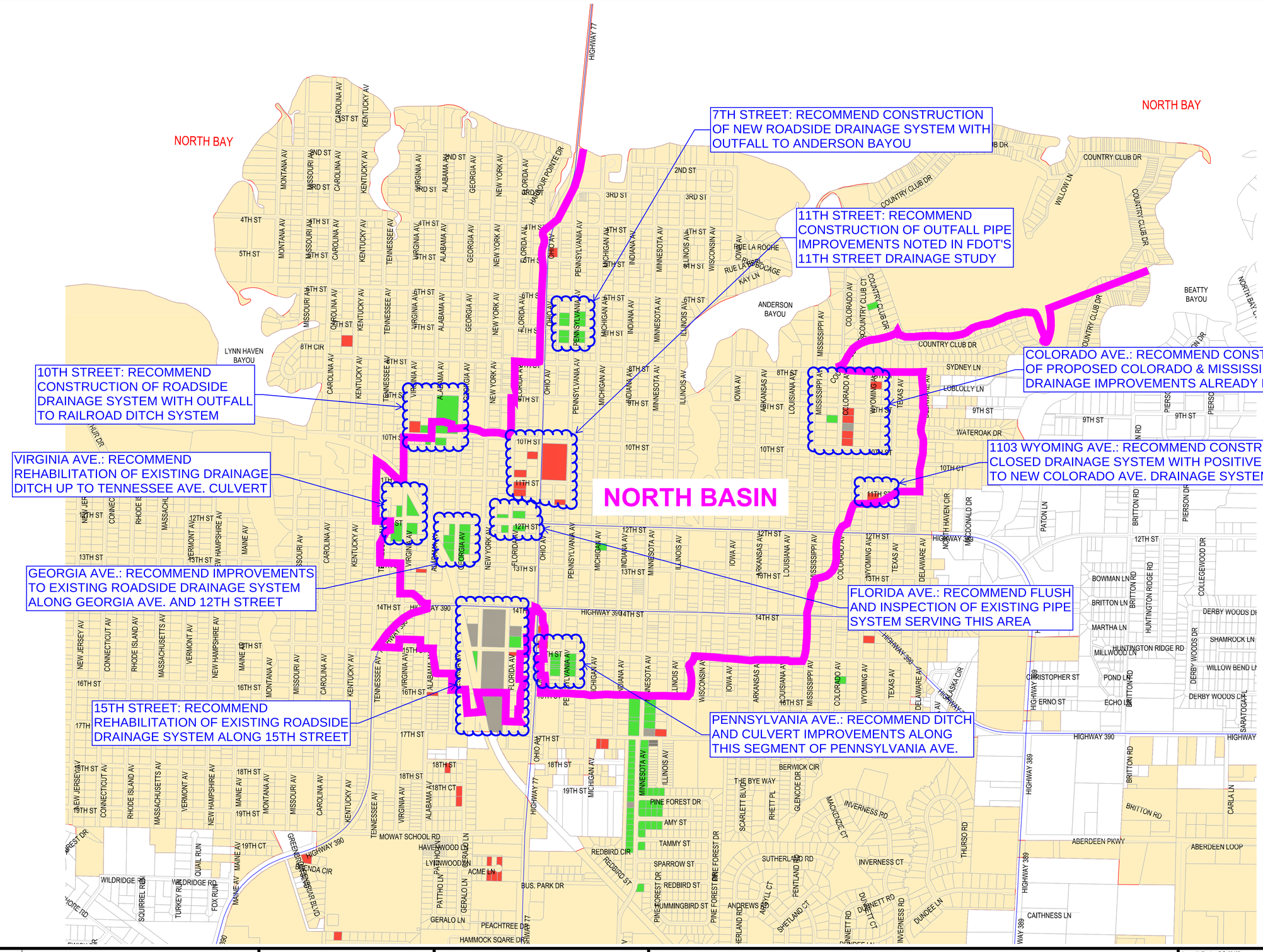
SHEET NUMBER I-2

PROJECT NUMBER 14412

14412 STORMWATER MASTER PLAN RECOMMENDED IMPROVEMENTS MAP - WEST Sheet I-2

Date: Monday, April 15, 2019 3:03:39 PM ID: jdm File: P:\14412 Stormwater Master Plan\1 CIVIL\3D\Folder\Drawings\Recommended Improvements Map Appendix I.dwg

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG



REV	DATE	BY	REVISIONS
NOT			RELEASED FOR CONSTRUCTION BY: DATE:

SCALE:	AS NOTED
DESIGNED BY:	JDC
DRAWN BY:	jdm
REVIEWED BY:	JDC
ISSUE DATE:	JANUARY 2019
ACAD FILE NAME:	Recommended Improvements Map Appendix I.dwg

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RECOMMENDED IMPROVEMENTS MAP - NORTH STORMWATER MASTER PLAN

LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
James M. Southall, P.E. 39637
Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
J. Doug Crook, P.E. 66556

DPR CERTIFICATION #EB-7806

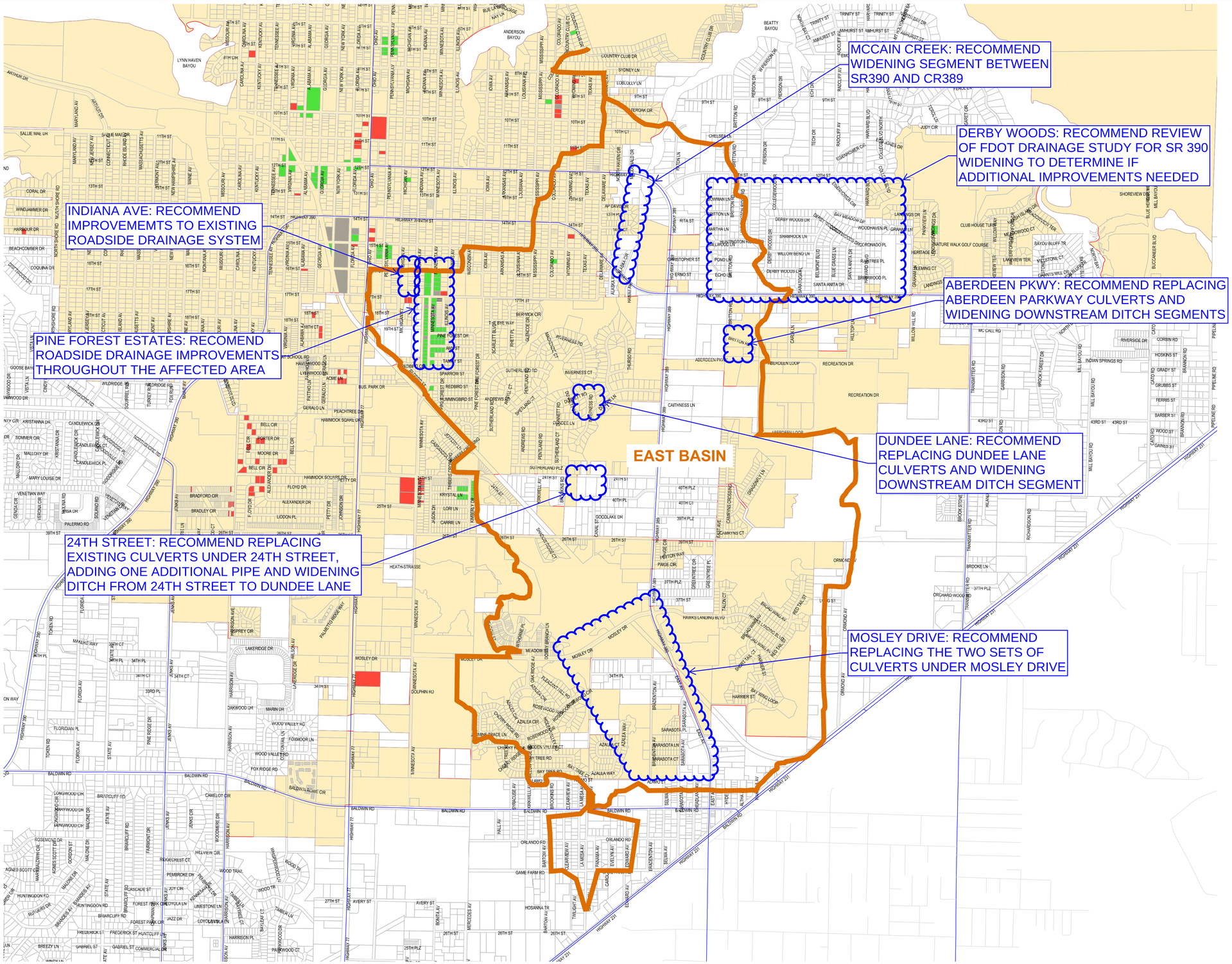
SHEET NUMBER I-3

PROJECT NUMBER 14412

14412 STORMWATER MASTER PLAN RECOMMENDED IMPROVEMENTS MAP - NORTH Sheet I-3

Date: Monday, April 15, 2019 3:03:44 PM ID: jdm File: P-14412 Stormwater Master Plan\1 CIVIL\3DFolder\Drawings\Recommended Improvements Map Appendix I.dwg

FOR SCALE VERIFICATION AFTER DUPLICATION, THIS LINE SHOULD BE 1" LONG



REV	DATE	BY	REVISIONS
NOT			RELEASED FOR CONSTRUCTION BY: DATE:

SCALE:	AS NOTED
DESIGNED BY:	JDC
DRAWN BY:	jdm
REVIEWED BY:	JDC
ISSUE DATE:	JANUARY 2019
ACAD FILE NAME:	Recommended Improvements Map Appendix I.dwg

PANHANDLE ENGINEERING, INC.
ENVIRONMENTAL ENGINEERS ● CIVIL ENGINEERS ● LAND PLANNERS
3005 South Highway 77 Lynn Haven, Florida 32444
(850)763-5200 Fax (850)769-0730 www.panhandleengineering.com

RECOMMENDED IMPROVEMENTS MAP - EAST STORMWATER MASTER PLAN

LYNN HAVEN, FLORIDA

James H. Slonina, P.E. 39197
James M. Southall, P.E. 39037
Christopher B. Forehand, P.E. 58028
Stephen E. Price, P.E. 71646
J. Doug Crook, P.E. 66556

DPR CERTIFICATION #EB-7806

SHEET NUMBER
I-1

PROJECT NUMBER
14412

14412 STORMWATER MASTER PLAN RECOMMENDED IMPROVEMENTS MAP - EAST Sheet I-1

Date: Monday, April 15, 2019 3:03:33 PM ID: jdm File: P:\14412 Stormwater Master Plan\1 CIVIL\3D\Index\Drawings\Recommended Improvements Map Appendix I.dwg

Appendix J

City of Lynn Haven MS4 Permit

Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Noah Valenstein
Secretary

January 24, 2018

Sent via E-post

Bobby Baker
Director of Public Works
City of Lynn Haven
825 Ohio Ave
Lynn Haven, FL 32444

Subject: City of Lynn Haven II Municipal Separate Storm Sewer System (MS4)
NPDES Permit ID Number FLR04E008 (Cycle 4)
Notice of Renewed Permit Coverage

Dear Bobby Baker:

The Florida Department of Environmental Protection has received and processed your submittal of the *Notice of Intent to Use Generic Permit for Discharge of Stormwater from Phase II Municipal Separate Storm Sewer Systems* (NOI) and the applicable permit processing fee for renewal of coverage under the Phase II MS4 Generic Permit.

This letter serves to acknowledge that your NOI is complete. The determination of a complete NOI means that your MS4 continues to be covered under the Phase II MS4 Generic Permit. **Your renewed coverage under this permit is effective as of April 1, 2018 and will expire on March 31, 2023.** Your permit identification number remains the same.

This letter is not a permit. Coverage under the Phase II MS4 Generic Permit allows your MS4 to discharge stormwater provided that you implement the Stormwater Management Program (SWMP) included as Appendix A of your NOI and comply with all requirements of the Phase II MS4 Generic Permit.

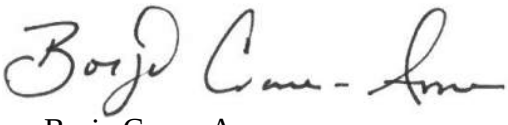
Please note that annual reports summarizing your SWMP implementation efforts are required only for Years 2 and 4 of your five-year permit coverage term, as follows:

- The Year 2 Annual Report should cover the 12-month period from **April 1, 2019 through March 31, 2019 and is due by September 30, 2019.**

- The Year 4 Annual Report should cover the 12-month period from **April 1, 2021 through March 31, 2022 and is due by September 30, 2022.**

If you have any questions, please contact Borja Crane-Amores phone at (850) 245-7520 or by email at Borja.CraneAmores@floridadep.gov.

Sincerely,



Borja Crane-Amores
Environmental Administrator
NPDES Stormwater Program

NOTICE OF INTENT TO USE GENERIC PERMIT FOR DISCHARGE OF STORMWATER FROM PHASE II MUNICIPAL SEPARATE STORM SEWER SYSTEMS (RULE 62-621.300(7)(B), F.A.C)

For FDEP Internal Use Only
Permit ID: FLR04E008

INSTRUCTIONS:

- This NOI must be completed and submitted to the Department to authorize use of the Generic Permit for Discharge of Stormwater from Phase II Municipal Separate Storm Sewer Systems ("MS4 GP"), provided in Rule 62-621.300(7)(a), F.A.C.
- The type of municipal separate storm sewer system that qualifies for coverage under the MS4 GP and the applicable Phase II MS4 stormwater management program requirements are specified in the permit. You should familiarize yourself with the MS4 GP before completing this NOI.
- Submit this fully completed NOI, permit fee, and required attachments by mail to the address in the box at right. **DO NOT SUBMIT any materials not in the checklist in Section V. of this NOI.**
- **Please print or type information in the appropriate areas below and complete each section.**

Submit NOI, permit fee, and required attachments to:

NPDES Stormwater Notices Center
M.S. #3585
Florida Department of Environmental Protection 2600 Blair Stone Road
Tallahassee, FL 32399-2400

SECTION I. PHASE II MS4 OPERATOR INFORMATION

A.	Name of the Phase II MS4 Operator: Bobby Baker		
B.	Name of the Phase II MS4 Responsible Authority: Lynn Haven, Florida		
	Title: Director of Public Works		
	Mailing Address: 825 Ohio Avenue		
	City: Lynn Haven	Zip Code: 32444	County: Bay
	Telephone Number: 850-265-5989	E-mail Address: bbaker@cityoflynnhaven.com	
C.	Name of the Designated Phase II MS4 Stormwater Management Program Contact: Bobby Baker		
	Title: Director of Public Works		
	Department: Public Works		
	Mailing Address: 825 Ohio Avenue		
	City: Lynn Haven	Zip Code: 32444	County: Bay
	Telephone Number: 850-265-5989		
	E-mail Address: bbaker@cityoflynnhaven.com		
D.	Location of the Phase II MS4 (if different than the mailing address in Section I.C. above):		
	Street Address:		
	City:	Zip Code:	County:
E.	Approximate center of the Phase II MS4: Latitude: 30° 14' 46" Longitude: -85 ° 38' 55"		
F.	Phase II MS4 ownership status (check one): ☒ Public ☐ State ☐ Federal		
G.	Total resident population of the Phase II MS4: 18,493		
H.	Name of the urbanized area(s) the Phase II MS4 is located within (if applicable):		
I.	Name of the Water Management District the Phase II MS4 is located within (check all that apply): ☒ Northwest Florida Water Management District ☐ Suwanee River Water Management District ☐ South Florida Water Management District ☐ Southwest Florida Water Management District ☐ St. John's River Water Management District		

SECTION II. SHARING RESPONSIBILITY

You may rely on another entity to satisfy some or all of your permit obligations if the conditions in Part IX of the MS4 GP are met. Another entity may implement one or more of the measures and/or a component of a measure on your behalf. You may rely on another entity to satisfy all permit obligations (including annual reporting) but only if the entity is permitted under Chapter 62-624, F.A.C. Note the following:

- You will remain responsible for compliance with your permit obligations if the other entity(ies) fails to implement the control measure(s) or a component thereof on your behalf. You must establish a written agreement with the other entity(ies) before submitting this NOI.
- Relying on another entity, or entities, either partially or fully does not preclude you from the obligation to fully complete this NOI, including the information required in Section IV.

A.	**1.**	Has another entity, regulated under Chapter 62-624, F.A.C., agreed to implement all of your permit obligations on your behalf? ☐ **Yes** x **No** If yes, complete Section II.A.2. If no, skip to Section II. B		
	2.	Name of Entity:		
		Contact Name:		
		Title:		
		Department:		
		Mailing Address:		
		City:	Zip Code:	County:
		Telephone Number:		
		E-mail Address:		
B.	1.	Has another entity, agreed to implement one or more of the minimum control measures (or a component thereof) on your behalf? ☐ **Yes** x **No** If yes, complete Section II.B.2. If no, skip to Section II. B.3 (See the note below for any additional entities)		
	2.	Control measure(s) or component of a control measure to be implemented by the other entity:		
	3.	Name of Entity:		
		Contact Name:		
		Title:		
		Department:		
		Mailing Address:		
		City:	Zip Code:	County:
		Telephone Number:		
		E-mail Address:		
	Note: For each additional entity sharing stormwater management program responsibilities with you, provide on a separate sheet the information requested in Sections II.B.2. and II.B.3. Title the sheet "Section II.B: Additional Entities Information" and attach it to this NOI.			

SECTION III. RECEIVING WATERS

Identify the named receiving waterbodies to which your Phase II MS4 discharges. Include all such waterbodies known to you at the time of this application:

North Bay/St Andrews Bay watershed		

INSTRUCTIONS FOR APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

General Instructions

- Complete this form for each minimum control measure described in Part VI. of the Generic Permit for Discharge of Stormwater from Phase II Municipal Separate Storm Sewer Systems ("MS4 GP") provided in Rule 62-621.300(7)(a), F.A.C., except the Post-construction Stormwater Management in New Development and Redevelopment minimum control measure if you have chosen the qualifying alternative program option for this measure under Part X. of the permit. If you choose, however, to implement BMPs for the Post-construction measure, please complete a SWMP Elements Form for the measure.

- Include all best management practices (BMPs) currently in place or planned for each element of each minimum control measure. There is no limit to the total number of BMPs you may include.

- Make copies of the form as necessary to accommodate all of your BMPs.

- The completed forms, in their entirety, will be considered by the Department to be the outline of your proposed stormwater management program. Attach the forms to the NOI and submit to the Department at the address provided on the NOI.

- **Please print or type information in the appropriate areas of this form.**

Section A.I: MINIMUM CONTROL MEASURE

- Indicate which minimum control measure the BMPs in Section A.II. address. Check only one measure. Use a separate form for each measure.

Section A.II: BEST MANAGEMENT PRACTICES

- Include BMPs only for the measure you have identified in Section A.I. The Department encourages the use of the Florida Land Development Manual: A Guide to Sound Land and Water Management (FDER, 1988) and the U.S. Environmental Protection Agency's National Menu of Best Management Practices for Storm Water Phase II in developing Phase II stormwater management programs. Both are available from the Department.

- Element ID: Table 1 below includes all the minimum control measure elements required under Part IV. of the MS4 GP. Using Table 1, identify which element of the minimum control measure each BMP addresses. For example, a BMP addressing the procedures for site plan review under the Construction Site Stormwater Runoff Control Minimum Control Measure would be labeled as "4d." You must include at least one BMP for each element.

- BMP Number: For each minimum control measure, number the BMPs starting with 01 and continue the numbering in sequential order on any additional forms for the measure. The numbering of the BMPs is for reference purposes only and does not provide additional weight to, nor prioritize, one BMP over another.

- Measurable Goals: List the measurable goal(s) for each BMP. You must include at least one measurable goal for each BMP and may include as many as necessary for the BMP – you are not limited to the four lines provided on the form.

- Schedule for Implementation/Completion: For each measurable goal, include the year each action will be implemented and, as applicable, the interim milestones, completion date, or planned frequency of the action.

- Responsible Entity/Department: Include the name of the entity (if other than the Phase II MS4 Operator) or of the internal department (if it is the Phase II MS4 Operator) responsible for implementing or coordinating each BMP.

Page Numbering

- Once this form has been completed for each minimum control measure, place the forms in an order corresponding to the order of the measures in Table 1 (below) and number the forms accordingly at the bottom of each.

Table 1: Minimum Control Measure Required Elements

Element ID	Description of Minimum Control Measure Required Elements
	1. Public Education and Outreach Minimum Control Measure:
1a	a) Implement a public education program to distribute educational materials to the community or conduct equivalent outreach activities about the impacts of stormwater discharges on water bodies and the steps that the public can take to reduce pollutants in stormwater runoff.
	2. Public Participation/Involvement Minimum Control Measure:
2a	a) Comply with State and local public notice requirements when implementing a public involvement/public participation program.
	3. Illicit Discharge Detection and Elimination Minimum Control Measure:
3a	a) Develop, if not already completed, a storm sewer system map, showing the location of all known outfalls and the names and location of all surface waters of the State that receive discharges from those outfalls.
3b	b) To the extent allowable under State or local law, effectively prohibit through ordinance, or other regulatory mechanism, of non-stormwater (i.e., "illicit") discharges into the storm sewer system and implement appropriate enforcement procedures and actions.
3c	c) Develop and implement a plan to detect and eliminate non-stormwater discharges, including illegal dumping, to the MS4.
3d	d) Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste.
	4. Construction Site Stormwater Runoff Control Minimum Control Measure:
4a	a) Develop and implement, to the extent allowable under State or local law, an ordinance or other regulatory mechanism to require erosion and sediment controls, as well as sanctions to ensure compliance, to reduce pollutants in any stormwater runoff to the Phase II MS4 from construction activities that result in a land disturbance of greater than or equal to one acre. Reduction of pollutants associated with stormwater discharges from construction activity disturbing less than one acre must also be included if that construction activity is part of a larger common plan of development or sale that would disturb one acre or more.
4b	b) Develop and implement requirements for construction site operators to implement appropriate erosion and sediment control best management practices.
4c	c) Develop and implement requirements for construction site operators to control waste such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste at the construction site that may cause adverse impacts to water quality.
4d	d) Develop and implement procedures for site plan review that incorporate consideration of potential water quality impacts.
4e	e) Develop and implement procedures for receipt and consideration of information submitted by the public.
4f	f) Develop and implement procedures for site inspection and enforcement of control measures.
	5. Post-construction Stormwater Management in New Development and Redevelopment Minimum Control Measure: NOT REQUIRED IF USING QUALIFIED ALTERNATIVE PROGRAM
5a	a) Use an ordinance or other regulatory mechanism, to the extent allowable under State or local law, to address from post-construction runoff from new development and redevelopment projects that disturb greater than or equal to one acre, including projects less than one acre that are part of a larger common plan of development or sale, that discharge into the Phase II MS4. The program must require that controls be in place that would prevent or minimize water quality impacts from new development or redevelopment.
5b	b) Develop and implement strategies that include a combination of structural and/or non-structural best management practices (BMPs) appropriate for the community.
5c	c) Require adequate long-term operation and maintenance of BMPs.
	6. Municipal Operation Pollution Prevention and Good Housekeeping Minimum Control Measure:
6a	a) Develop and implement an operation and maintenance program that has the ultimate goal of preventing or reducing pollutant runoff from MS4 operator activities, such as park and open space maintenance, fleet and building maintenance, new construction and land disturbances, and stormwater system maintenance.
6b	b) Using training materials that are available from EPA, the Department, or other organizations, include employee training to prevent and reduce stormwater pollution from MS4 operator activities.

SECTION IV. MINIMUM CONTROL MEASURES

A. Complete the Phase II MS4 Stormwater Management Program (SWMP) Elements Form in Appendix A for each minimum control measure described in Part VI. of the MS4 GP, except the Post-construction Stormwater Management in New Development and Redevelopment minimum control measure if you have chosen the qualifying alternative program option for this measure under Part X. of the permit. If you choose, however, to implement BMPs for the Post-construction measure, please complete a SWMP Elements Form for the measure.

Include in the SWMP Elements Form all best management practices (BMPs) currently in place or planned for each element of each minimum control measure. There is no limit to the number of BMPs you may include. Make copies of the form as necessary to accommodate all of your BMPs. The completed forms, in their entirety, will be considered by the Department to be the outline of your proposed stormwater management program. Attach all completed forms to this NOI.

B. Provide the total number of pages of SWMP Elements Forms that are attached to this NOI for each minimum control measure:

Minimum Control Measure	# of Pages
Public Education and Outreach as to Stormwater Impacts	1
Public Involvement/Public Participation	1
Illicit Discharge Detection and Elimination	1
Construction Site Stormwater Runoff Control	1
Post-construction Stormwater Management in New Development and Redevelopment	1
Pollution Prevention/Good Housekeeping for Municipal Operations	1

SECTION V. MATERIALS TO BE SUBMITTED WITH THIS NOI

Only the following materials are to be submitted to the Department along with your fully completed and signed NOI (check the appropriate box to indicate whether the item is attached or is not applicable):

Attached	N/A	
☐	Waived	The permit application fee, as prescribed by Rule 62-4.050(4)(d)(6), F.A.C. Make all check and money orders payable to the Florida Department of Environmental Protection.
☒		A fully completed Phase II MS4 Stormwater Management Program Elements Form (see Appendix A) for each minimum control measure except the Post-construction Stormwater Management in New Development and Redevelopment minimum control measure if you have chosen the qualifying alternative program option for this measure under Part X. of the MS4 GP.
☐	☒	Additional entities information, as required under the note in Section II.B. of this NOI.

DO NOT SUBMIT ANY OTHER MATERIALS

(such as your complete Stormwater Management Plan, ordinances, storm sewer map, public outreach, etc.)

SECTION VI. CERTIFICATION STATEMENT AND SIGNATURE

The Responsible Authority listed in Section I.B. of this NOI must sign the following certification statement:[1]

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based upon my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Name of Phase II MS4 Responsible Authority (type or print): Bobby Baker

Title: Director of Public Works, City of Lynn Haven, Florida

Signature:  Date: 1/24/2018

[1] Signatory requirements are contained in Rule 62-620.305, F.A.C.

APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

SECTION A.I. MINIMUM CONTROL MEASURE (check only one)

☒ 1. Public Education and Outreach	☐ 3. Illicit Discharge Detection/Elimination	☐ 5. Post-construction Stormwater Management (optional)
☐ 2. Public Involvement/Participation	☐ 4. Construction Site Stormwater Runoff Control	☐ 6. Pollution Prevention/Good Housekeeping

SECTION A.II. BEST MANAGEMENT PRACTICES (BMPs) For The Minimum Control Measure Identified In Section A.I. Of This Form

Element ID	BMP Number	A Description of BMP	B Measurable Goal(s)	C Schedule for Implementation/Completion	D Responsible Entity/Department
1a	01	Install tributary signage and drain markers with decals to increase public awareness of local water resources	1. Document and report the number of signs installed	1. Years 1-5	Public Works
1a	02	Concise review of the city MS4 permit will be presented and stormwater information provided at a public city meeting once a year. Public response will be solicited.	1. Document and report the number of public meetings	1. Years 1-5	Public Works
			2. Document and report the number of attendees	2. Year 1 - 5	
1a	03	Update the city's stormwater website periodically with BMPs relevant to public interest / needs Update quarterly per year	1. Document and report the number of hits to the website	1. Years 1-5	Public Works
			2. Document and report the number of updates to the website	2. Year 1 - 5	
1a	04	The city public library will display topics of stormwater pollution and prevention for 3 months, yearly	1. Estimate the number of viewers	1. Years 1-5	Library
			2. Document the number of flyers provided	2. Years 1-5	
1a	05	Promote prevention of personal pollution by providing an "information booth' at city community festivities such as the *Jazz Festival*, *Block Party*, *Cruise on Florida Avenue Car Show*, *Farmer's Market*, and *Winter Wonderland*..	1.Document and report the number of festivities attended.	1. Years 1-5	Public Works
			2.	2.	
			3.	3.	
			4.	4.	

Page # 1 of 6 total pages of SWMP Elements Forms attached to the NOI

APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

SECTION A.I. MINIMUM CONTROL MEASURE (check only one)

☐ 1. Public Education and Outreach	☐ 3. Illicit Discharge Detection/Elimination	☐ 5. Post-construction Stormwater Management (optional)
☒ 2. Public Involvement/Participation	☐ 4. Construction Site Stormwater Runoff Control	☐ 6. Pollution Prevention/Good Housekeeping

SECTION A.II. BEST MANAGEMENT PRACTICES (BMPs) For The Minimum Control Measure Identified In Section A.I. Of This Form

Element ID	BMP Number	A Description of BMP	B Measurable Goal(s)	C Schedule for Implementation/Completion	D Responsible Entity/Department
2a	01	Public notice in the form of signs will be placed on parcels within the city that petition for a development order or land use change. The number of responses to noticing and subsequent action taken will be documented	**1.** Number of parcels noticed per year	1.Years 1 - 5	Public Works
			2. Document and report the number of comments/calls received related to public notice	**2.** Year 1 - 5	
			3. Document the responses and the city response	**3.** Year 1 - 5	
2a	02	Participate in educational activity with local elementary / middle schools to promote stormwater discharge awareness	**1.** Document and report the number of presentations held	1.Years 1 - 5	Public Works
			2. Document and report the number of students	**2.** Year 1 - 5	
2a	03	The *Adopt a Waterway* and *Adopt a Roadway* community programs will be continued and expanded	**1.** Document the number of participants annually	**1.** Years 1 - 5	Public Works
			2. Document the number of posted signage annually	**2.** Years 1 - 5	
				3.	
2a	04	Trash/Litter program: involve volunteers from residential property owners, neighborhood groups or other civic groups to address trash/litter in open spaces and along roadways.	**1.** Number of volunteers	1 Years 1 - 5	Public Works
			2. Number of trash bags filled	2.Years 1 - 5	
			3.	**3.**	
			4.	**4.**	

Page # 2 of 6 total pages of SWMP Elements Forms attached to the NOI

APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

SECTION A.I. MINIMUM CONTROL MEASURE (check only one)

☐ 1. Public Education and Outreach	☒ 3. Illicit Discharge Detection/Elimination	☐ 5. Post-construction Stormwater Management (optional)
☐ 2. Public Involvement/Participation	☐ 4. Construction Site Stormwater Runoff Control	☐ 6. Pollution Prevention/Good Housekeeping

SECTION A.II. BEST MANAGEMENT PRACTICES (BMPs) For The Minimum Control Measure Identified In Section A.I. Of This Form

Element ID	BMP Number	A Description of BMP	B Measurable Goal(s)	C Schedule for Implementation/Completion	D Responsible Entity/Department
3a	01	Maintain the city storm sewer systems and outfalls discharge/inventory map. The map includes the location of discharges into the following waters of the State: McKitchin's, Mill, Beatty, Anderson, Maxwell, Lynn Haven and Upper Goose bayous and City Old Canal. Distribute updated map twice a year at city Commission meeting	**1.** Document the number of new outfalls	1.Year 1-5	Public Works
			2. Document and report the total number of outfalls	**2.** Year 1-5	
			3. Document and report the total number of retention/detention ponds	**3.** Year 1 - 5	
			4. Document and report the total number of inlet/catch basins	**4.** Year 1 - 5	
			5. Document the lengths of conveyance systems (pipe or swales)	**5.** Year 1 -5	
3b	01	Maintain the city ordinance Chapter 26.32, Litter Control and Illegal Dumping. Review ordinance annually.	**1.** Document and report any changes to the ordinance	**1.** Year 1-5	Public Works
3c	01	Illicit discharges detection and elimination will be investigated pursuant to Chapter 26.32 and the city *Drainage System Maintenance Standard Operating Procedures (SOP).* Review the SOP annually. The illicit discharge 'hot line' phone number (directly to Public Works) is provided on the city website. Proactive inspections of the MS4 will be conducted monthly.	**1.** Document and report the number of proactive inspections	**1.** Year 1-5	Public Works
			2. Document and report the number of reactive inspections	**2.**Years 1-5	
			3. Document and report the number of illicit discharges identified	**3.** Year 1 - 5	
			4. Document and report the number of illicit discharge eliminated	**4.** Year 1 - 5	
3d	01	Illicit connection/dumping and discharge prevention information will be promulgated on the city website relevant flyers posted quarterly and at the library. Provide flyers as needed.	**1.** Document and report the number of flyers distributed	**1.** Year 1-5	Public Works
			2. Document and report the number of hits to illicit discharge flyers	**2.** Year 1-5	
3d	02	Inform public employees, businesses, and the general public of hazards associated with illegal discharges and improper disposal of waste. Public awareness information will be added to the city business license billing annually.	1. Document the number of billings issued to local business.	**1.** Years 1 - 5	Public Works / Building Department
			2. Document the type of illicit discharge information provided	**2.** Years 1 - 5	

Page # 3 of 6 total pages of SWMP Elements Forms attached to the NOI

APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

SECTION A.I. MINIMUM CONTROL MEASURE (check only one)

☐ 1. Public Education and Outreach	☐ 3. Illicit Discharge Detection/Elimination	☐ 5. Post-construction Stormwater Management (optional)
☐ 2. Public Involvement/Participation	☒ 4. Construction Site Stormwater Runoff Control	☐ 6. Pollution Prevention/Good Housekeeping

SECTION A.II. BEST MANAGEMENT PRACTICES (BMPs) For The Minimum Control Measure Identified In Section A.I. Of This Form

Element ID	BMP Number	A Description of BMP	B Measurable Goal(s)	C Schedule for Implementation/Completion	D Responsible Entity/Department
4a	01	The city will maintain an ordinance requiring erosion and sediment controls as well as sanctions to ensure compliance to reduce pollutants in any stormwater runoff to the Phase II MS4 from construction activities that result in land disturbance of greater than or equal to one acre.	**1.** The ordinance will be updated and authorized by the city commission within the first year.	**1.** Year 1	Public Works / Planning
	02	Construction activities that result in land disturbance of greater than or equal to one acre will be periodically monitored for compliance with city ordinance.	**Document the number of inspections conducted following a ≥¼ inch rain event**	**1. Years 2-5**	Building / Public Works
4b	01	Implementation of appropriate stormwater erosion and sedimentation control measures at construction sites. Provide erosion control flyers to each permittee: *Brochure on the Florida NPDES Stormwater Permitting Program for Construction Activity* and *Erosion Control for Home Builders*	**1.** Track and report the number of erosion control flyers issued.	**1.** Years 15	Building
4c	01	The city requires all construction sites to implement effective waste control measures pursuant to Ordinance 54.32	**1.** Track and report the number of active construction sites operating under waste control ordinance	**1.** Years 1-5	Building
4d	01	Annual site plan review of proposed land development projects, will continue by the city technical review committee.	**1.** Document the number of stormwater management plans reviewed/approved	**1.** Years 1-5	Public Works
			2. Document the number of proposals deemed to require SWERP permitting and/or CGP	**2.** Years 1-5	
4e	01	Maintain city public "hot line" advertised on the city website, under NPDES. Illicit discharge reporting will be investigated upon discovery. Maintain reporting and investigation process	**1.** Track and report the number of call/complaints	**1.** Years 1-5	Public Works
			2. Document investigation results annually	**2.** Years 1-5	
4f	01	Building site inspection and enforcement of control measures will continue to be accomplished pursuant to the city *Sediment and Silt Erosion Control Measures* guidelines. Review the guidelines annually	**1.** Report the number of sites inspected per year	**1.** Years 1-5	Building
			2. Document and report the number of enforcement actions	**2.** Years 1-5	
			3. Document and report the number of sites with ERP/CGP	**3.** Year 1 -5	

Page # 4 of 6 total pages of SWMP Elements Forms attached to the NOI

APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

SECTION A.I. MINIMUM CONTROL MEASURE (check only one)

☐ 1. Public Education and Outreach	☐ 3. Illicit Discharge Detection/Elimination	☒ 5. Post-construction Stormwater Management (optional)
☐ 2. Public Involvement/Participation	☐ 4. Construction Site Stormwater Runoff Control	☐ 6. Pollution Prevention/Good Housekeeping

SECTION A.II. BEST MANAGEMENT PRACTICES (BMPs) For The Minimum Control Measure Identified In Section A.I. Of This Form

Element ID	BMP Number	A Description of BMP	B Measurable Goal(s)	C Schedule for Implementation/Completion	D Responsible Entity/Departmen
5a-c	01	Utilize qualifying alternative program; City of Lynn Haven relies on the current NWFWMD and FDEP regulatory criteria by providing stormwater treatment for department projects.	**1.** Continue to maintain compliance with DEP and WMD criteria	**1.** Effective upon permit issuance.	DEP and WMD

Page # 5 of 6 total pages of SWMP Elements Forms attached to the NOI

APPENDIX A
PHASE II MS4 STORMWATER MANAGEMENT PROGRAM (SWMP) ELEMENTS FORM

SECTION A.I. MINIMUM CONTROL MEASURE (check only one)

☐ 1. Public Education and Outreach	☐ 3. Illicit Discharge Detection/Elimination	☐ 5. Post-construction Stormwater Management (optional)
☐ 2. Public Involvement/Participation	☐ 4. Construction Site Stormwater Runoff Control	☒ 6. Pollution Prevention/Good Housekeeping

SECTION A.II. BEST MANAGEMENT PRACTICES (BMPs) For The Minimum Control Measure Identified In Section A.I. Of This Form

Element ID	BMP Number	A Description of BMP	B Measurable Goal(s)	C Schedule for Implementation/Completion	D Responsible Entity/Department
6a	01	The current fleet maintenance BMPs, strategies and guidelines will be used to maximize pollution prevention for vehicle washing, maintenance and fueling. Review the BMPs, Strategies and guidelines annually for applicability	**1.** Document and report the number of inspections conducted	**1.**Years 1-5	Public Works
			2. Document the quantities of used oil, antifreeze, oil filters and batteries per year	**2.** Years 1-5	
6a	02	Maintain the city permitted stormwater management systems, i.e. ponds, inlets/catch basins, pipes, ditches and swales	**1.** Seven stormwater management systems will be inspected/maintained per year	**1.** Years 1-5	Public Works
			2. Document and report the number of city inlets/catch basins inspected/maintained	**2.** Years 1-5	
			3. Document and report the amount of city conveyances inspected/maintained	**3.** Year 1 - 5	
6a	03	The city will continue open space maintenance / litter removal and pet waste bag dispensers/awareness signage. The city will maintain existing and new city parks, open space and the Bailey Bridge.	1. Document and report the number of pet waste bags dispensed.	1. Years 1-5	Leisure Services
6b	01	Conduct employee training on best management practices to prevent and reduce stormwater pollution from entering the city MS4 systems	1. Conduct annual employee training, document the number of employees that are trained	**1.**Years 1-5	Public Works
			2. Train newly hired employees within 60 days of hiring, document the number of employees trained	**2.**Years 1-5	

Page # 6 of 6 total pages of SWMP Elements Forms attached to the NOI

NOTICE OF RIGHTS

This action is final and effective on the date filed with the Clerk of the Department unless a petition for an administrative hearing is timely filed under Sections 120.569 and 120.57, F.S., before the deadline for filing a petition. On the filing of a timely and sufficient petition, this action will not be final and effective until further order of the Department. Because the administrative hearing process is designed to formulate final agency action, the hearing process may result in a modification of the agency action or even denial of the application.

Petition for Administrative Hearing

A person whose substantial interests are affected by the Department's action may petition for an administrative proceeding (hearing) under Sections 120.569 and 120.57, F.S. Pursuant to Rules 28-106.201 and 28-106.301, F.A.C., a petition for an administrative hearing must contain the following information:

(a) The name and address of each agency affected and each agency's file or identification number, if known;
(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding; and an explanation of how the petitioner's substantial interests are or will be affected by the agency determination;
(c) A statement of when and how the petitioner received notice of the agency decision;
(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;
(e) A concise statement of the ultimate facts alleged, including the specific facts that the petitioner contends warrant reversal or modification of the agency's proposed action;
(f) A statement of the specific rules or statutes that the petitioner contends require reversal or modification of the agency's proposed action, including an explanation of how the alleged facts relate to the specific rules or statutes; and
(g) A statement of the relief sought by the petitioner, stating precisely the action that the petitioner wishes the agency to take with respect to the agency's proposed action.

The petition must be filed (received by the Clerk) in the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, or via electronic correspondence at Agency_Clerk@dep.state.fl.us. Also, a copy of the petition shall be mailed to the applicant at the address indicated above at the time of filing.

Time Period for Filing a Petition

In accordance with Rule 62-110.106(3), F.A.C., petitions for an administrative hearing by the applicant and persons entitled to written notice under Section 120.60(3), F.S., must be filed within **14** days of receipt of this written notice. Petitions filed by any persons other than the applicant, and other than those entitled to written notice under Section 120.60(3), F.S., must be filed within **14** days of publication of the notice or within **14** days of receipt of the written notice, whichever occurs first. The failure to file a petition within the appropriate time period shall constitute a waiver of that person's right to request an administrative determination (hearing) under Sections 120.569 and 120.57, F.S., or to intervene in this proceeding and participate as a party to it. Any subsequent intervention (in a proceeding initiated by another party) will be only

at the discretion of the presiding officer upon the filing of a motion in compliance with Rule 28-106.205, F.A.C.

Extension of Time

Under Rule 62-110.106(4), F.A.C., a person whose substantial interests are affected by the Department's action may also request an extension of time to file a petition for an administrative hearing. The Department may, for good cause shown, grant the request for an extension of time. Requests for extension of time must be filed with the Office of General Counsel of the Department at 3900 Commonwealth Boulevard, Mail Station 35, Tallahassee, Florida 32399-3000, or via electronic correspondence at Agency_Clerk@dep.state.fl.us, before the deadline for filing a petition for an administrative hearing. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

Mediation

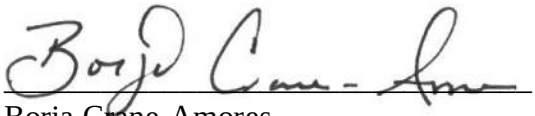
Mediation is not available in this proceeding.

Judicial Review

Once this decision becomes final, any party to this action has the right to seek judicial review pursuant to Section 120.68, F.S., by filing a Notice of Appeal pursuant to Florida Rules of Appellate Procedure 9.110 and 9.190 with the Clerk of the Department in the Office of General Counsel (Station #35, 3900 Commonwealth Boulevard, Tallahassee, Florida 32399-3000) and by filing a copy of the Notice of Appeal accompanied by the applicable filing fees with the appropriate district court of appeal. The notice must be filed within 30 days from the date this action is filed with the Clerk of the Department.

EXECUTION AND CLERKING

Executed in Tallahassee, Florida.
STATE OF FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION



Borja Crane-Amores
Environmental Administrator

Attachment(s):

1. Acknowledgement Letter
2. Notice of Intent

CERTIFICATE OF SERVICE

The undersigned duly designated deputy clerk hereby certifies that this document and all attachments were sent on the filing date below to the following listed persons:

Robin Babin, Florida Department of Environmental Protection, Robin.Babin@floridadep.gov

FILING AND ACKNOWLEDGMENT
FILED, on this date, pursuant to Section 120.52, F. S., with the designated Department Clerk, receipt of which is hereby acknowledged.

January 24, 2018
Clerk **Date**

Appendix K

NRCS Damage Survey Reports

United States Department of Agriculture
Natural Resources Conservation Service

LYNN HAVEN EAST SIDE

OMB No. 0578-0030
NRCS-PDM-20

DAMAGE SURVEY REPORT (DSR)
Emergency Watershed Protection Program - Recovery

NRCS Entry Only
Eligible: YES ☑ NO ☐
Approved: YES ☐ NO ☐
Funding Priority Number (from Section 4) 3a

Section 1A

Date of Report: December 12, 2018 Limited Resource Area: YES ☐ NO ☑
DSR Number: MIC-LH-001 Project Number: 5074

Section 1B Sponsor Information

Sponsor Name: City of Lynn Haven
Address: 825 Ohio Avenue
City/State/Zip: Lynn Haven, Florida 32444
Telephone Number: 850-265-2121 Fax:

Section 1C Site Location Information

County: Bay State: Florida Congressional District: 2
Latitude: N30d 14m 24s Longitude: W85d37m46s Section: 15 Township: 03S Range: 14W
UTM Coordinates:
Drainage Name: Natural Drainage ways east side of city Reach: East 8th to Canal street
Damage Description: Heavy storm debris in stormwater outfall channels impeding drainage flow in approximately 32,600 linear feet of stream and ditches on the east side of the City of Lynn Haven.

Section 1D Site Evaluation

All answers in this Section must be YES in order to be eligible for EWP assistance.

Site Eligibility	YES	NO	Remarks
Damage was a result of a natural disaster?*	☑	☐	Result of Hurricane Michael.
Recovery measures would be for runoff retardation or soil erosion prevention?*	☑	☐	
Threat to life and/or property?*	☑	☐	
Event caused a sudden impairment in the watershed?*	☑	☐	
Imminent threat was created by this event?**	☑	☐	
For structural repairs, not repaired twice within ten years?**	☑	☐	
Site Defensibility			
Economic, environmental, and social documentation adequate to warrant action (Go to pages 3, 4, 5 and 6***)	☑	☐	
Proposed action technically viable? (Go to Page 9 ***)	☑	☐	

Have all the appropriate steps been taken to ensure that all segments of the affected population have been informed of the EWP program and its possible effects? YES ☑ NO ☐

Comments:

* Statutory

** Regulation

*** DSR Pages 3 through 6 and 9 are required to support the decisions recorded on this summary page. If additional space is needed on this or any other page in this form, add appropriate pages.

DSR NO: MIC-LH-001

Section 1E Proposed Action

Describe the preferred alternative from Findings: Section 5A:

Total installation cost identified in this DSR: Section 3: $3,392,967

Section 1F NRCS State Office Review and Approval

Reviewed By: _____ Date Reviewed: _____
State EWP Program Manager

Approved By: _____ Date Approved: _____
State Conservationist

PRIVACY ACT AND PUBLIC BURDEN STATEMENT

NOTE: The following statement is made in accordance with the Privacy Act of 1974, (5 U.S.C. 552a) and the Paperwork Reduction Act of 1995, as amended. The authority for requesting the following information is 7 CFR 624 (EWP) and Section 216 of the Flood Control Act of 1950, Public Law 81-516, 33 U.S.C. 701b-1; and Section 403 of the Agricultural Credit Act of 1978, Public Law 95334, as amended by Section 382, of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104-127, 16 U.S.C. 2203. EWP, through local sponsors, provides emergency measures for runoff retardation and erosion control to areas where a sudden impairment of a watershed threatens life or property. The Secretary of Agriculture has delegated the administration of EWP to the Chief or NRCS on state, tribal and private lands.

Signing this form indicates the sponsor concurs and agrees to provide the regional cost-share to implement the EWP recovery measure(s) determined eligible by NRCS under the terms and conditions of the program authority. Failure to provide a signature will result in the applicant being unable to apply for or receive a grant the applicable program authorities. Once signed by the sponsor, this information may not be provided to other agencies. IRS, Department of Justice, or other State or Federal Law Enforcement agencies, and in response to a court or administrative tribunal.

The provisions of criminal and civil fraud statutes, including 18 U.S.C. 286, 287, 371, 641, 651, 1001; 15 U.S.C. 714m; and 31 U.S.C. 3729 may also be applicable to the information provided. According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0578-0030. The time required to complete this information collection is estimated to average 117/1.96 minutes/hours per response, including the time for reviewing instructions, searching existing data sources, field reviews, gathering, designing, and maintaining the data needed, and completing and reviewing the collection information.

USDA NONDISCRIMINATION STATEMENT

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.)

Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write USDA, Director of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-941 0 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Civil Rights Statement of Assurance

The program or activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended; the Civil Rights Restoration Act of 1987 (Public Law 100-259); and other nondiscrimination statutes: namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Amendments of 1972, the Age Discrimination Act of 1975, and the Americans with Disabilities Act of 1990. They will also be in accordance with regulations of the Secretary of Agriculture (7 CFR 15, 15a, and 15b), which provide that no person in the United States shall on the grounds of race, color, national origin, gender, religion, age or disability, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

Section 2 Environmental Evaluation

2A Resource Concerns	2B Existing Condition	2C Alternative Designation		
		Proposed Action	No Action	Alternative
		2D Effects of Alternatives		
Soil				
Water				
Air				
Plant				
Animal				
Other				

DSR NO: MIC-LH-001

Section 2E Special Environmental Concerns

		Alternatives and Effects		
Resource Consideration	**Existing Condition**	**Proposed Action**	**No Action**	**Alternative**
Clean Water Act Waters of the U.S.				
Coastal Zone Management Areas				
Coral Reefs				
Cultural Resources				
Endangered and Threatened Species				
Environmental Justice				
Essential Fish Habitat				
Fish and Wildlife Coordination				
Floodplain Management				
Invasive Species				
Migratory Birds				
Natural Areas				
Prime and Unique Farmlands				
Riparian Areas				
Scenic Beauty				
Wetlands				
Wild and Scenic Rivers				

Completed By: _____ Date: _____

DSR NO: MIC-LH-001

Section 2F Economic

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Future Damages ($)	Damage Factor (%)	Near Term Damage Reduction ($)
Properties Protected (Private)			
10% of Residences Impacted (812); Mean Home Value = $183,700	$149,164,400	25	$37,291,100
Properties Protected (Public)			
10% of City-Owned Property Damaged due to Flooding	$1,775,082	25	$443,771
Business Losses			
10% of Businesses experience 3-month loss of annual revenue	$6,576,600	25	$1,644,150
10% of Private Businesses Impacted (114); Estimated Mean Value = $400,000	$45,600,000	25	$11,400,000
Other			
125 Passenger Vehicles Damaged due to Flooding; Mean Value = $25,000	$3,125,000	25	$781,250
		Total Near Term Damage Reduction $	$51,560,271
		Net Benefit (Total Near Term Damage Reduction minus Cost from Section 3)	$48,167,304

Completed By: _____ Date: _____

Section 2G Social Consideration

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Yes	No	Remarks
Has there been a loss of life as a result of the watershed impairment?	☐	☑	
Is there the potential for loss of life due to damages from the watershed impairment?	☐	☑	
Has access to a hospital or medical facility been impaired by watershed impairment?	☐	☑	
Has the community as a whole been adversely impacted by the watershed impairment (life and property ceases to operate in a normal capacity)	☑	☐	Channel capacity has been reduced due to storm debris caused by Hurricane Michael. Properties adjacent to the water ways become flooded due to the reduced channel capacity.
Is there a lack or has there been a reduction of public safety due to watershed impairment?	☑	☐	Roadways have flooded during storm events due to reduced channel capacity. Flooded roadways present safety hazard for motorists.

Completed By: Tony Harvey and Herikka Thornton Date: 12/12/18

DSR NO: MIC-LH-001

Section 2H Group Representation and Disability Information

This section is completed only for the preferred alternative selected.

Group Representation	Number
American Indian/Alaska Native Female Hispanic	0
American Indian/Alaska Native Female Non-Hispanic	10
American Indian/Alaska Native Male Hispanic	0
American Indian/Alaska Native Male Non-Hispanic	10
Asian Female Hispanic	0
Asian Female Non-Hispanic	221
Asian Male Hispanic	0
Asian Male Non-Hispanic	197
Black or African American Female Hispanic	0
Black or African American Female Non-Hispanic	1,308
Black or African American Male Hispanic	0
Black or African American Male Non-Hispanic	1,160
Hawaiian Native/Pacific Islander Female Hispanic	0
Hawaiian Native/Pacific Islander Female Non-Hispanic	10
Hawaiian Native/Pacific Islander Male Hispanic	0
Hawaiian Native/Pacific Islander Male Non-Hispanic	10
White Female Hispanic	356
White Female Non-Hispanic	9,181
White Male Hispanic	317
White Male Non-Hispanic	8,142
Total Group	20,922

Census tract(s) 12,13.01,13.02,14.02

Completed By: Tony Harvey and Herrika Thornton Date: 12/12/18

Section 2I Required consultation or coordination between the lead agency and/or the RFO and another governmental unit including tribes:

Easements, permissions, or permits:

Permits for channel access through wetlands…

Mitigation Description:

Agencies, persons, and references consulted, or to be consulted:

U.S. Army Corps of Engineers; Florida Department of Environmental Protection; Bay County

DSR NO: MIC-LH-001

Section 3 Engineering Cost Estimate

Completed By: Doug Crook Date: 01/17/19

This section must be completed by each alternative considered (attach additional sheets as necessary).				
Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)
Waterway Debris Removal	32,600	LF	$60.00	$1,956,000
Waterway Stabilization Post-Removal	32,600	LF	$10.00	$326,000
Management and Processing Vegetation	40,000	CY	$2.50	$100,000
Leaners 6-12" (Tree Removal)	650	EA	$75.00	$48,750
Leaners 13-24" (Tree Removal)	217	EA	$95.00	$20,615
Leaners 25-36" (Tree Removal)	108	EA	$185.00	$19,980
Leaners 37-48" (Tree Removal)	22	EA	$185.00	$4,070
Leaners 49"+ (Tree Removal)	4	EA	$275.00	$1,100
Tipping Fees Vegetation	40,000	CY	$4.70	$188,000
Haulout	40,000	CY	$4.25	$170,000
Construction Access	1	LS	$250,000.00	$250,000
Contingency (%)	10%		$308,451.50	$308,452
			Total Installation Cost (Enter in Section 1F) $	$3,392,967

Unit Abbreviations:

AC	Acre	LS	Lump Sum
CY	Cubic	SF	Square Feet
EA	Each	SY	Square Yard
HR	Hour	TN	Ton
LF	Linear Feet	Other	(Specify)

DSR NO: MIC-LH-001

Section 4 NRCS EWP Funding Priority

Complete the following section to compute the funding priority for the recovery measures in this application (see instructions on page 14).

Priority Ranking Criteria	Yes	No		Ranking Number Plus Modifier
1. Is this an exigency situation?	☐	☑		3a
2. Is this a site where there is serious, but not immediate threat to human life?	☐	☑		
3. Is this a site where buildings, utilities, or other important infrastructure components are threatened?	☑	☐		
4. Is this site a funding priority established by the NRCS Chief?	☐	☑		
The following are modifiers for the above criteria			Modifier	
a. Will the proposed action or alternatives protect or conserve federally-listed threatened and endangered species or critical habitat?			☑	
b. Will the proposed action or alternatives protect or conserve cultural sites listed on the National Register of Historic Places?			☐	
c. Will the proposed action or alternatives protect or conserve prime or important farmland?			☐	
d. Will the proposed action or alternatives protect or conserve existing wetlands?			☐	
e. Will the proposed action or alternatives maintain or improve current water quality conditions?			☐	
f. Will the proposed action or alternatives protect or conserve unique habitat, including but not limited to, areas inhabited by State-listed species, fish and wildlife management area, or State identified sensitive habitats?			☐	

Enter priority computation in Section 1A, NRCS Entry, Funding priority number.

Remarks:

DSR NO: MIC-LH-001

Section 5A Findings

Finding: Indicate the preferred alternative from Section 2 (Enter to Section 1E):

I have considered the effect of the action and the alternatives on the Environmental, Economic, Social; the Environmental Concerns and the extraordinary circumstances (40CFR 1508.27). I find the reasons stated below, that the preffered alternative:

☑ Has been sufficiently analyzed in the EWP PEIS (reference all that apply)

Chapter 5.2.2.2.1.2

Chapter

Chapter

Chapter

Chapter

☐ May require the preparation of an environmental assessment or environmental impact statement.

NRCS representative of the DSR team: Tony Harvey, Herrika Thornton, Codie Yelverton

Title: Agriculture Engineer(s) and District Conservationist Date: 12/12/18

Section 5B Comments:

Section 5C Sponsor(s) Review and Concurrence:

Sponsor Representative:

Title: Date:

Section 6 Attachments:

A. Location Map
B. Site Plan or Sketches
C. Other (explain):

INSTRUCTIONS FOR COMPLETING THE NRCS-PDM-20, DSR

	Explanation of Requested Item	Who Completes
Section 1	Enter Site Sponsor, Location, Evaluation, Selected Alternative, and Reviewed and Approval Signatures.	NRCS completes with voluntary assistance from Sponsor except for NRCS only portion of Section 1A.
1A	Enter the Date, DSR Number, Project Number. For NRCS only enter Eligible Yes/No, Approved Yes/No, Funding Priority Number, and Limited Resource Area Yes/No.	
1B	Enter Sponsor Name, Address, Telephone, Fax	
1C	Enter site location County, State, Congressional District, Latitude, Longitude, Section, Township, Range, UTM Coordinates, Drainage Name, Reach within drainage, and Damage Description.	
1D	Enter Yes/No and any Remarks for the Site Evaluation information. Any No response means the site is not eligible for EWP assistance and no further information is necessary to complete the DSR. (See NEWPPM 390-502.03 and 390-502-04) Enter Yes/No regarding whether the affected public has been informed of the EWP program.	
1E	Enter the proposed treatment and the cost of installation.	NRCS only.
1F	NRCS Review and Approval.	
Section 2	Use available natural resource, economic, and social, information, including the EWP Programmatic Environmental Impact Statement (PEIS), to briefly describe the effects of the alternatives to the proposed action including the "no action" alternative. The no action alternative is the predictive future condition if no action is taken. Typically, the proposed action and no action are the alternatives considered for EWP recovery measures due to the focus on repairing or preventing damages within a watershed. However, in cases where additional alternatives are considered, include all pertinent information to adequately address the additional alternatives (e.g., proposed action would be bio-engineering for bank stabilization, no action alternative, and an additional alternative may be riprap for bank stabilization).	NRCS completes with voluntary assistance from Sponsor except for NRCS only portion of Section 1A.
2A	List all resource concerns which are relevant to the area of the proposed action and alternatives. Refer to National Bulletin 450-5-8 TCH-COMPLETING AND FILING MEASUREMENT UNITS FOR RESOURCE CONCERNS IN THE FIELD OFFICE TECHNICAL GUIDE (FOTG). Note: the affected area may extend beyond the construction foot print (ex. where water quality or water rights are affected downstream of the site).	
2B	Provide a brief description of the present condition of each resource concern listed in 2A. Quantify conditions where possible. Reference accompanying photo documentation.	
2C	Briefly summarize the practice/system of practices being proposed, as well as the "no action" alternative is the predicted future condition if no action is taken.	
2D	Document the efforts of the proposed action and alternatives for the considerations listed in 2A. Reference applicable quality criteria, information in the CPPE, and quantify effects whenever possible. Consider both long-term and short-term effects. Consider any effects which may be individually minor but cumulatively significant at a larger scale or over an extended time period. Clearly define the differences between proposed action, no action, and the other alternatives.	

	Explanation of Requested Item	Who Completes
2E	Enter Special Environmental Concerns for Clean Water Act Waters of the U.S., Coastal Zone Management Areas, Coral Reefs, Cultural Resources, Endangered and Threatened Species, Environmental Justice, Essential Fish Habitat, Fish and Wildlife Coordination, Floodplain Management, Invasive Species, Migratory Birds, Natural Areas, Prime and Unique Farmlands, Riparian Areas, Scenic Beauty, Wetlands, and Wild and Scenic Rivers for each alternative considered. In the case where the selected alternative from Section 5A impacts a Special Environmental Concern, additional information, coordination, permitting or mitigation may be required and adequate documentation should be prepared and attached to the DSR to identify how NRCS or the Sponsor addressed the concern.	NRCS completes with voluntary assistance from Sponsor except for NRCS only portion of Section 1A.
2F	Identify Property Protected both private and public, business losses and other economic impacts considered for each alternative. Enter the dollar value of the potential future damages if no action is taken in the Future Damage ($) column. This would be the estimate of the value lost if the EWP recovery measure is not installed. Use the repair cost or damage dollar method to determine the estimate of future damages. The repair cost method uses the costs to return the impaired property, good, or services based on their original pre-event condition or value. The damage dollar method uses an estimate of the future damage to value (e.g. if the structure is condemned, then enter the value of the structure). Enter the estimated amount based upon existing information or information furnished by the sponsor, contractors or others with specific knowledge for recovery from natural disasters for each alternative considered. Often market values for properties or services can be obtained from personnel at the local county/parish tax assessment office. The DSR team needs to determine the Damage Factor (%) which is a coefficient that indicates the degree of damage reduction to a property that is attributed to the effect of the proposed EWP recovery measures. Use an appropriate estimate of how much of the damage the EWP recovery measure will avoid for the alternative being considered. If the recovery measures from a single site will prevent 100 percent of the damage use 100 percent. The Near Term Damage Reduction is the Future Damage ($) times the Damage Factor (%). Sum the Near Term Damage Reduction values to calculate the Total Near Term Damage Reduction. Enter the Net Benefit which is computed by subtracting the Cost from section 3 from the total near term damage reduction. The economic section must be completed for each alternative considered. Attach additional sheets as necessary.	
2G	Enter information to describe the potential social impacts and considerations for each alternative. Answer Yes or No and any remarks necessary to adequately address each question. The information may be obtained through interviews with community leaders, government officials or sponsors. Factors such as road closures, loss of water, electricity, access to emergency services are used when answering whether the community as a whole has been impaired. This information is part of the environmental evaluation portion of the DSR but may be pertinent in Section 4 regarding priorities. The Social Considerations Section must be completed for each alternative considered. Attach additional sheets as necessary.	
2H	Enter the Group Representation Information for the preferred alternative. Use the most recent census tract information based upon where the EWP recovery measures are located.	Sponsor completes

	Explanation of Requested Item	Who Completes
2I	Enter whether easement, permissions, or permits, and mitigation will require consultation or coordination for the selected alternative (e.g., Clean Water Act section 404 permit, Endangered Species Act section 10 permits, and any State or county permits or requirements). Describe mitigation to be applied that will offset any adverse impacts and attach any documentation from other agencies regarding mitigation requirements.	NRCS completes with voluntary assistance from Sponsor.
Section 3	Enter Proposed Recovery Measure(s) including Quantity, Units, Unit Cost, and Total Amount Cost. Enter sum of all Proposed Recovery Measure Costs to calculate Total Costs. Enter Total Installation Costs in Section 1F. The Engineering Cost Estimate must be completed for each alternative considered. Attach additional sheets as necessary.	
Section 4	Explanation of Requested Item This section is used to determine the Funding Priority for the preferred alternative and sequence for initiating recovery measures. Enter Yes/No for questions 1 through 4 and enter the number (exigency 1, serious threat to human life 2, etc.) in the right column, Ranking Number Plus Modifier. Complete the Modifier portion by placing the alphabetic indicator a. through f. in the Modifier column. Complete the Ranking Number Plus Modifier column by entering the alphabetic indictor(s) that exists within the site. The number of the site designates the priority (e.g., a site with a designation of 2 is a higher priority that a site with a designation of 3). The modifiers increase the priority for the same numeric site (e.g., a site with a designation of 1a, would be a higher priority than a site with a designation of 1, a site with a designation of 2bc would be a higher priority than a site designated as 2b). Enter the Funding Priority in Section 1A.	
Section 5	Enter the Findings, Rationale Supporting Findings, NRCS Representative signature and Comments, and Concurrence signature by the Sponsor(s).	NRCS completes.
5A	Indicate the preferred alternative and check the applicable finding being made. The NRCS Representative signs indicating the Finding selected. If the proposed action was adequately addressed in the PEIS, check all appropriate chapter paragraphs.	
5B	Enter any additional Comments.	
5C	Sponsor(s) review and concurrence.	Sponsor(s) signature.
Section 6	Include attachments for location map, site sketch, or plan and other information as needed.	NRCS completes with voluntary assistance from Sponsor.

United States Department of Agriculture
Natural Resources Conservation Service

LYNN HAVEN WEST SIDE

OMB No. 0578-0030
NRCS-PDM-20

DAMAGE SURVEY REPORT (DSR)
Emergency Watershed Protection Program - Recovery

NRCS Entry Only
Eligible: YES ☑ NO ☐
Approved: YES ☐ NO ☐
Funding Priority Number (from Section 4) 3a

Section 1A

Date of Report: December 17, 2018
Limited Resource Area: YES ☐ NO ☑
DSR Number: MIC-LH-002
Project Number: 5074

Section 1B Sponsor Information

Sponsor Name: City of Lynn Haven
Address: 825 Ohio Avenue
City/State/Zip: Lynn Haven, Florida 32444
Telephone Number: 850-265-2121
Fax:

Section 1C Site Location Information

County: Bay
State: Florida
Congressional District: 2
Latitude: N30D14M38S
Longitude: W85D39M28S
Section: 16
Township: 03S
Range: 14W
UTM Coordinates:
Drainage Name: City drainage ways west side of city
Reach: Lynn Haven Bayou to Mosley Drive west of Hwy 77
Damage Description: Heavy storm debris in channel impeding drainage flow in approximately 44,000 linear feet of stream on the west side of the City of Lynn Haven.

Section 1D Site Evaluation

All answers in this Section must be YES in order to be eligible for EWP assistance.

Site Eligibility	YES	NO	Remarks
Damage was a result of a natural disaster?*	☑	☐	Result of Hurricane Michael.
Recovery measures would be for runoff retardation or soil erosion prevention?*	☑	☐	
Threat to life and/or property?*	☑	☐	
Event caused a sudden impairment in the watershed?*	☑	☐	
Imminent threat was created by this event?**	☑	☐	
For structural repairs, not repaired twice within ten years?**	☑	☐	
Site Defensibility			
Economic, environmental, and social documentation adequate to warrant action (Go to pages 3, 4, 5 and 6***)	☑	☐	
Proposed action technically viable? (Go to Page 9 ***)	☑	☐	

Have all the appropriate steps been taken to ensure that all segments of the affected population have been informed of the EWP program and its possible effects? YES ☑ NO ☐

Comments:

* Statutory

** Regulation

*** DSR Pages 3 through 6 and 9 are required to support the decisions recorded on this summary page. If additional space is needed on this or any other page in this form, add appropriate pages.

DSR NO: MIC-LH-002

Section 1E Proposed Action

Describe the preferred alternative from Findings: Section 5A:

Total installation cost identified in this DSR: Section 3: $4,259,239

Section 1F NRCS State Office Review and Approval

Reviewed By: _____ Date Reviewed: _____
State EWP Program Manager

Approved By: _____ Date Approved: _____
State Conservationist

PRIVACY ACT AND PUBLIC BURDEN STATEMENT

NOTE: The following statement is made in accordance with the Privacy Act of 1974, (5 U.S.C. 552a) and the Paperwork Reduction Act of 1995, as amended. The authority for requesting the following information is 7 CFR 624 (EWP) and Section 216 of the Flood Control Act of 1950, Public Law 81-516, 33 U.S.C. 701b-1; and Section 403 of the Agricultural Credit Act of 1978, Public Law 95334, as amended by Section 382, of the Federal Agriculture Improvement and Reform Act of 1996, Public Law 104-127, 16 U.S.C. 2203. EWP, through local sponsors, provides emergency measures for runoff retardation and erosion control to areas where a sudden impairment of a watershed threatens life or property. The Secretary of Agriculture has delegated the administration of EWP to the Chief or NRCS on state, tribal and private lands.

Signing this form indicates the sponsor concurs and agrees to provide the regional cost-share to implement the EWP recovery measure(s) determined eligible by NRCS under the terms and conditions of the program authority. Failure to provide a signature will result in the applicant being unable to apply for or receive a grant the applicable program authorities. Once signed by the sponsor, this information may not be provided to other agencies. IRS, Department of Justice, or other State or Federal Law Enforcement agencies, and in response to a court or administrative tribunal.

The provisions of criminal and civil fraud statutes, including 18 U.S.C. 286, 287, 371, 641, 651, 1001; 15 U.S.C. 714m; and 31 U.S.C. 3729 may also be applicable to the information provided. According to the Paperwork Reduction Act of 1995, an agency may not conduct or sponsor, and a person is not required to respond to a collection of information unless it displays a valid OMB control number. The valid OMB control number for this information collection is 0578-0030. The time required to complete this information collection is estimated to average 117/1.96 minutes/hours per response, including the time for reviewing instructions, searching existing data sources, field reviews, gathering, designing, and maintaining the data needed, and completing and reviewing the collection information.

USDA NONDISCRIMINATION STATEMENT

"The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, sex, religion, age, disability, political beliefs, sexual orientation, and marital or family status. (Not all prohibited bases apply to all programs.)

Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write USDA, Director of Civil Rights, Room 326-W, Whitten Building, 14th and Independence Avenue, SW, Washington, DC 20250-941 0 or call (202) 720-5964 (voice or TDD). USDA is an equal opportunity provider and employer.

Civil Rights Statement of Assurance

The program or activities conducted under this agreement will be in compliance with the nondiscrimination provisions contained in the Titles VI and VII of the Civil Rights Act of 1964, as amended; the Civil Rights Restoration Act of 1987 (Public Law 100-259); and other nondiscrimination statutes: namely, Section 504 of the Rehabilitation Act of 1973, Title IX of the Amendments of 1972, the Age Discrimination Act of 1975, and the Americans with Disabilities Act of 1990. They will also be in accordance with regulations of the Secretary of Agriculture (7 CFR 15, 15a, and 15b), which provide that no person in the United States shall on the grounds of race, color, national origin, gender, religion, age or disability, be excluded from participation in, be denied the benefits of, or otherwise subjected to discrimination under any program or activity receiving Federal financial assistance from the U.S. Department of Agriculture or any agency thereof.

Section 2 Environmental Evaluation

2A Resource Concerns	2B Existing Condition	2C Alternative Designation		
		Proposed Action	No Action	Alternative
		2D Effects of Alternatives		
Soil				
Water				
Air				
Plant				
Animal				
Other				

DSR NO: MIC-LH-002

Section 2E Special Environmental Concerns

		Alternatives and Effects		
Resource Consideration	**Existing Condition**	**Proposed Action**	**No Action**	**Alternative**
Clean Water Act Waters of the U.S.				
Coastal Zone Management Areas				
Coral Reefs				
Cultural Resources				
Endangered and Threatened Species				
Environmental Justice				
Essential Fish Habitat				
Fish and Wildlife Coordination				
Floodplain Management				
Invasive Species				
Migratory Birds				
Natural Areas				
Prime and Unique Farmlands				
Riparian Areas				
Scenic Beauty				
Wetlands				
Wild and Scenic Rivers				

Completed By: _____ Date: _____

DSR NO: MIC-LH-002

Section 2F Economic

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Future Damages ($)	Damage Factor (%)	Near Term Damage Reduction ($)
Properties Protected (Private)			
10% of Residences Impacted (812); Mean Home Value = $183,700	$149,164,400	25	$37,291,100
Properties Protected (Public)			
10% of City-Owned Property Damaged from Flooding	$1,775,082	25	$443,771
Business Losses			
10% of Businesses experience 3-month loss of annual revenue	$6,576,600	25	$1,644,150
10% of Private Businesses Impacted (114); Estimated Mean Value = $400,000	$45,600,000	25	$11,400,000
Other			
125 Passenger Vehicles Damaged due to Flooding; Mean Value = $25,000	$3,125,000	25	$781,250
		Total Near Term Damage Reduction $	$51,560,271
		Net Benefit (Total Near Term Damage Reduction minus Cost from Section 3)	$47,301,032

Completed By: _____ Date: _____

Section 2G Social Consideration

This section must be completed by each alternative considered (attach additional sheets as necessary).

	Yes	No	Remarks
Has there been a loss of life as a result of the watershed impairment?	☐	☑	
Is there the potential for loss of life due to damages from the watershed impairment?	☐	☑	
Has access to a hospital or medical facility been impaired by watershed impairment?	☐	☑	
Has the community as a whole been adversely impacted by the watershed impairment (life and property ceases to operate in a normal capacity)	☑	☐	Channel capacity has been reduced due to storm debris caused by Hurricane Michael. Properties adjacent to the water ways become flooded due to the reduced channel capacity.
Is there a lack or has there been a reduction of public safety due to watershed impairment?	☑	☐	Roadways have flooded duringstorm events due to reduced channel capacity. Flooded roadways present safety hazard for motorists.

Completed By: Tony Harvey and Herrika Thornton Date: 12/17/18

DSR NO: MIC-LH-002

Section 2H Group Representation and Disability Information

This section is completed only for the preferred alternative selected.

Group Representation	Number
American Indian/Alaska Native Female Hispanic	0
American Indian/Alaska Native Female Non-Hispanic	10
American Indian/Alaska Native Male Hispanic	0
American Indian/Alaska Native Male Non-Hispanic	10
Asian Female Hispanic	0
Asian Female Non-Hispanic	221
Asian Male Hispanic	0
Asian Male Non-Hispanic	197
Black or African American Female Hispanic	0
Black or African American Female Non-Hispanic	1,308
Black or African American Male Hispanic	0
Black or African American Male Non-Hispanic	1,160
Hawaiian Native/Pacific Islander Female Hispanic	0
Hawaiian Native/Pacific Islander Female Non-Hispanic	10
Hawaiian Native/Pacific Islander Male Hispanic	0
Hawaiian Native/Pacific Islander Male Non-Hispanic	10
White Female Hispanic	356
White Female Non-Hispanic	9,181
White Male Hispanic	317
White Male Non-Hispanic	8,142
Total Group	20,922

Census tract(s) 13.01,13.02,14.02, 14.03, 14.04, 15.01

Completed By: Herrika Thornton Date: 12/17/18

Section 2I Required consultation or coordination between the lead agency and/or the RFO and another governmental unit including tribes:

Easements, permissions, or permits:

Mitigation Description:

Agencies, persons, and references consulted, or to be consulted:

DSR NO: MIC-LH-002

Section 3 Engineering Cost Estimate

Completed By: Doug Crook Date: 01/17/19

This section must be completed by each alternative considered (attach additional sheets as necessary).				
Proposed Recovery Measure (including mitigation)	Quantity	Units	Unit Cost ($)	Amount ($)
Waterway Debris Removal	44,000	LF	$60.00	$2,640,000
Waterway Stabilization Post-Removal	44,000	LF	$10.00	$440,000
Management and Processing Vegetation	54,000	CY	$2.50	$135,000
Leaners 6-12" (Tree Removal)	850	EA	$75.00	$63,750
Leaners 13-24" (Tree Removal)	283	EA	$95.00	$26,885
Leaners 25-36" (Tree Removal)	142	EA	$185.00	$26,270
Leaners 37-48" (Tree Removal)	28	EA	$185.00	$5,180
Leaners 49"+ (Tree Removal)	6	EA	$275.00	$1,650
Tipping Fees Vegetation	54,000	CY	$4.70	$253,800
Haulout	54,000	CY	$4.25	$229,500
Construction Access	1	LS	$50,000.00	$50,000
Contingency (%)	10%		$387,203.50	$387,204
			Total Installation Cost (Enter in Section 1F) $	$4,259,239

Unit Abbreviations:

AC	Acre	LS	Lump Sum
CY	Cubic	SF	Square Feet
EA	Each	SY	Square Yard
HR	Hour	TN	Ton
LF	Linear Feet	Other	(Specify)

Section 4 NRCS EWP Funding Priority

Complete the following section to compute the funding priority for the recovery measures in this application (see instructions on page 14).

Priority Ranking Criteria	Yes	No		Ranking Number Plus Modifier
1. Is this an exigency situation?	☐	☑		3a
2. Is this a site where there is serious, but not immediate threat to human life?	☐	☑		
3. Is this a site where buildings, utilities, or other important infrastructure components are threatened?	☑	☐		
4. Is this site a funding priority established by the NRCS Chief?	☐	☑		
The following are modifiers for the above criteria			Modifier	
a. Will the proposed action or alternatives protect or conserve federally-listed threatened and endangered species or critical habitat?			☐	
b. Will the proposed action or alternatives protect or conserve cultural sites listed on the National Register of Historic Places?			☐	
c. Will the proposed action or alternatives protect or conserve prime or important farmland?			☐	
d. Will the proposed action or alternatives protect or conserve existing wetlands?			☐	
e. Will the proposed action or alternatives maintain or improve current water quality conditions?			☐	
f. Will the proposed action or alternatives protect or conserve unique habitat, including but not limited to, areas inhabited by State-listed species, fish and wildlife management area, or State identified sensitive habitats?			☐	

Enter priority computation in Section 1A, NRCS Entry, Funding priority number.

Remarks:

DSR NO: MIC-LH-002

Section 5A Findings

Finding: Indicate the preferred alternative from Section 2 (Enter to Section 1E):

I have considered the effect of the action and the alternatives on the Environmental, Economic, Social; the Environmental Concerns and the extraordinary circumstances (40CFR 1508.27). I find the reasons stated below, that the preffered alternative:

☑ Has been sufficiently analyzed in the EWP PEIS (reference all that apply)

Chapter 5.2.2.2.1.2

Chapter

Chapter

Chapter

Chapter

☐ May require the preparation of an environmental assessment or environmental impact statement.

NRCS representative of the DSR team: Tony Harvey, Herrika Thornton, Codie Yelverton

Title: Agriculture Engineer(s) and District Conservationist Date: 12/17/18

Section 5B Comments:

Section 5C Sponsor(s) Review and Concurrence:

Sponsor Representative:

Title: Date:

Section 6 Attachments:

A. Location Map
B. Site Plan or Sketches
C. Other (explain):

INSTRUCTIONS FOR COMPLETING THE NRCS-PDM-20, DSR

	Explanation of Requested Item	Who Completes
Section 1	Enter Site Sponsor, Location, Evaluation, Selected Alternative, and Reviewed and Approval Signatures.	NRCS completes with voluntary assistance from Sponsor except for NRCS only portion of Section 1A.
1A	Enter the Date, DSR Number, Project Number. For NRCS only enter Eligible Yes/No, Approved Yes/No, Funding Priority Number, and Limited Resource Area Yes/No.	
1B	Enter Sponsor Name, Address, Telephone, Fax	
1C	Enter site location County, State, Congressional District, Latitude, Longitude, Section, Township, Range, UTM Coordinates, Drainage Name, Reach within drainage, and Damage Description.	
1D	Enter Yes/No and any Remarks for the Site Evaluation information. Any No response means the site is not eligible for EWP assistance and no further information is necessary to complete the DSR. (See NEWPPM 390-502.03 and 390-502-04) Enter Yes/No regarding whether the affected public has been informed of the EWP program.	
1E	Enter the proposed treatment and the cost of installation.	NRCS only.
1F	NRCS Review and Approval.	
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	Explanation of Requested Item	Who Completes
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Section 5	Enter the Findings, Rationale Supporting Findings, NRCS Representative signature and Comments, and Concurrence signature by the Sponsor(s).	NRCS completes.
5A	Indicate the preferred alternative and check the applicable finding being made. The NRCS Representative signs indicating the Finding selected. If the proposed action was adequately addressed in the PEIS, check all appropriate chapter paragraphs.	
5B	Enter any additional Comments.	
5C	Sponsor(s) review and concurrence.	Sponsor(s) signature.
Section 6	Include attachments for location map, site sketch, or plan and other information as needed.	NRCS completes with voluntary assistance from Sponsor.