DRAFT

POND SITING REPORT

Florida Department of Transportation

District 4

SR 5/ US 1 at Aviation Boulevard

Indian River, Florida

Financial Management Number: 441693-1-22-02

ETDM Number: 14475

February 2024

The environmental review, consultation and other actions required by applicable federal environmental laws for this project are being, or have been, carried out by FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022, and executed by the Federal Highway Administration (FHWA) and FDOT

Project Development & Environment (PD&E) Study

SR 5/US 1 at Aviation Boulevard

Financial Management Number: 441693-1-22-02

ETDM Number: 14475

Indian River County, Florida

POND SITING REPORT

Prepared for:

Florida Department of Transportation

District 4

Prepared by:

WGI, Inc.

2035 Vista Parkway

West Palm Beach, FL 33411

February 2024

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PROFESSIONAL ENGINEER CERTIFICATION

POND SITING REPORT

Project: SR 5/US 1 at Aviation Boulevard

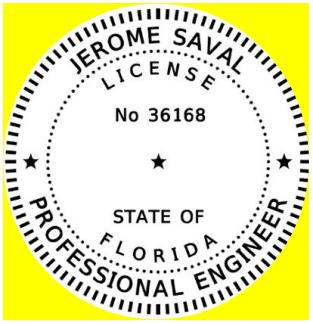
ETDM Number: 14475

Financial Project ID: 441693-1-22-02

Federal Aid Project Number: N/A

This Pond Siting Report contains engineering information that fulfills the purpose and need for the SR 5/US 1 at Aviation Boulevard Project Development & Environment Study in Indian River County, Florida. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of transportation engineering as applied through professional judgment and experience.

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



This item has been digitally signed and sealed by Jerome Saval P.E. on the date adjacent to the seal.

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

Table of Contents

Table of Contents i
List of Appendices ii
Executive Summary iv
1. Introduction 1
2. Project Description 1
3. Data Collection 2
4. Design Criteria 2
4.1 Florida Department of Transportation (FDOT) 2
4.2 St. John's River Water Management District (SJRWMD) 3
4.3 Indian River Farms Water Control District (IRFWCD) 3
4.4 Land Use Data and Topography 4
4.5 Natural and Biological Features 4
4.6 Datum And Conversion 4
5. Environmental Look Around Coordination 4
6. Pre-Development (Existing) and Post Development (Proposed) Conditions 5
6.2 Existing Drainage Conditions 5
6.3 Proposed Drainage Conditions 6
6.4 Geotechnical Information 8
7. Floodplain & Environmental Information 8
8. Stormwater Ponds 8
9. Results 10
10. Conclusions 10
10.1 Pond Siting Conditions 10
10.2 Selection of the Preferred Alternative 11

List of Appendices

Appendix A - Figures

Figure 1: Project Location Map A-1
Figure 2: USGS Quadrangle Map A-2
Figure 3: Web Soils Survey A-3
Figure 4: FEMA FIRMettes A-4
Figure 5: SJRWMD Watershed Map A-5
Figure 6: Land Use Map A-6
Figure 7: Archaeological Site Map A-7
Figure 8: NOAA Precipitation Frequency Data A-8
Figure 9: Typical Sections A-9

Appendix B – Pre-Development and Post Development Drainage Maps

Pre-Development Drainage Map B-1
Post Development Drainage Maps for Alternatives 1, 2, 7, and 8 ..... B-2 B-5

Appendix C – Pond Siting Calculations

Pond Sizing Calculations for Alternatives 1, 2, 7, and 8 ..... C-1 C-4
ICPR Analysis for Alternative 1, Ponds A and C C-5 C-8

Appendix D – Pond Alternatives Layouts

Alternatives 1 ..... D-1
Alternatives 2 ..... D-2
Alternatives 7 ..... D-3
Alternatives 8 ..... D-4

Appendix E – Pond Site Evaluation Matrices

Appendix F – Correspondence and Excerpts from SJRWMD Permits

City & County Coordination Meeting Minutes 6/16/2023 ..... F-1
Pond Siting Kickoff Meeting Minutes 6/28/2023 ..... F-2
Pond-Siting Meeting #2 Minutes 7/26/2023 ..... F-3
IRFWCD - Phone Notes-2023-07-27 ..... F-4
IRFWCD - Meeting Notes-2023-08-04 ..... F-5
IRFWCD - Email Criteria 2023-11-16 ..... F-6
IRFWCD System Evaluation Report Excerpts and Memo F-7
FDOT Drainage and Proposed Ponds Meeting Minutes 8/14/2023 ..... F-8
Pond-Siting Meeting #3 Minutes 8/30/2023 ..... F-9
Draft Cultural Resource Review for Pond Siting Memo 2023-08-22 ..... F-10
Indian River Memorial Hospital (1987) - Permit 40-061-0027 ..... F-11

Alcohope of the Treasure Coast (2003) - Permit 42-061-86755-3 .....F-12
Aviation Boulevard Roadway Widening (2010) - Permit 40-061-123418-1 .....F-13
All Aboard Florida - Fiber Optic Cable (2015) - Permit 144190-1 .....F-14
FAA Advisory Circular 150-5200-33C.....F-15
IRFWCD System Evaluation Report Excerpts and Memo F-14

Executive Summary

The Florida Department of Transportation (FDOT) District 4 is conducting a Project Development and Environmental (PD&E) Study to evaluate the alternatives for the enhancement of State Road (SR) 5/US 1 and Aviation Boulevard in Indian River County, Florida.

The purpose of this Pond Siting Report is to evaluate potential Stormwater Management Facility (SMF) options, also referenced as Pond Options, for each design alternative. Sites along the project have been examined and anticipated pond sizes have been determined in order to identify potential future locations for stormwater ponds. Pond sizes are determined based on Indian River Farms Water Control District (IRFWCD), St. John's River Water Management District (SJRWMD), and FDOT criteria. The Pond Siting analysis was completed to determine the appropriate pond sites associated with the recommended alternatives. The analysis was performed in accordance with the stipulations published by federal, state, and local authorities. The selection methods in this report represent the most suitable locations for proposed ponds and are based on quantitative and qualitative engineering assessment.

Preferred pond site options were selected for each design alternative based on several factors including drainage, environmental, maintenance, construction, and estimated right-of-way costs. Recommendations were made regarding sites within each design alternative with the greatest potential for successful pond construction, but final pond locations will be determined during the design phase of this project. Dry ponds were considered as the alternative pond type meeting all regulatory agencies criteria.

Multiple alternatives were evaluated to determine viable pond options for each of the recommended design alternatives. This method yielded a recommended Pond Site Matrix shown in ***Table 1***.

Table 1 – Recommended Pond Site Matrix

THE PREFERRED STORMWATER MANAGEMENT FACILITY			
DESIGN ALTERNATIVE	DRY DETENTION POND A	DRY DETENTION POND B	DRY DETENTION POND C
ALTERNATIVE 1	X		
ALTERNATIVE 2		X	
ALTERNATIVE 7	X		
ALTERNATIVE 8			X

1. Introduction

The FDOT is conducting a PD&E Study to evaluate alternatives for mobility and safety improvements to SR 5/US 1 and Aviation Boulevard in City of Vero Beach, Indian River County, Florida. The purpose of this report is to present an evaluation of pond site options for each design alternative. The report identifies potential pond locations and preliminary right-of-way requirements associated with the pond site options. The preferred site options are based on the results of the pond site evaluation matrices which weighted and scored each pond based on criteria such as right-of-way (zoning) implications, drainage considerations, environmental impacts, construction and more. The pond site evaluation process and evaluation matrices are developed in accordance with the FDOT District 4 Pond Siting Procedures. This report will also serve as the document of record for technical support in subsequent engineering decisions as the project moves to the design construction phase.

2. Project Description

The project intersection of SR 5/US 1 and Aviation Boulevard is located within the urbanized area of the City of Vero Beach in Indian River County, Florida. This is a 4-legged, signalized intersection that accommodates the Florida East Coast (FEC) Railroad crossing on the eastbound approach. The FEC Railroad, which is part of the Strategic Intermodal System (SIS) Railroad Corridor, includes double-tracks running north-south parallel to SR 5/US 1 on the west side. Pedestrian crosswalks are provided on the northbound and westbound approaches of the intersection. There are no dedicated bicycle facilities. Nearby landmarks include Vero Beach Regional Airport, Cleveland Clinic Indian River Hospital and Indian River Medical Center, and downtown Vero Beach. The intersection is near a Runway Protection Zone (RPZ) of the Vero Beach Regional Airport.

The project proposes operational and capacity improvements to the intersection of SR 5/US 1 and Aviation Boulevard. Various alternatives were considered during the Project Development & Environment (PD&E) study, which include grade-separated crossings over the FEC Railroad. Additional features were considered such as multi-modal improvements. To account for potential grade separation and other solutions that address the purpose and need, the north-south limits of the PD&E study extend beyond the intersection along US 1 between 21st Street and 41st Street (approximately 2 miles). The west limits extend along Aviation Boulevard between 27th Avenue and US-1 (approximately 1 mile). East of SR 5/US 1, Aviation Boulevard becomes 32nd Street. The east limits include several side streets east of US 1 to 13th Avenue. The PD&E study limits are shown in **Figure 1, Appendix A**.

SR 5/US 1 constitutes the north and south approaches of the intersection, as a proposed four-lane divided facility with a painted center turn-lane, curb and gutter on both sides, and a sidewalk on the east side. SR 5/US 1 has a functional classification of Urban Principal Arterial Other and a context classification of C4 Urban General since there are mostly non-residential land uses along the corridor with residential neighborhood connections. Indian River County has designated SR 5/US 1 corridor as a hurricane evacuation route.

At the eastbound approach of the intersection, Aviation Boulevard crosses the FEC Railroad. This is a 2-lane undivided roadway with no pedestrian facilities. Aviation Boulevard has a functional classification of Urban Minor Arterial and a context classification of C3 Commercial due to the non-

residential land uses. The westbound approach is served by 32nd Street as a local 2-lane undivided street serving limited commercial and residential properties.

3. Data Collection

Project information was obtained from a variety of sources as listed below:

- Florida Department of Transportation (FDOT) Drainage Manual & Drainage Design Guide, January 2023
- FDOT PD&E Manual, July 2020
- FDOT Design Manual (FDM), January 2023
- SJRWMD Permit Information Manual, 2018
- Indian River Farms Water Control District (IRFWCD) Permit Criteria
- Federal Aviation Administration (FAA) Advisory Circular 150/5200-33C
- FDEP and Department of Management Services (DMS) Florida State Owned Land and Record Information System (FL-SOLARIS) and Land Inventory Tracking System (LITS) (2019)
- U.S. Department of Agriculture, Soil Conservation Service (SCS)
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) SSURGO Database of Clay County, Florida, 1989
- United States Geological Survey (USGS) 7.5-Minute Quadrangle Map
- U.S. Fish and Wildlife Service National Wetland Inventory (NWI)
- Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM)
- Field Survey
- Field Review

4. Design Criteria

4.1 Florida Department of Transportation (FDOT)

The design of the stormwater facilities will comply with the standards and criteria set forth by the FDOT Drainage Manual, 2023; FDOT Drainage Design Guide, 2023; and the FDOT Design Manual, 2023.

- Using storm event frequency of 3 years in the appropriate zone and excluding minor losses, the storm sewer system shall provide a minimum clearance of 1-foot from the Hydraulic Grade Line (HGL) to the gutter elevation.
- For on-site ponds, the top of the treatment volume is constrained to the low point in the road minus the base clearance

Stormwater Management Facility Configuration

Ponds are designed to meet minimum FDOT design criteria with side slopes of 1:4 down to the pond bottom. Maintenance berms shall have a width of 20 feet with varying slope of 1:8 or flatter. Tie-downs or tie-ups behind berms have a slope of 1:4. To allow for grading irregularities, one foot of freeboard above the maximum stage to the inside of the Maintenance Berm is to be maintained in the design.

Stormwater Management Facility Aesthetics

Pond aesthetics will be addressed during the Project Development & Environment (PD&E) and final design phase of the project. It is anticipated that landscaping along the side slopes (not the maintenance berm itself) can be incorporated into the design of the ponds.

4.2 St. John's River Water Management District (SJRWMD)

The SJRWMD regulates Stormwater discharge and will require an individual ERP for this project. Federal Regulatory Agencies are delegated as the authority to oversee impacts to isolated wetlands and wetlands connected to waters of the U.S.

The SJRWMD requires that all projects meet state water quality standards, as set forth in Chapter 62-40, Florida Administrative Code (FAC) and in Environmental Permit Applicant's Handbook, Volumes I and II, 2018. To meet SJRWMD water quality criteria:

- Wet detention systems shall be provided for the first one inch of runoff over the entire contributing area, or 2.5 inches times the impervious area, whichever is greater.
- Dry detention systems shall provide for at least 75% of the amounts calculated for wet detention.
- Dry retention systems shall provide at least 50% of the amount computed for wet detention.

For projects which discharge to impaired water bodies, the applicant must demonstrate that the proposed activity will not contribute to the existing loading for the impairment. This reasonable assurance can be achieved by providing a sufficient wet detention permanent pool or by using dry retention or dry detention. The project will require satisfying pre-post criteria (post-development discharge needs to be less than pre-development discharge) for stormwater management design within an open basin. If the project has more than a 50% impervious area, it will require Mean Annual 24-hour storm calculation.

The permitting agency that will be the main point of contact in coordination between parties is the SJRWMD. The existing permits associated with the project location are listed below:

- Indian River Memorial Hospital (1987) - Permit 40-061-0027
- Alcohope of the Treasure Coast (2003) - Permit 42-061-86755-3
- Aviation Boulevard Roadway Widening (2010) - Permit 40-061-123418-1
- All Aboard Florida - Fiber Optic Cable (2015) - Permit 144190-1

4.3 Indian River Farms Water Control District (IRFWCD)

For attenuation, IRFWCD criteria are followed to size the potential pond alternatives. The post development discharge should be less than pre-development discharge for 25-year/24-hour storm. However, the IRFWCD discharge limitation criteria states that no more than 4 inches of volume in 24 hours from the existing roadway and no more than 2 inches of volume in 24 hours from the proposed roadway will be allowed to discharge into the receiving Indian River Farms Main Relief

Canal. The criteria memos are provided in **Appendix F**.

The IRFWCD Hydrologic Model Data, as presented in IRFWCD "*Evaluation and Updating of the Plan of Reclamation Works of Improvement" Report,* shall be used as a design aid for the project since it discharges to the Main Relief Canal which is classified as an impaired waterbody.

4.4 Land Use Data and Topography

The land uses throughout the project corridor are designated as mostly mixed use and industrial with some residential and commercial land uses along the east side of SR 5/US 1. The existing roadway elevations along this section of Aviation Blvd. and SR 5/US 1 range from 10 to 19 feet NAVD'88. The Land Use Map is provided as **Figure 6** in **Appendix A**.

4.5 Natural and Biological Features

Forested and herbaceous freshwater wetlands and surface waters are located within the study area. Estuarine systems and the Indian River Lagoon are one mile to the east. Wetland impacts are expected to be minimal. There is a large archaeological zone called the Vero man Ice Age site just south of Aviation Boulevard and west of the intersection with SR 5/US 1. This is a Section 106 archaeological site. The Archaeological Site Maps are provided as **Figure 7** in **Appendix A**.

4.6 Datum And Conversion

All elevations and stages shown in this document are referenced to the North American Vertical Datum 1988 (NAVD'88) unless otherwise noted. The elevations shown in parenthesis are referenced to the National Geodetic Vertical Datum 1929 (NGVD'29). Datum conversion was obtained from the VDatum software tool available from NOAA's National Geodetic Survey (NGS), Office of Coast Survey (OCS), and Center for Operational Oceanographic Products and Services (CO-OPS) website: https://vdatum.noaa.gov/vdatumweb/. The datum conversion is as follows: NAVD'88 = NGVD'29 - 1.486.

5. Environmental Look Around Coordination

Environmental Look Arounds (ELAs) provide a unique opportunity to team up with regional stakeholders to explore watershed wide stormwater needs and alternative permitting approaches for the project.

A Coordination Meeting with the City of Vero Beach and Indian River County took place on June 16, 2023, where regional stormwater management opportunities were discussed. This meeting was not part of an official ELA. An ELA is not required based on coordination with the City of Vero Beach, Indian River County, and Indian River Farms Water Control District. Pond Siting meetings were held with the Department on June 28, 2023, July 26, 2023, and August 30, 2023. The meeting minutes are provided in **Appendix F**. Key points from these meetings are:

- Proposed ponds will be dry ponds due to aviation requirements.
- The ponds must be dry in the required 72 hours.
- Nutrient loading to the Indian River Lagoon will be a top concern for the agencies.

6. Pre-Development (Existing) and Post Development (Proposed) Conditions

6.2 Existing Drainage Conditions

The project improvements are located within the jurisdictional boundaries of the SJRWMD and IRFWCD and is situated within the Indian River Lagoon Basin.

The existing roadway drainage system along SR 5/US 1 is comprised of “closed conveyance systems” where stormwater runoff is collected and conveyed via curb and gutter to inlets and underground pipes, ultimately discharging into the Indian River Farms Main Relief Canal. The existing roadway drainage system along Aviation Blvd. is comprised of “open conveyance systems” where stormwater runoff sheet flows from the roadway into roadside ditches and an existing dry detention pond, ultimately discharging into the Indian River Farms Main Relief Canal. There are no formal ponds or other SMFs for the local roadways located east of SR 5/US 1. Runoff sheet flows into shallow roadside ditches the discharges into the groundwater by soil percolation.

The project corridor, within the project limits, is divided into five (5) distinct sub-basins that correspond to the existing drainage patterns along the project corridor. The five existing drainage basins are depicted on the drainage maps included in **Appendix B** and described below:

Basin 100 (550 feet west of Airport North Drive to SR 5/US 1 on Aviation Blvd.): The existing roadway consists of east, west through lanes and turn lanes at SR 5/US 1 and Airport North Drive. Runoff from the roadway sheet flows into roadside ditches and is conveyed to the Indian River Farms Main Relief Canal. There is an existing dry detention pond located on the south side of Aviation Blvd. This pond discharges into the Main Relief Canal that ultimately flows into the Indian River Lagoon. There are several cross drains that run under Aviation Blvd.

Basin 200 (26th Street to Indian River Farms Main Relief Canal on SR 5/US 1): The existing roadway consists of two through lanes in each direction and with a center flush paved median for left turns. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed to the Indian River Farms Main Relief Canal. There are no existing ponds on SR 5/US 1 and the roadway storm system discharges directly into the Main Relief Canal that ultimately flows into the Indian River Lagoon.

Basin 300 (Indian River Farms Main Relief Canal to Aviation Blvd. on SR 5/US 1): The existing roadway consists of two through lanes in each direction and with a center flush paved median for left turns. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed to the Indian River Farms Main Relief Canal. There are no existing ponds on SR 5/US 1 and the roadway storm water discharges directly into the Main Relief Canal that ultimately flows into the Indian River Lagoon.

Basin 400 (Local roads; 30th Street, 31st Street, 32nd Street, 33rd Street and surrounding properties east of SR 5/US 1): The existing roadways consist of one through lane in each direction. Runoff sheet flows into shallow roadside ditches then discharges into the groundwater by soil percolation. This area will accommodate the proposed roadway improvements associated with the proposed design alternatives.

Basin 500 (Aviation Blvd to approximately 1,500 feet north of Aviation Blvd. on SR 5/US 1): The existing roadway consists of two through lanes in each direction and with a center flush paved median for left turns. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed to the Indian River Farms Main Relief Canal. There are no existing ponds on SR 5/US 1 and the roadway storm water discharges directly into the Main Relief Canal that ultimately flows into the Indian River Lagoon.

6.3 Proposed Drainage Conditions

The primary purpose of the PD&E study is to evaluate intersection improvement solutions to address existing and projected traffic demands, improve safety, support economic growth, and enhance modal interrelationships with rail, bicycle, and pedestrian modes. As part of the PD&E process, design alternatives were prepared based on the purpose and need of the project. A total of eight (8) alternatives were developed and described in the PD&E Preliminary Engineering Report. Of the eight alternatives, four were selected for consideration. They are listed and described below:

Alternative 1 Conventional Intersection: This alternative expands Aviation Blvd. and the railroad grade crossing to provide four eastbound lanes (1 right, 1 through, 2 lefts), a median separator and two westbound through lanes.

Alternative 2 Twin Intersections (One-way Pairs): This alternative expands Aviation Boulevard and the railroad grade crossing to provide four eastbound lanes (1 right, 1 through, 2 lefts), a median separator and two westbound through lanes. The northbound SR 5/US 1 lanes are shifted eastward to provide a one-way pair with twin intersections.

Alternative 7 Displaced Left Turn (DLT): This alternative deflects the northbound SR 5/US 1 left turn lane to the west side of the SR 5/US 1 right of way via a signalized directional median and a two-lane, two-way parallel roadway that is separated from the SR 5/US 1 through lanes by a concrete separator. This alternative is similar to Alternative 1 as it expands Aviation Boulevard and the railroad grade crossing to provide three eastbound lanes (1 right, 2 through), a median separator and two westbound through lanes.

Alternative 8 Median U-Turn with Roundabout: This alternative incorporates a roundabout and quadrant road to provide for the northbound to westbound left turn and the eastbound to northbound left turn. The SR 5/US 1 and Aviation Blvd. left turns are accomplished using U-Turn movements within a roundabout placed east of the intersection. A detailed description of the traffic movements is provided in the PD&E Preliminary Engineering Report. This alternative expands Aviation Boulevard and the railroad grade crossing to provide two through lanes in each direction and a right turn lane.

The proposed roadway drainage system along SR 5/US 1 consists of “closed conveyance systems” where stormwater runoff is collected and conveyed via curb and gutter to inlets and underground pipes, outfalling into proposed ponds. Potential drainage challenges are present within the project limits. New pond sites may not be within 100 feet of public wells. Due to the dense development along the SR 5/US 1 corridor, detention ponds will have to be located north of the canal. In accordance with the Federal Aviation Administration (FAA) Advisory Circular 150/5200-33C, the

proposed pond will be a dry detention pond that must have a maximum 48-hour detention period. Excerpts of the FAA Advisory Circular is included in **Appendix F.**

Like the existing condition, the project corridor, within the project limits, is divided into five (5) distinct sub-basins that correspond to the existing drainage patterns along the project corridor. The four existing drainage basins are depicted on the drainage maps included in **Appendix B** and described below:

Basin 100 (550 feet west of Airport North Drive to SR 5/US 1 on Aviation Blvd.): The proposed roadway consists of an expanded intersection with east, west through lanes and turn lanes at SR 5/US 1 and Airport North Drive. Runoff from the roadway sheet flows into roadside ditches and is conveyed to the Indian River Farms Main Relief Canal. The proposed improvements will continue to use the existing dry detention pond located on the south side of Aviation Blvd. This pond discharges into the Main Relief Canal that ultimately flows into the Indian River Lagoon. No modifications to this pond are permitted since it is situated within the Vero man Ice Age site described in Section 4.5. However, part of this pond will be impacted by the proposed widening. The pond capacity will be verified to ensure it will accommodate runoff from Aviation Blvd. The existing cross drains that run under Aviation Blvd. will require extension because of the widening.

Basin 200 (26th Street to Indian River Farms Main Relief Canal on SR 5/US 1): The proposed roadway consists of two through lanes in each direction, a median separator, and turn lanes. The exact roadway configuration varies with each design alternative. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed via underground pipes to a proposed dry detention pond. A control structure will be provided in the pond to regulate discharge into the Main Relief Canal.

Basin 300 (Indian River Farms Main Relief Canal to Aviation Blvd. on SR 5/US 1): The proposed roadway consists of two through lanes in each direction, a median separator, and turn lanes with an expanded intersection at Aviation Blvd. The exact roadway configuration varies with each design alternative. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed via underground pipes to a proposed dry detention pond. A control structure will be provided in the pond to regulate discharge into the Main Relief Canal.

Basin 400 (Local roads; 30th Street, 31st Street, 32nd Street, 33rd Street and surrounding properties east of SR 5/US 1): This basin encompasses the proposed roadway right of way east of SR 5/US 1. The proposed roadway consists of one through lane in each direction, a median separator, roundabout, and turn lanes. The exact roadway configuration varies with each design alternative. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed via underground pipes to a proposed dry detention pond. A control structure will be provided in the pond to regulate discharge into the Main Relief Canal.

The existing local roadways will be altered because of the proposed roadway improvements and the construction of the detention ponds. Runoff from the remaining pavement sheet flows into shallow roadside ditches the discharges into the groundwater by soil percolation.

Basin 500 (Aviation Blvd to approximately 1,500 feet north of Aviation Blvd. on SR 5/US 1): The proposed roadway consists of two through lanes in each direction, a median separator, and turn

lanes with an expanded intersection at Aviation Blvd. The exact roadway configuration varies with each design alternative. Runoff from the roadway sheet flows to curb inlets on either side of SR 5/US 1 and is conveyed via underground pipes to a proposed dry detention pond. A control structure will be provided in the pond to regulate discharge into the Main Relief Canal.

6.4 Geotechnical Information

The United States Department of Agriculture (USDA) Soil Conservation Service (SCS), currently the Natural Resources Conservation Service (NRCS), Web Soil Survey Report for Indian River County, Florida (**Figure 3 – Appendix A**) was used to identify soil types within and adjacent to the proposed project. A list of the predominant soil types is documented in the Web Soil Survey Report and Section 2.17 of the Preliminary Engineering Report, “Soils and Geotechnical Data”.

7. Floodplain & Environmental Information

The entire project limits are located within Floodplain Zone X, an area of minimal flood hazard, and poses no significant floodplain encroachment as shown in Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) 12061C0244J (effective 1/26/23). The Indian River Farms Main Relief Canal is located within Floodplain Zone AE, areas where base flood elevations are determined. The flood base elevations within Zone AE range from 16 to 5 feet NAVD’88. The FEMA FIRMette is provided as **Figure 4** in **Appendix A**.

8. Stormwater Ponds

The stormwater ponds have been preliminarily sized for the recommended sites and to treat the impervious areas from each basin. The required pond sizes for the project drainage basin were calculated by evaluating the stormwater runoff volumes using the NRCS Curve Number (CN) method, calculating treatment volume requirements, and reviewing floodplain impacts. Refer to the criteria described in Section 4 for the water quality, water quantity criterion used for this project. The resulting volumes were combined with maintenance berm assumptions to determine the total required pond size. The pond configuration and discharge rates will comply with FDOT, SJRWCD, and IRFWCD design criteria described in Section 4. The pond sizing calculations are included in **Appendix C**.

The pond bottom will be set at a minimum of one foot above the Seasonal High Groundwater Table (SHGWT) elevation. The SHGWT elevation is approximately 6.00 NAVD. This was obtained from the existing SJRWMD permit for the 2011 Aviation Blvd. widening project. The proposed pond will provide treatment and attenuation for Basins 300, 400, and 500. Basin 200 is located south of the Indian River Farms Main Relief Canal and due to the dense development along the SR 5/US 1 corridor, a pond cannot be constructed. Runoff from this basin will continue to discharge directly into the Main Relief Canal. The roadway pavement in Basin 200 is not changed in Alternative 2 and reduced in Alternative 7. Increases in roadway pavement are addressed by compensatory treatment in the proposed ponds. For Basin 100, the existing dry detention pond located on the south side of Aviation Blvd. will remain in use. However, compensatory treatment will be provided in the proposed ponds for the added impervious area in this basin.

Three different pond options were analyzed for each design alternative. The existing R/W throughout

the project is constrained, which requires acquisition of surrounding properties for stormwater ponds. The three pond options are similar hydraulically and in size, the location and geometry vary. Pond layouts for each Alternative are included in **Appendix D**.

Below are detailed summaries for the pond options for each design alternative. A summary of right of way and other environmental impacts are contained in the Pond Site Evaluation Matrices included in **Appendix E**.

Alternative 1: The pond associated with Alternative 1 is a dry detention pond attenuating the proposed improvements associated with this design alternative. Each pond option (Pond 1A, Pond 1B, and Pond 1C) will be sized to treat and attenuate the proposed road right of way within Basins 300, 400, and 500. The proposed pond will be sized to accommodate a required water quality/quantity of 2.72 ac-ft. The provided water quality/quantity storage for Pond 1A, Pond 1B, and Pond 1C is 4.04 ac-ft, 3.61 ac-ft, and 3.55 ac-ft respectively. The pond will include a 20-foot maintenance berm in order to allow access to maintenance crews. The right of way requirement for Pond 1A, Pond1B, and Pond 1C is 2.52 acres, 2.61 acres, and 2.21 acres respectively.

Alternative 2: The pond associated with Alternative 2 is a dry detention pond attenuating the proposed improvements associated with this design alternative. Each pond option (Pond 2A, Pond 2B, and Pond 2C) will be sized to treat and attenuate the proposed road right of way within Basins 300, 400, and 500. The proposed pond will be sized to accommodate a required water quality/quantity of 3.44 ac-ft. The provided water quality/quantity storage for Pond 2A, Pond 2B, and Pond 2C is 3.46 ac-ft, 4.51 ac-ft, and 4.18 ac-ft respectively. The pond will include a 20-foot maintenance berm in order to allow access to maintenance crews. The right of way requirement for Pond 2A, Pond 2B, and Pond 2C is 2.77 acres, 2.49 acres, and 2.54 acres respectively.

Alternative 7: The pond associated with Alternative 7 is a dry detention pond attenuating the proposed improvements associated with this design alternative. Each pond option (Pond 7A, Pond 7B, and Pond 7C) will be sized to treat and attenuate the proposed road right of way within Basins 300, 400, and 500. The proposed pond will be sized to accommodate a required water quality/quantity of 1.48 ac-ft. The provided water quality/quantity storage for Pond 7A, Pond 7B, and Pond 7C is 2.37 ac-ft, 2.82 ac-ft, and 2.07 ac-ft respectively. The pond will include a 20-foot maintenance berm in order to allow access to maintenance crews. The right of way requirement for Pond 7A, Pond 7B, and Pond 7C is 1.59 acres, 2.27 acres, and 1.58 acres respectively.

Alternative 8: The pond associated with Alternative 8 is a dry detention pond attenuating the proposed improvements associated with this design alternative. Each different pond location (Pond 8A, Pond 8B, and Pond 8C) will be sized to treat and attenuate the proposed road right of way within Basins 300, 400, and 500. The proposed pond will be sized to accommodate a required water quality/quantity of 3.50 ac-ft. The provided water quality/quantity storage for Pond 8A, Pond 8B, and Pond 8C is 3.80 ac-ft, 4.89 ac-ft, and 4.38 ac-ft respectively. The pond will include a 20-foot maintenance berm in order to allow access to maintenance crews. The right of way requirement for Pond 8A, Pond 8B, and Pond 8C is 2.40 acres, 2.77 acres, and 2.49 acres respectively.

Inter-Connected Pond Routing (ICPR Version 4.07.05) computer software from Streamline technologies was used to perform the hydrologic and hydraulic analysis of the dry detention pond for each design alternative. Only one alternative was analyzed since the three pond options for each

design alternative are hydraulically similar to each other. The SWM calculations and ICPR analyses are included in **Appendix C**.

9. Results

The Pond Siting selection process for SR 5/US-1 at Aviation Boulevard adheres to the FDOT District 4 Pond Siting Procedures. After initial coordination with the FDOT Drainage office, a Pond Siting Team was assembled by the PD&E Project Manager. The team consisted of members from Planning and Environment Management, Roadway Design, Drainage, Survey, Right-of-Way, Maintenance, Construction, and Legal advisor. The objective of the Pond Siting Team was to evaluate all potential aspects and considerations to determine the factors, weight of factors and scores for each potential pond alternative. Detailed Pond Alternative Layouts were created and are included in **Appendix D**.

Close coordination was maintained with the FDOT Drainage office throughout the process. The process started with a Pond Siting Kick-off meeting where the design alternatives, design process and criteria, special issues, agency coordination, and selection factors were discussed. Subsequent meetings were held with the appropriate team members to screen the pond options, discuss the weight of factors, and finalize each location for evaluation. The Pond Siting Team weighed each factor for each pond option according to significance on the project. Each pond option was scored and multiplied by its weighing factor. Addition of weighted scores (multiplication of weight factor and score) of each pond option for each design alternative is determined and ranked. A higher total number indicates a more desirable alternative. During the final team meetings, the team discussed all previously identified factor weights, scores and total scores to rank the alternatives for each pond option. Finally, a concurrence was achieved for the selected pond option for each design alternative. A Pond Siting Evaluation Matrix was developed to summarize the scoring and ranking and used to select the most beneficial site that minimizes adverse impacts to the aforementioned site conditions. The Pond Siting Evaluation Matrix is included in **Appendix E**.

10. Conclusions

10.1 Pond Siting Conditions

A preliminary Pond Siting investigation was completed and yielded several different locations for pond options for each design alternative. The analysis was performed in accordance with the stipulations published by federal, state, and local authorities. The stormwater ponds, identified in this report, represent the most suitable locations, and are based on quantitative and qualitative engineering judgment. Based on the findings herein, the stormwater management facilities comply with water quality and quantity criteria as outlined by the appropriate agencies. The recommended pond alternatives size, configuration, and location may be revised during the design phases. The selected ponds are illustrated in the table below:

Table 10 – Recommended Pond Site Matrix

THE PREFERRED STORMWATER MANAGEMENT FACILITY			
DESIGN ALTERNATIVE	DRY DETENTION POND A	DRY DETENTION POND B	DRY DETENTION POND C
ALTERNATIVE 1	X		
ALTERNATIVE 2		X	
ALTERNATIVE 7	X		
ALTERNATIVE 8			X

10.2 Selection of the Preferred Alternative

Based on the comprehensive alternatives evaluation preformed for the SR 5/US 1 at Aviation Boulevard intersection, Alternative 1 was chosen as the Preferred Alternative. Alternative 1 maintains the existing conventional intersection geometry and results in the least impacts and costs. The preferred pond configuration for Alternative 1 is Pond 1A. A full description of Alternative 1 can be found in Section 1.5 of the PD&E Preliminary Engineering Report.

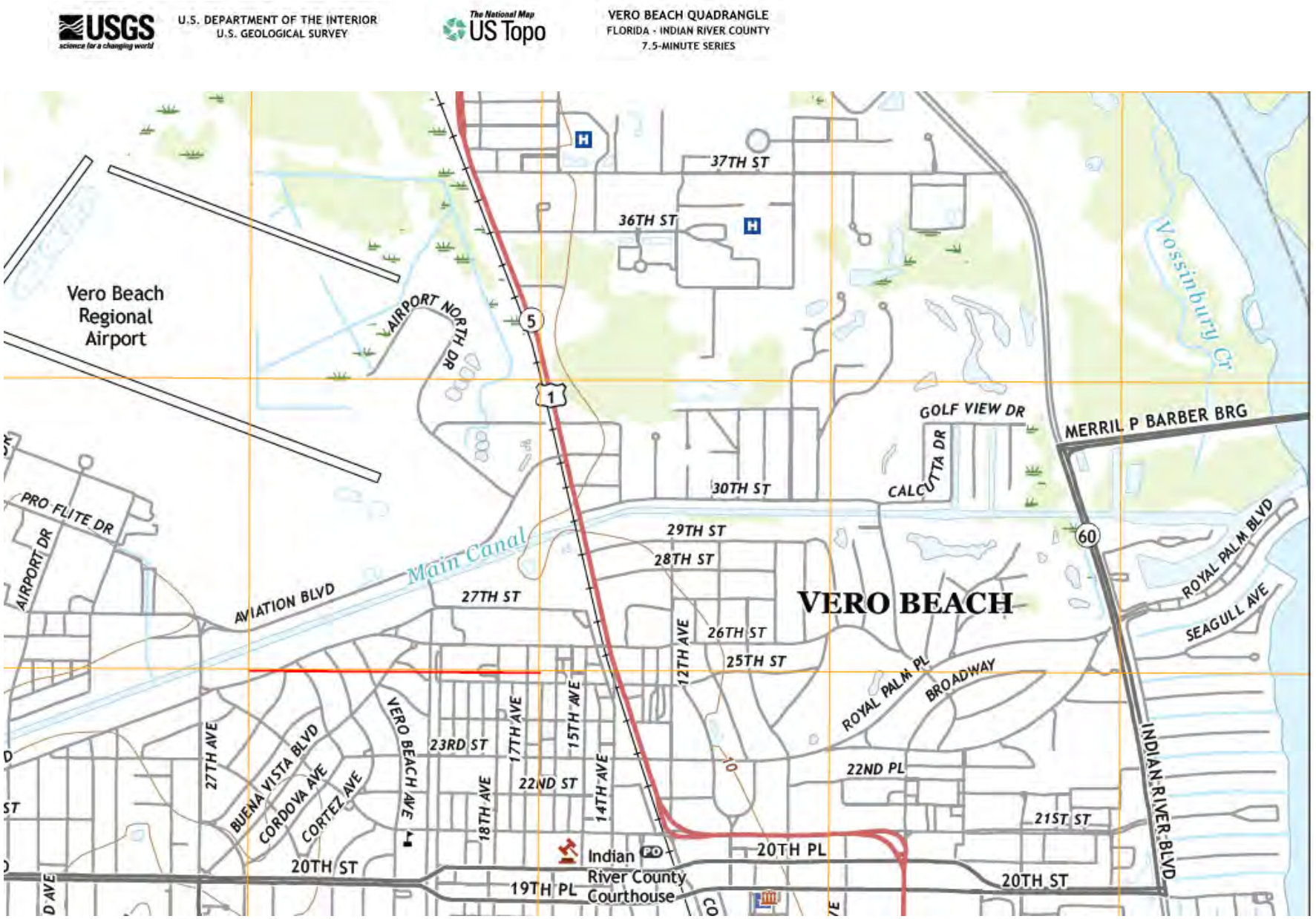
Appendix A
Figures

- Figure 1: Project Location Map
- Figure 2: USGS Quadrangle Map
- Figure 3: Web Soils Survey
- Figure 4: FEMA FIRMettes
- Figure 5: SJRWMD Watershed Map
- Figure 6: Land Use Map
- Figure 7: Archaeological Site Map
- Figure 8: NOAA Precipitation Frequency Data
- Figure 9: Typical Sections

FIGURE 1

Project Location Map

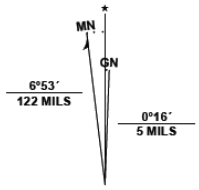
FIGURE 2


USGS
science for a changing world
U.S. DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY
The National Map
US Topo
VERO BEACH QUADRANGLE
FLORIDA - INDIAN RIVER COUNTY
7.5-MINUTE SERIES
Vero Beach Regional Airport
AIRPORT NORTH DR
37TH ST
36TH ST
Vossinbury Cr
GOLF VIEW DR
MERRIL P BARBER BRG
CALCUTTA DR
30TH ST
PRO FLITE DR
AIRPORT DR
29TH ST
28TH ST
Main Canal
AVIATION BLVD
27TH ST
VERO BEACH
ROYAL PALM BLVD
SEAGULL AVE
26TH ST
25TH ST
12TH AVE
ROYAL PALM PL
BROADWAY
INDIAN RIVER BLVD
27TH AVE
BUENA VISTA BLVD
CORDOVA AVE
CORTEZ AVE
VERO BEACH AVE
23RD ST
17TH AVE
15TH AVE
18TH AVE
22ND ST
14TH AVE
22ND PL
21ST ST
20TH PL
20TH ST
19TH PL
Indian River County Courthouse
PO

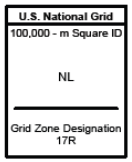
Produced by the United States Geological Survey
North American Datum of 1983 (NAD83)
World Geodetic System of 1984 (WGS84). Projection and
1 000-meter grid:Universal Transverse Mercator, Zone 17R

This map is not a legal document. Boundaries may be generalized for this map scale. Private lands within government reservations may not be shown. Obtain permission before entering private lands.

Imagery	NAIP,	December 2019
Roads	U.S. Census Bureau,	2016
Names	GNIS, 1979 -	2020
Hydrography	National Hydrography Dataset, 1899 -	2019
Contours	National Elevation Dataset, 1999 -	2012
Boundaries	Multiple sources; see metadata file 2018 -	2019
Public Land Survey System	BLM,	2020
Wetlands	FWS National Wetlands Inventory	2010



UTM GRID AND 2019 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET



ROAD CLASSIFICATION

Expressway
Secondary Hwy
Ramp
Local Connector
Local Road
4WD
Interstate Route
US Route
State Route

VERO BEACH, FL

2021

SCALE 1:24 000

1 0.5 0 KILOMETERS 1 2

1000 500 0 METERS 1000 2000

1 0.5 0 1

MILES

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

FEET

CONTOUR INTERVAL 10 FEET
NORTH AMERICAN VERTICAL DATUM OF 1988

This map was produced to conform with the
National Geospatial Program US Topo Product Standard.

FIGURE 3

Soil Map—Indian River County, Florida
(Aviation Blvd)

Map Scale: 1:10,500 if printed on A portrait (8.5" x 11") sheet.

N

Meters
0 150 300 600 900

Feet
0 500 1000 2000 3000

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

MAP LEGEND

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

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

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

Water Features
- Streams and Canals

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

Background
- Aerial Photography

MAP INFORMATION

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

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

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

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

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

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

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

Soil Survey Area: Indian River County, Florida
Survey Area Data: Version 21, Sep 1, 2022

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

Date(s) aerial images were photographed: Jan 18, 2022—Jan 30, 2022

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

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5	Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes	105.9	41.1%
8	Paola sand, 0 to 5 percent slopes	5.8	2.3%
10	Riviera fine sand, 0 to 2 percent slopes	3.4	1.3%
11	St. Lucie sand, 0 to 8 percent slopes	22.4	8.7%
13	Wabasso-Wabasso, wet, fine sand, 0 to 2 percent slopes	12.2	4.7%
21	Pomello sand, 0 to 5 percent slopes	16.8	6.5%
22	Urban land, 0 to 2 percent slopes	63.4	24.6%
23	Arents, 0 to 5 percent slopes	18.7	7.3%
29	Immokalee-Urban land complex	3.6	1.4%
32	Jonathan sand, 0 to 5 percent slopes	0.8	0.3%
36	Cypress Lake-Cypress Lake, wet, fine sands, 0 to 2 percent slopes	0.4	0.2%
100	Waters of the Atlantic Ocean	4.3	1.7%
Totals for Area of Interest		**257.6**	**100.0%**

Hydrologic Soil Group and Surface Runoff

This table gives estimates of various soil water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

Surface runoff refers to the loss of water from an area by flow over the land surface. Surface runoff classes are based on slope, climate, and vegetative cover. The concept indicates relative runoff for very specific conditions. It is assumed that the surface of the soil is bare and that the retention of surface water resulting from irregularities in the ground surface is minimal. The classes are negligible, very low, low, medium, high, and very high.

Report—Hydrologic Soil Group and Surface Runoff

Absence of an entry indicates that the data were not estimated. The dash indicates no documented presence.

Hydrologic Soil Group and Surface Runoff–Indian River County, Florida			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**

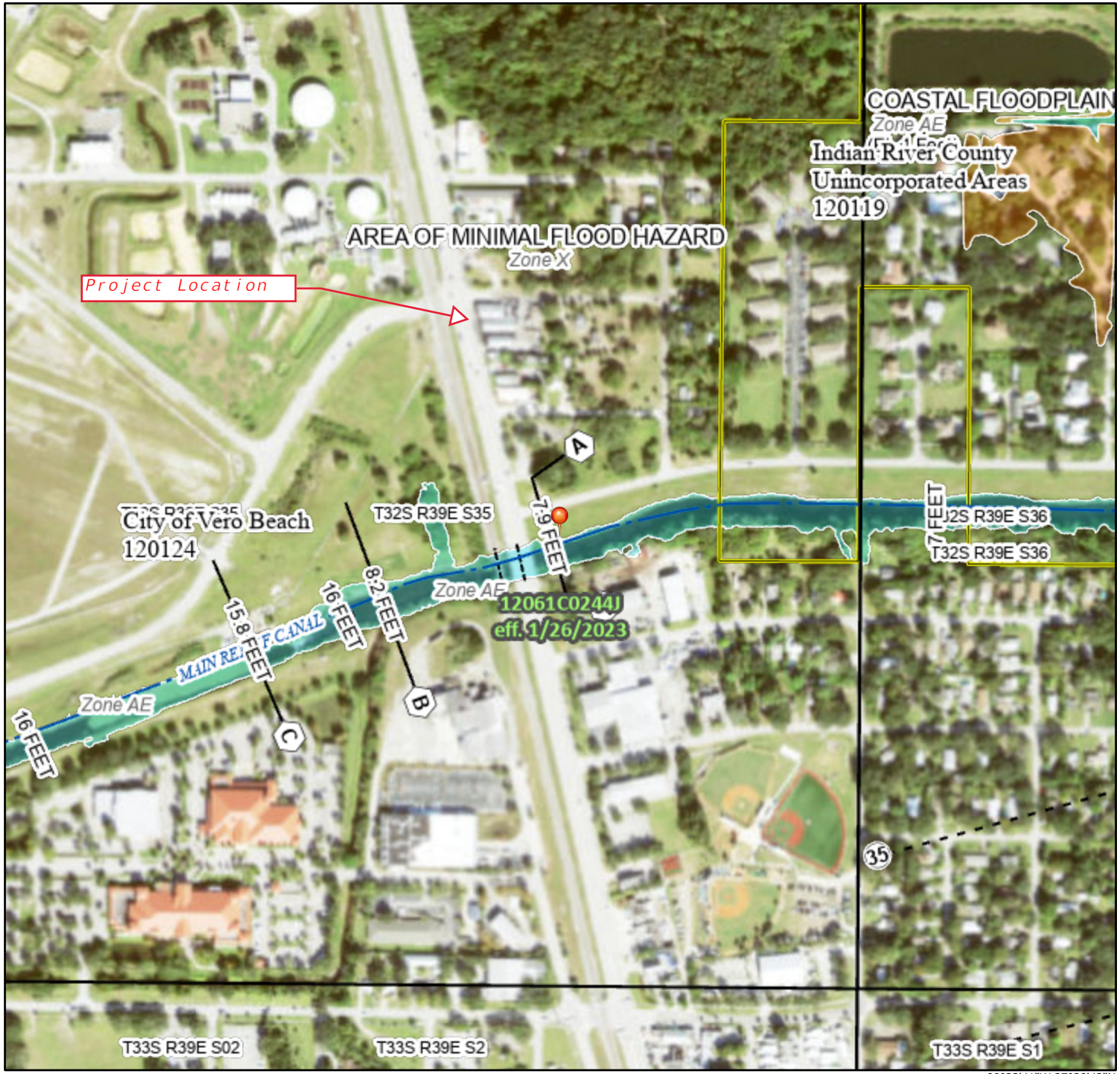
Hydrologic Soil Group and Surface Runoff–Indian River County, Florida			
Map symbol and soil name	**Pct. of map unit**	**Surface Runoff**	**Hydrologic Soil Group**
5—Myakka-Myakka, wet, fine sands, 0 to 2 percent slopes			
Myakka	70	Very high	A/D
Myakka, wet	15	Very high	A/D
8—Paola sand, 0 to 5 percent slopes			
Paola	85	Negligible	A
10—Riviera fine sand, 0 to 2 percent slopes			
Riviera	80	Very high	A/D
11—St. Lucie sand, 0 to 8 percent slopes			
St. lucie	90	Negligible	A
13—Wabasso-Wabasso, wet, fine sand, 0 to 2 percent slopes			
Wabasso	70	Very high	B/D
Wabasso, wet	15	Very high	B/D
21—Pomello sand, 0 to 5 percent slopes			
Pomello	85	Negligible	A
22—Urban land, 0 to 2 percent slopes			
Urban land	85	Very high	—
23—Arents, 0 to 5 percent slopes			
Arents	90	Low	A
28—EauGallie-Urban land complex			
Eaugallie, non-hydric	50	High	A/D
Urban land	30	—	—
Eaugallie, hydric	10	High	A/D
29—Immokalee-Urban land complex			
Immokalee, non-hydric	50	High	A/D
Urban land	25	—	—
Immokalee, hydric	10	High	A/D
32—Jonathan sand, 0 to 5 percent slopes			
Jonathan	85	Negligible	A
36—Cypress Lake-Cypress Lake, wet, fine sands, 0 to 2 percent slopes			
Cypress lake, non-hydric	60	Very high	B/D
Cypress lake, hydric	25	Very high	B/D
100—Waters of the Atlantic Ocean			
Waters of the atlantic ocean	100	—	—

National Flood Hazard Layer FIRMette

FEMA

FIGURE 4

80°24'19"W 27°39'14"N



80°23'41"W 27°38'42"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

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

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

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

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

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

OTHER FEATURES
- 20.2 / 17.5 Cross Sections with 1% Annual Chance / Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 1/31/2024 at 3:51 PM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

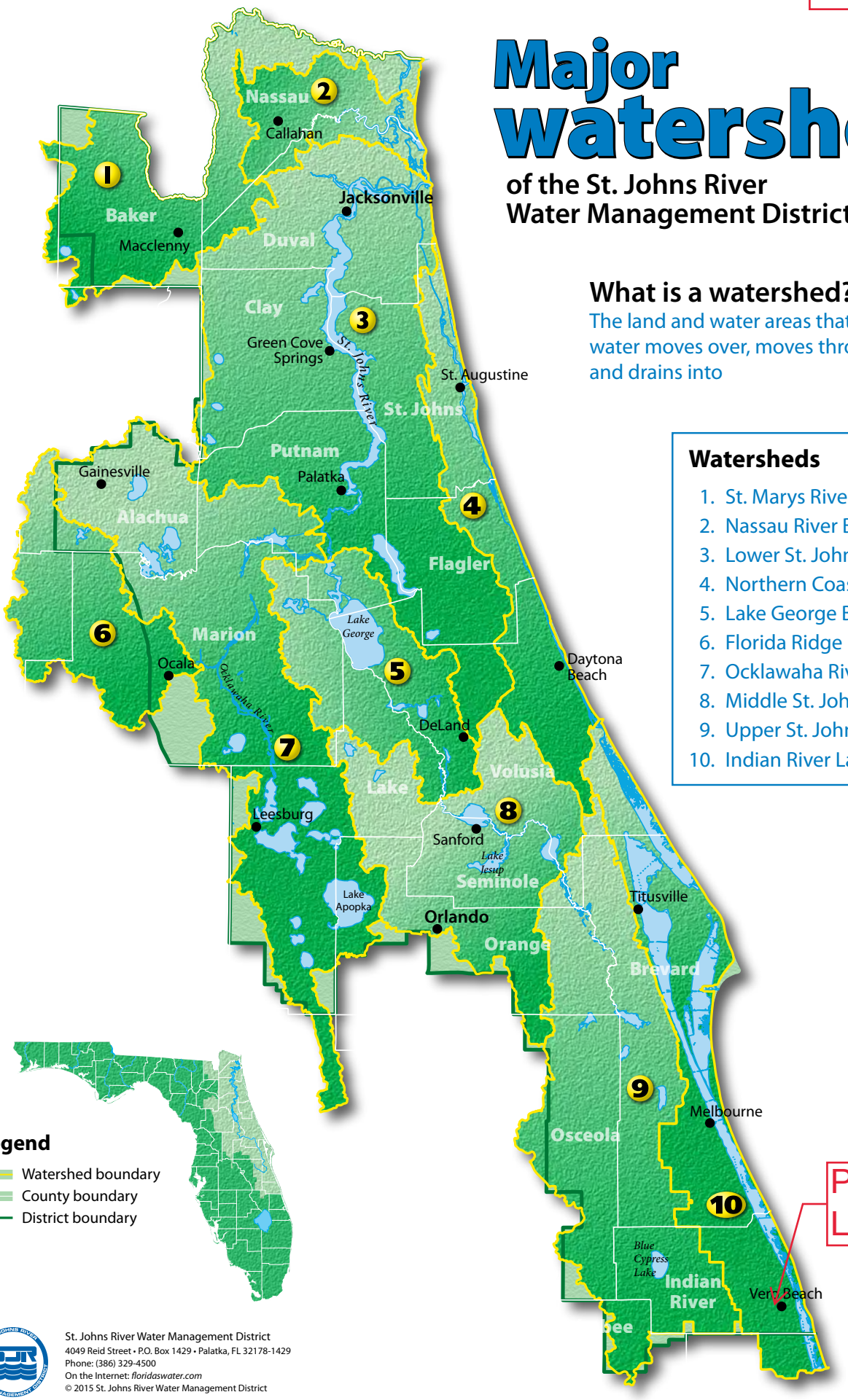
FIGURE 5

Major watersheds

of the St. Johns River Water Management District

What is a watershed?

The land and water areas that water moves over, moves through, and drains into



Watersheds

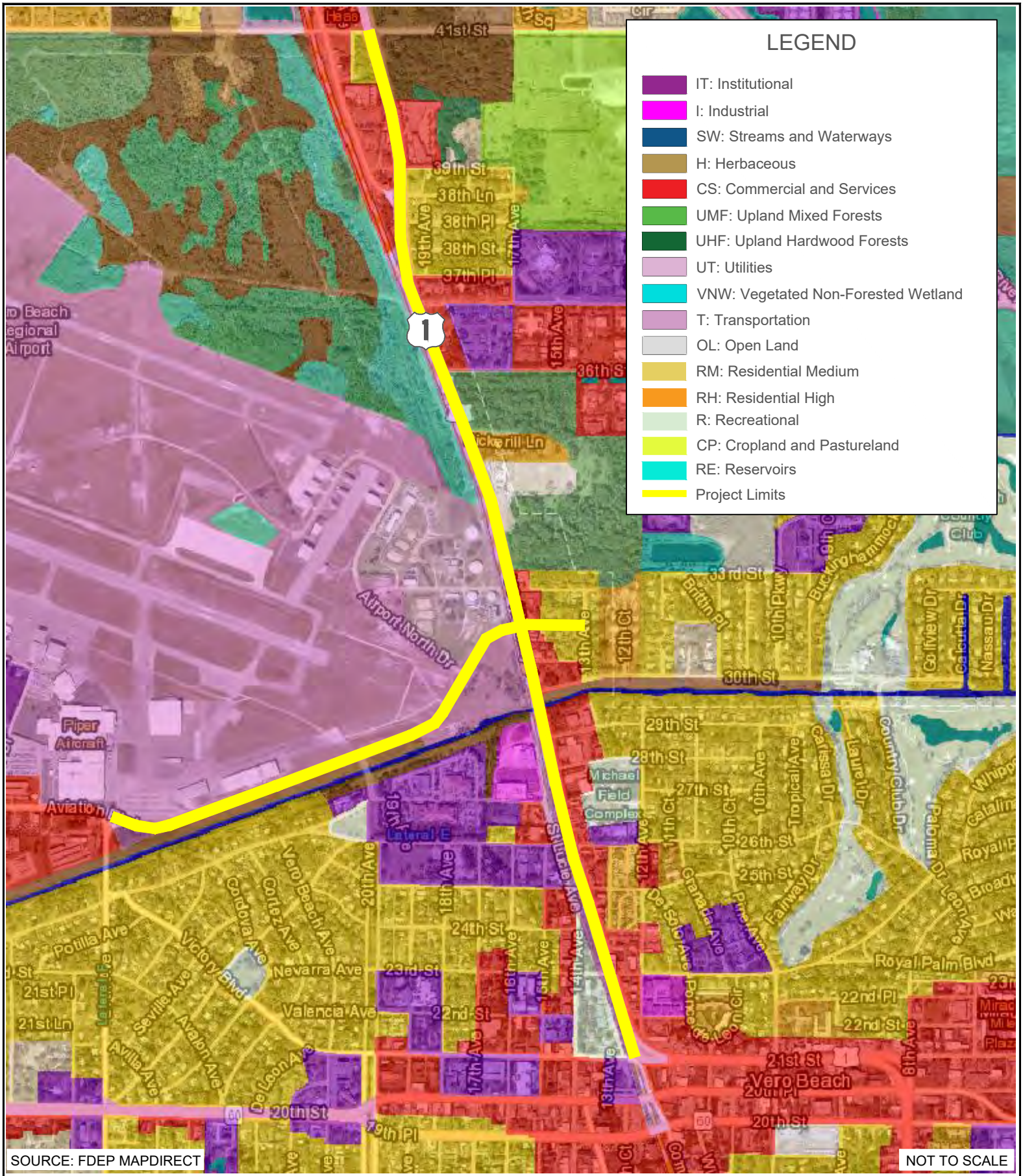
1. St. Marys River Basin
2. Nassau River Basin
3. Lower St. Johns River Basin
4. Northern Coastal Basin
5. Lake George Basin
6. Florida Ridge Basin
7. Ocklawaha River Basin
8. Middle St. Johns River Basin
9. Upper St. Johns River Basin
10. Indian River Lagoon Basin

Legend

- Watershed boundary
- County boundary
- District boundary

Project Location

St. Johns River Water Management District
4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429
Phone: (386) 329-4500
On the Internet: *floridaswater.com*



SOURCE: FDEP MAPDIRECT

NOT TO SCALE

PROJECT NAME:	SR 5/US-1 at Aviation Boulevard
PROJECT #:	441693-1-22-02
DATE:	09/14/2023
CREATED BY:	CO
CHECKED BY:	JA

EXISTING LAND USE MAP

FIGURE 6

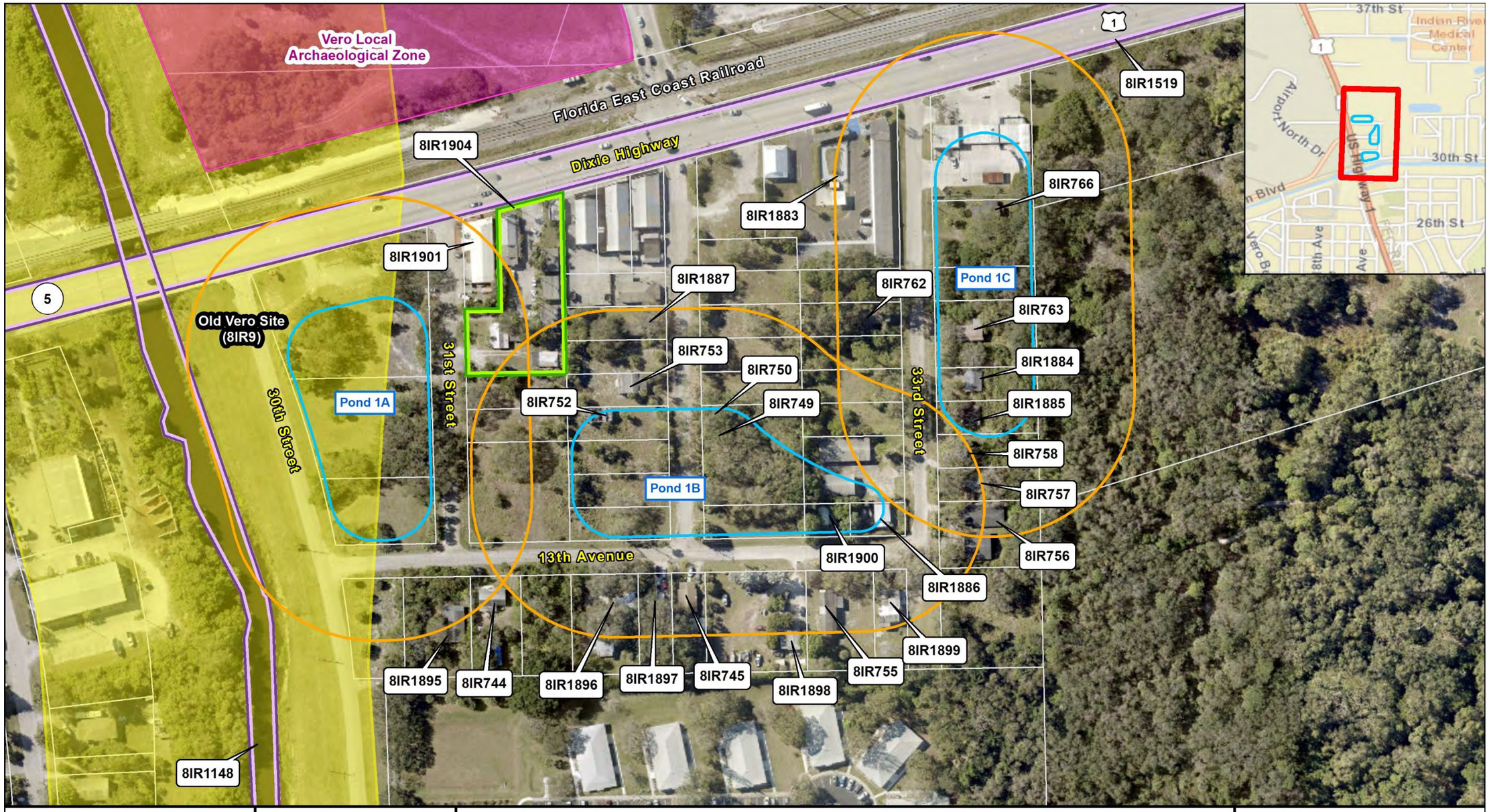


Figure 2: Historic and Archaeological Resources within the Study Area for the Alternative 1 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

Feet
0 100 200

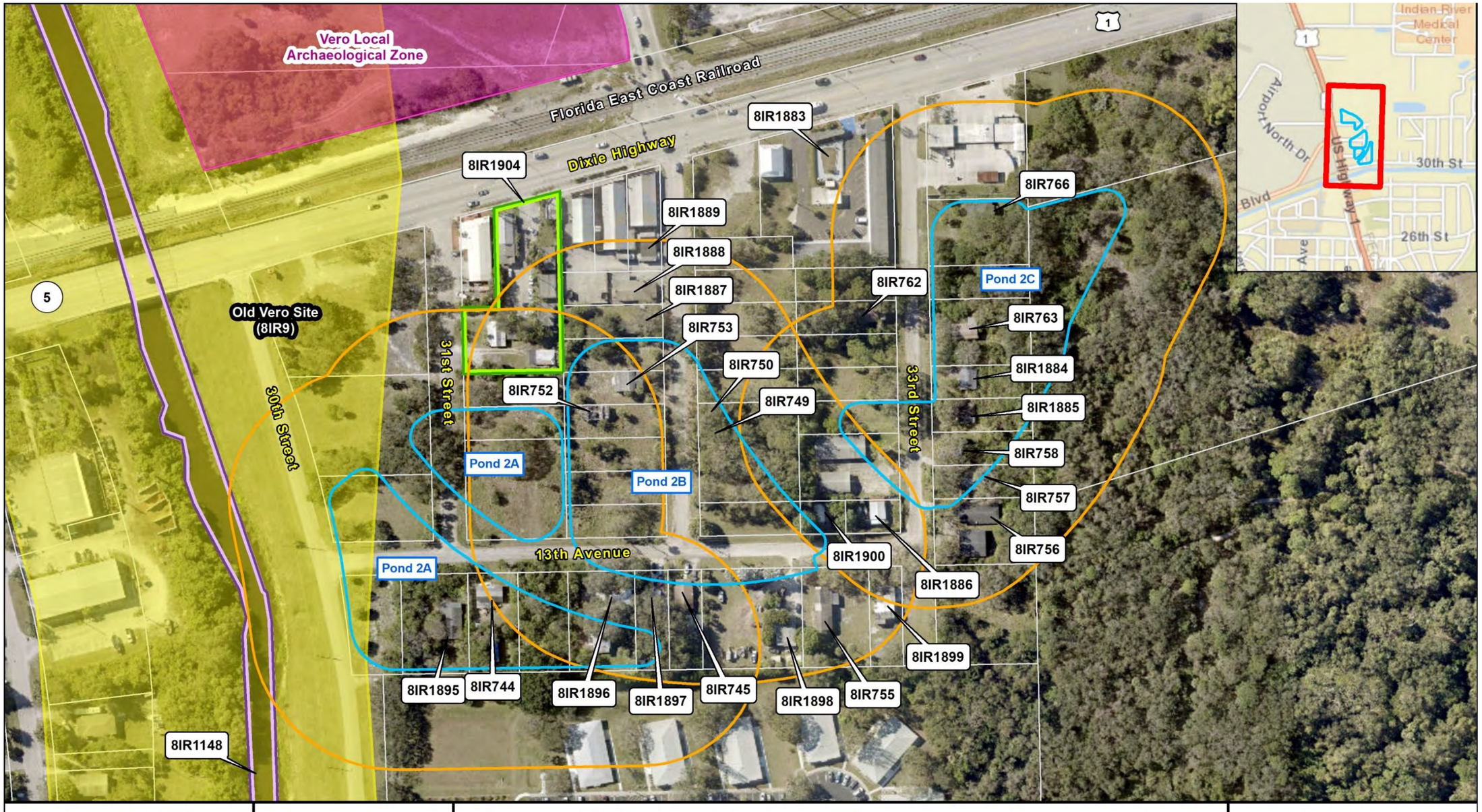


Figure 3: Historic and Archaeological Resources within the Study Area for the Alternative 2 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

0 100 200 Feet

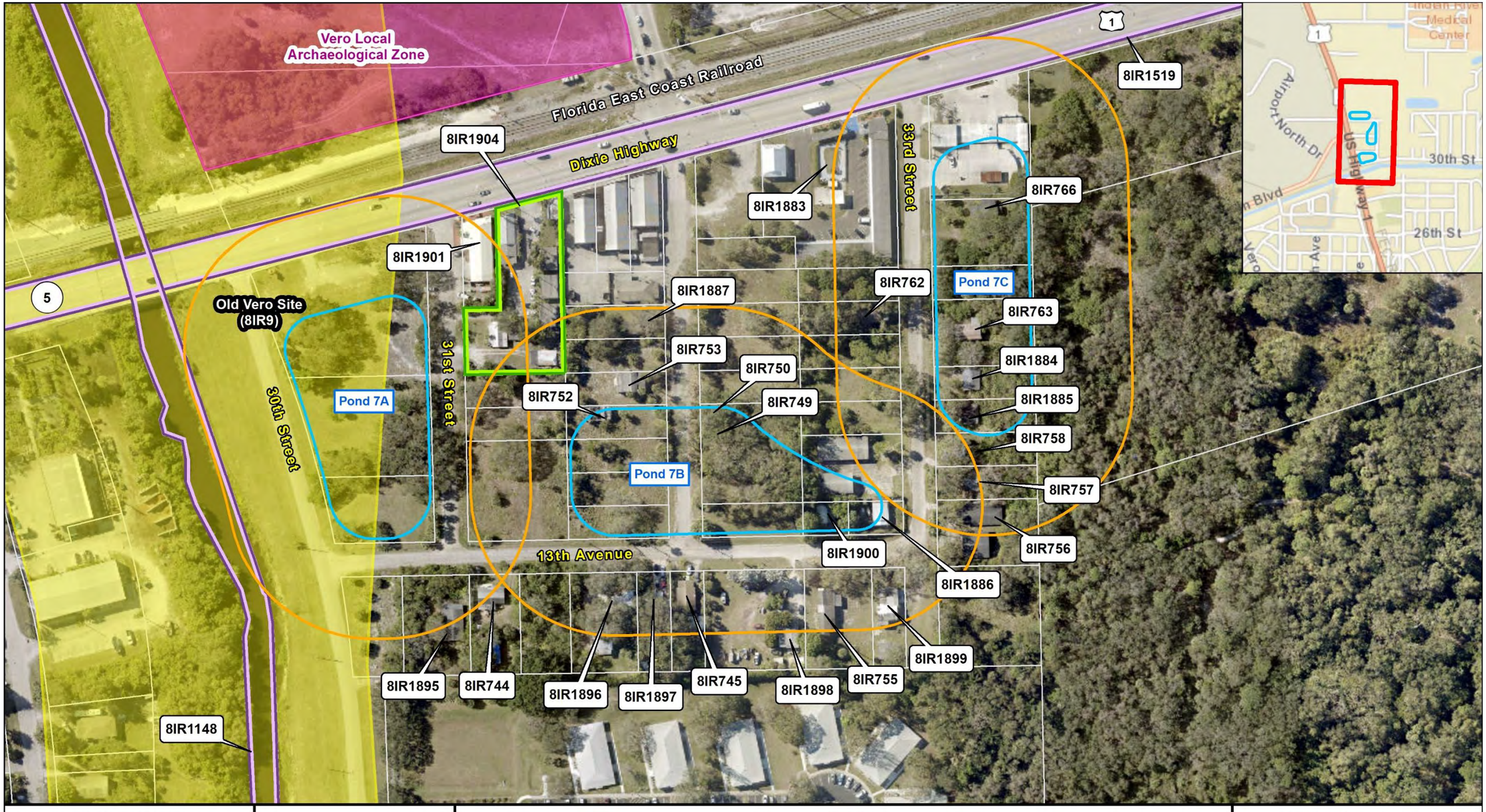


Figure 4: Historic and Archaeological Resources within the Study Area for the Alternative 7 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

0 100 200 Feet

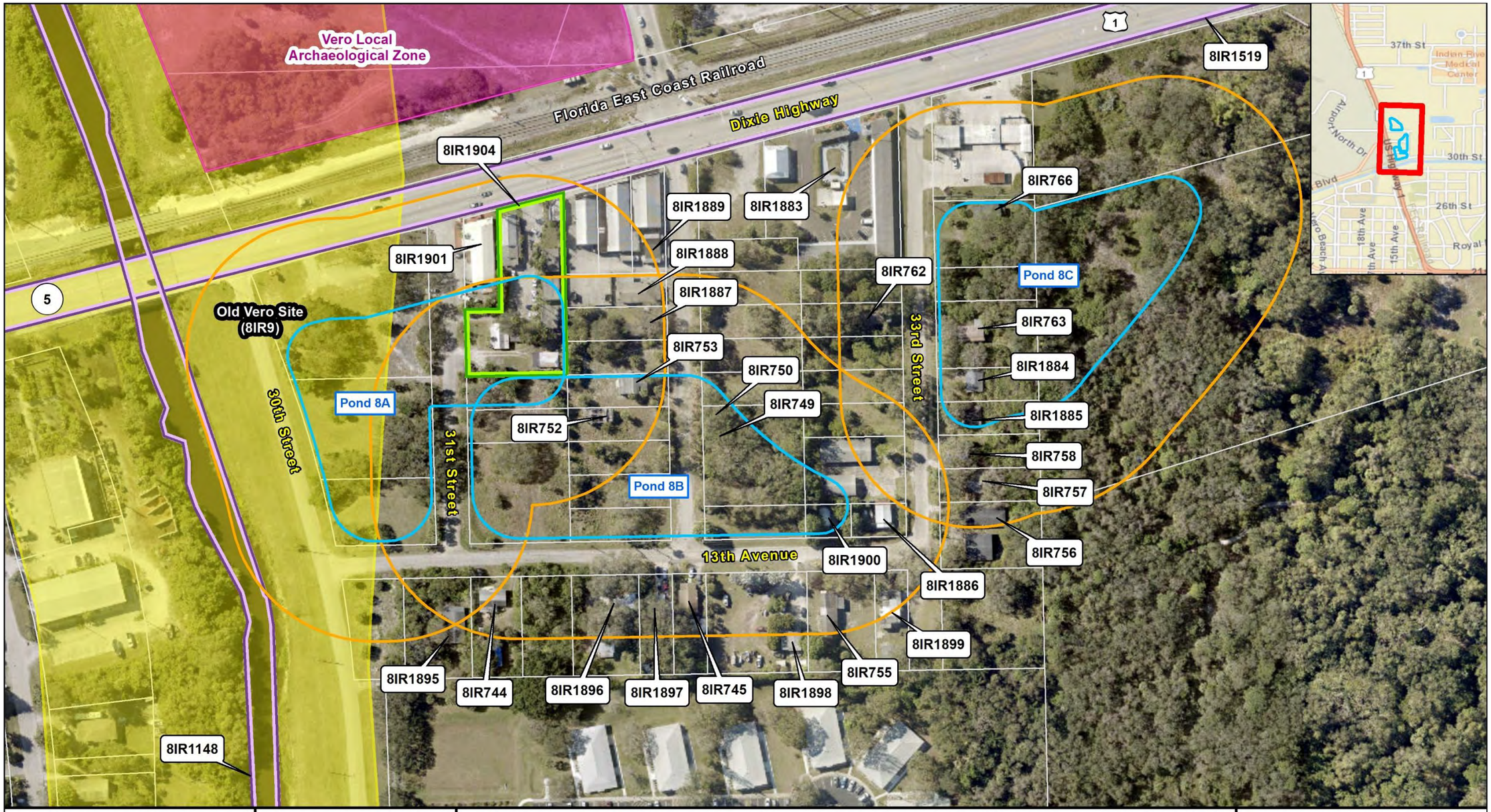


Figure 5: Historic and Archaeological Resources within the Study Area for the Alternative 8 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

Feet
0 100 200

FIGURE 8

NOAA Atlas 14, Volume 9, Version 2
Location name: Vero Beach, Florida, USA*
Latitude: 27.6512°, Longitude: -80.3994°
Elevation: 10 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

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

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.548 (0.455-0.673)	0.626 (0.520-0.771)	0.757 (0.626-0.935)	0.868 (0.714-1.08)	1.02 (0.813-1.32)	1.15 (0.888-1.50)	1.28 (0.949-1.72)	1.41 (0.999-1.96)	1.58 (1.08-2.27)	1.72 (1.14-2.51)
10-min	0.802 (0.666-0.986)	0.917 (0.761-1.13)	1.11 (0.917-1.37)	1.27 (1.04-1.58)	1.50 (1.19-1.93)	1.68 (1.30-2.20)	1.87 (1.39-2.52)	2.06 (1.46-2.86)	2.32 (1.58-3.33)	2.52 (1.67-3.68)
15-min	0.978 (0.813-1.20)	1.12 (0.928-1.38)	1.35 (1.12-1.67)	1.55 (1.27-1.92)	1.83 (1.45-2.36)	2.05 (1.59-2.69)	2.28 (1.70-3.07)	2.51 (1.78-3.49)	2.83 (1.93-4.06)	3.08 (2.03-4.49)
30-min	1.48 (1.23-1.82)	1.69 (1.40-2.08)	2.04 (1.69-2.52)	2.34 (1.92-2.91)	2.77 (2.19-3.56)	3.10 (2.40-4.06)	3.45 (2.56-4.64)	3.80 (2.70-5.29)	4.29 (2.92-6.16)	4.67 (3.08-6.81)
60-min	1.93 (1.60-2.38)	2.20 (1.83-2.71)	2.66 (2.20-3.28)	3.04 (2.50-3.77)	3.58 (2.84-4.60)	4.00 (3.09-5.23)	4.43 (3.29-5.96)	4.87 (3.46-6.77)	5.47 (3.72-7.84)	5.93 (3.92-8.65)
2-hr	2.38 (1.99-2.91)	2.72 (2.27-3.32)	3.27 (2.72-4.02)	3.74 (3.09-4.61)	4.39 (3.49-5.61)	4.90 (3.80-6.36)	5.41 (4.04-7.23)	5.94 (4.24-8.19)	6.65 (4.55-9.46)	7.19 (4.78-10.4)
3-hr	2.60 (2.18-3.17)	2.98 (2.50-3.64)	3.61 (3.01-4.41)	4.14 (3.43-5.08)	4.87 (3.89-6.20)	5.44 (4.24-7.04)	6.02 (4.51-8.01)	6.61 (4.74-9.08)	7.40 (5.08-10.5)	8.01 (5.35-11.6)
6-hr	2.99 (2.52-3.62)	3.49 (2.93-4.22)	4.32 (3.61-5.24)	5.02 (4.18-6.13)	6.02 (4.84-7.64)	6.81 (5.33-8.78)	7.62 (5.75-10.1)	8.46 (6.10-11.6)	9.60 (6.64-13.5)	10.5 (7.04-15.0)
12-hr	3.43 (2.90-4.12)	4.09 (3.45-4.92)	5.22 (4.40-6.30)	6.22 (5.20-7.53)	7.66 (6.20-9.71)	8.82 (6.96-11.4)	10.0 (7.64-13.3)	11.3 (8.24-15.5)	13.1 (9.14-18.5)	14.5 (9.83-20.7)
24-hr	4.00 (3.40-4.77)	4.79 (4.06-5.72)	6.17 (5.22-7.39)	7.41 (6.23-8.92)	9.25 (7.56-11.7)	10.8 (8.56-13.8)	12.4 (9.49-16.3)	14.1 (10.3-19.2)	16.6 (11.6-23.2)	18.5 (12.6-26.2)
2-day	4.74 (4.05-5.62)	5.58 (4.76-6.62)	7.08 (6.01-8.42)	8.43 (7.12-10.1)	10.4 (8.59-13.1)	12.1 (9.70-15.5)	13.9 (10.7-18.3)	15.9 (11.7-21.4)	18.6 (13.2-25.9)	20.8 (14.3-29.3)
3-day	5.23 (4.48-6.18)	6.15 (5.26-7.26)	7.74 (6.60-9.17)	9.16 (7.76-10.9)	11.2 (9.25-14.0)	13.0 (10.4-16.4)	14.8 (11.4-19.2)	16.7 (12.3-22.4)	19.4 (13.8-26.9)	21.5 (14.8-30.2)
4-day	5.65 (4.85-6.65)	6.60 (5.66-7.78)	8.25 (7.04-9.75)	9.69 (8.23-11.5)	11.8 (9.71-14.7)	13.5 (10.8-17.0)	15.3 (11.8-19.8)	17.2 (12.7-23.0)	19.8 (14.1-27.4)	21.9 (15.1-30.7)
7-day	6.77 (5.83-7.92)	7.71 (6.64-9.04)	9.34 (8.01-11.0)	10.8 (9.18-12.7)	12.9 (10.6-15.9)	14.6 (11.7-18.2)	16.3 (12.7-21.0)	18.2 (13.6-24.2)	20.8 (14.9-28.6)	22.9 (15.9-31.8)
10-day	7.77 (6.72-9.07)	8.74 (7.54-10.2)	10.4 (8.95-12.2)	11.9 (10.1-14.0)	14.0 (11.6-17.2)	15.7 (12.7-19.6)	17.6 (13.7-22.5)	19.5 (14.6-25.8)	22.2 (15.9-30.3)	24.3 (16.9-33.7)
20-day	10.7 (9.25-12.3)	11.9 (10.3-13.8)	14.0 (12.1-16.3)	15.8 (13.6-18.5)	18.4 (15.3-22.4)	20.5 (16.6-25.3)	22.6 (17.7-28.7)	24.8 (18.7-32.6)	27.9 (20.1-37.7)	30.3 (21.2-41.6)
30-day	13.1 (11.4-15.1)	14.6 (12.7-16.9)	17.2 (14.9-20.0)	19.4 (16.7-22.6)	22.4 (18.7-27.1)	24.8 (20.2-30.4)	27.2 (21.4-34.3)	29.7 (22.3-38.6)	33.0 (23.8-44.3)	35.5 (25.0-48.6)
45-day	16.2 (14.1-18.6)	18.1 (15.8-20.9)	21.3 (18.5-24.6)	24.0 (20.7-27.8)	27.5 (22.9-32.9)	30.2 (24.6-36.8)	32.9 (25.9-41.3)	35.6 (26.8-46.1)	39.1 (28.3-52.3)	41.7 (29.5-57.0)
60-day	18.8 (16.5-21.6)	21.1 (18.5-24.2)	24.8 (21.6-28.5)	27.8 (24.1-32.1)	31.7 (26.5-37.8)	34.7 (28.3-42.1)	37.6 (29.6-46.9)	40.4 (30.5-52.1)	44.1 (32.0-58.6)	46.7 (33.1-63.6)

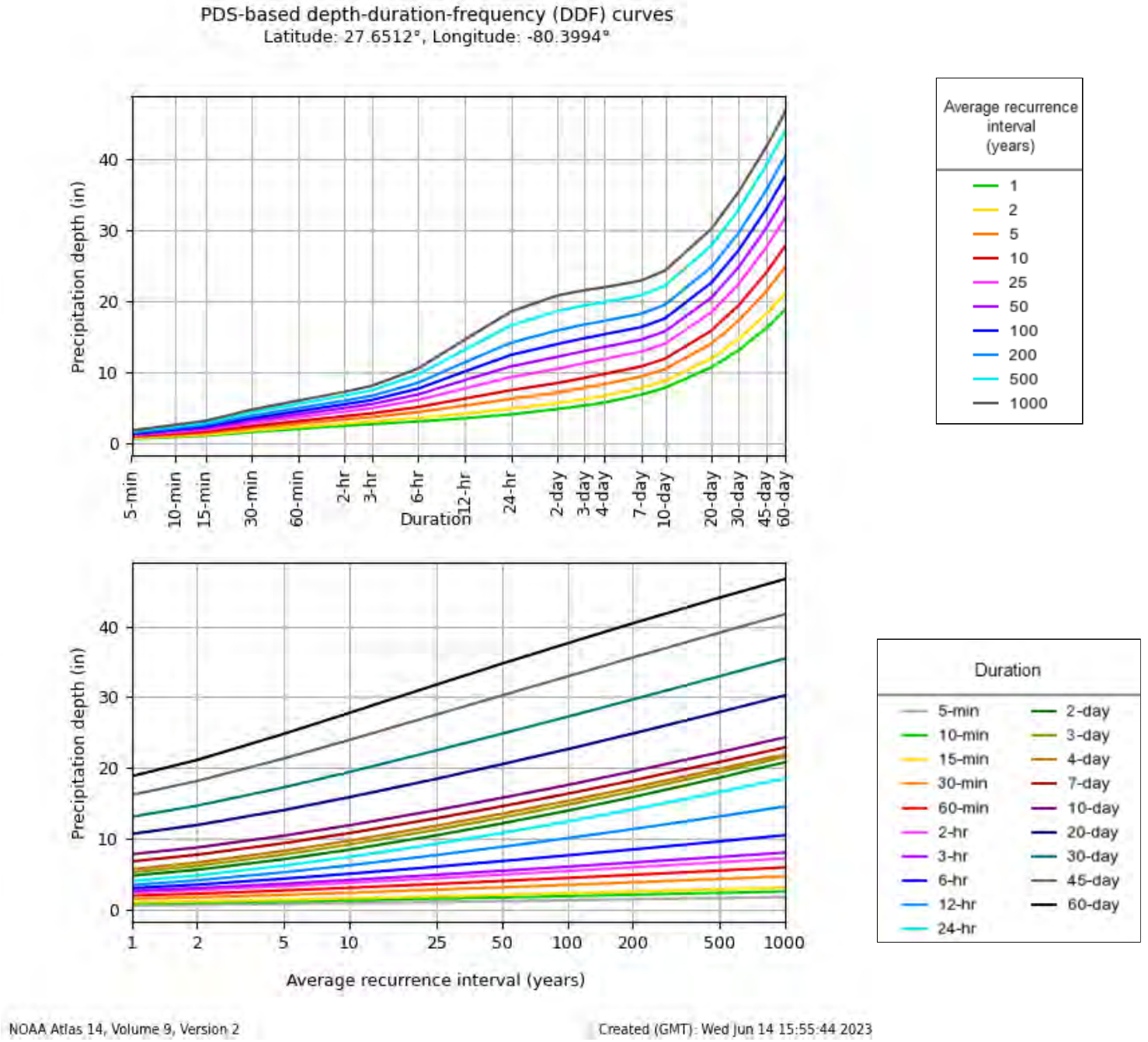
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



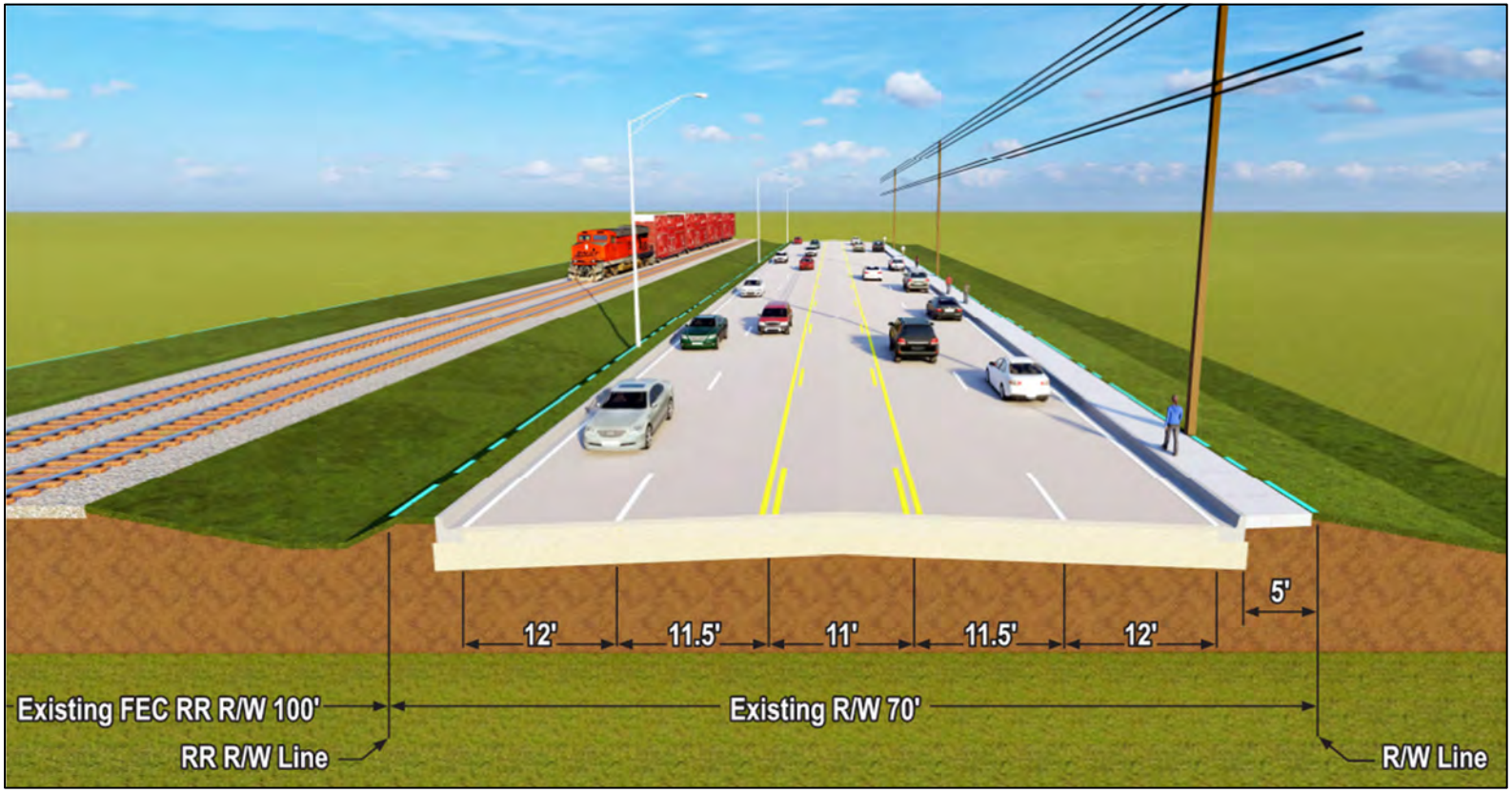
Back to Top

Maps & aerials

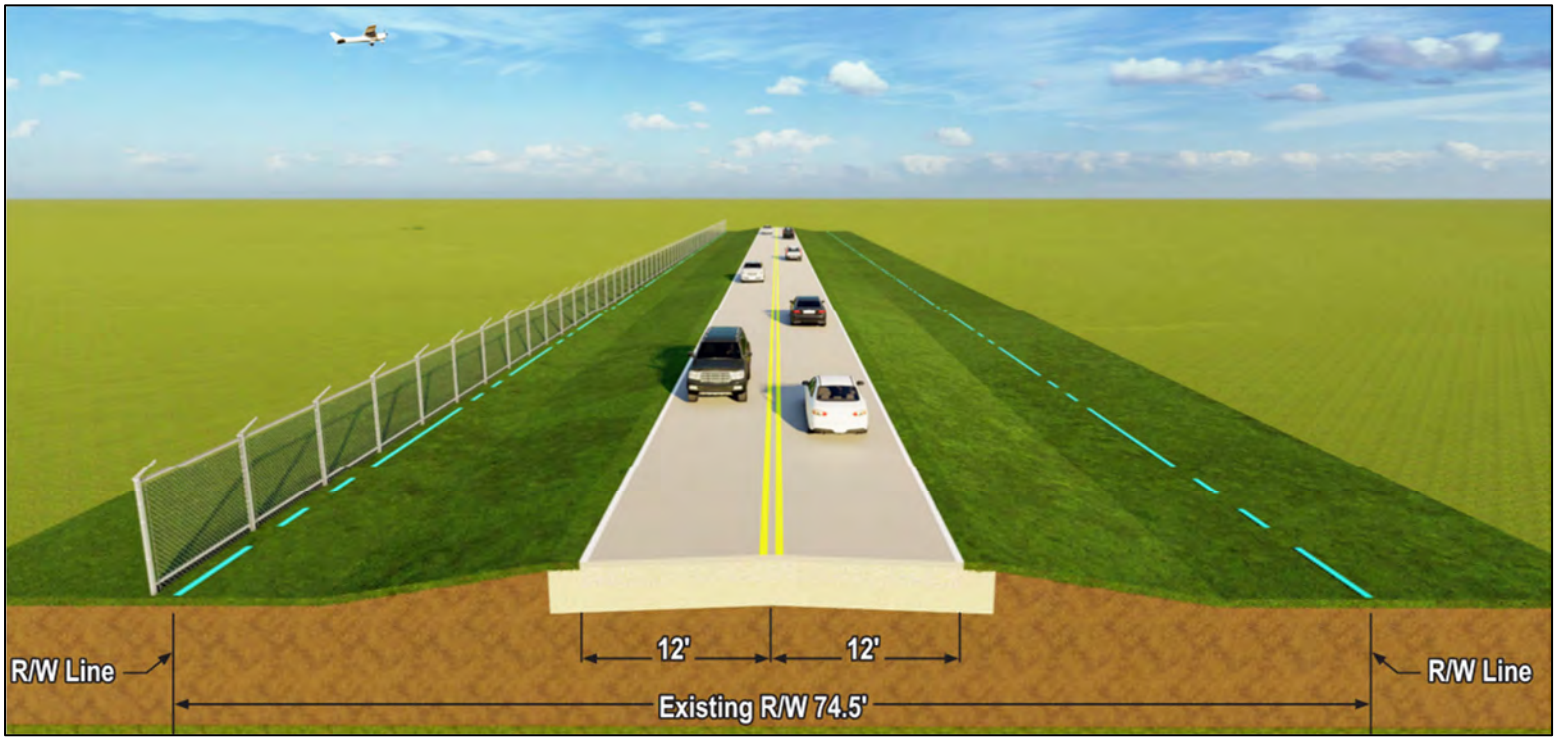
Small scale terrain

FIGURE 9

Typical Sections



Existing Typical Section – SR 5/US 1

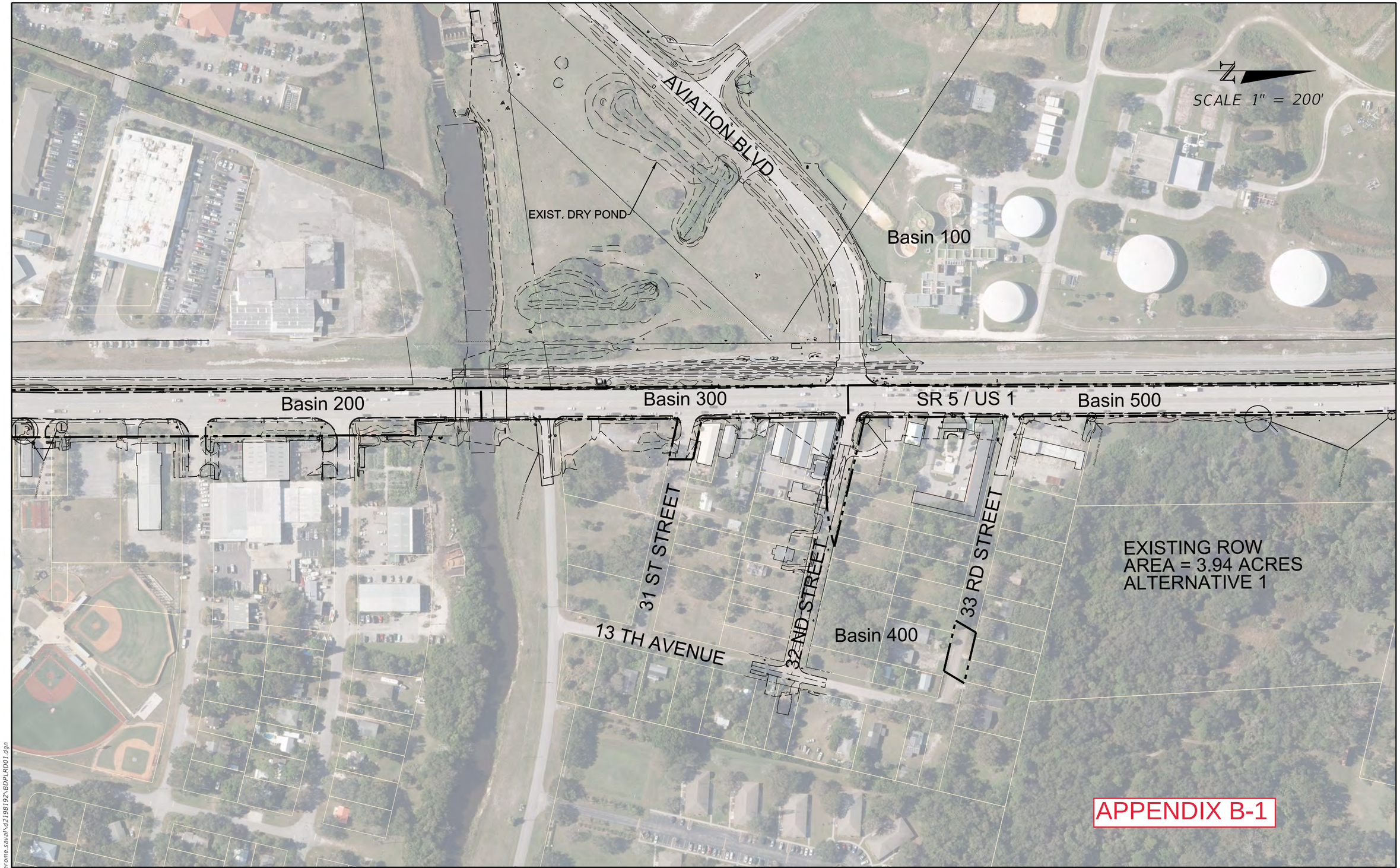


Existing Typical Section – Aviation Boulevard

Appendix B

Pre- and Post Development Drainage Maps

- Pre-Development Drainage Maps
- Post Development Drainage Maps for Alternatives 1, 2, 7, and 8



APPENDIX B-1

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PRE-DEVELOPMENT DRAINAGE MAP	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
					INDIAN RIVER			

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

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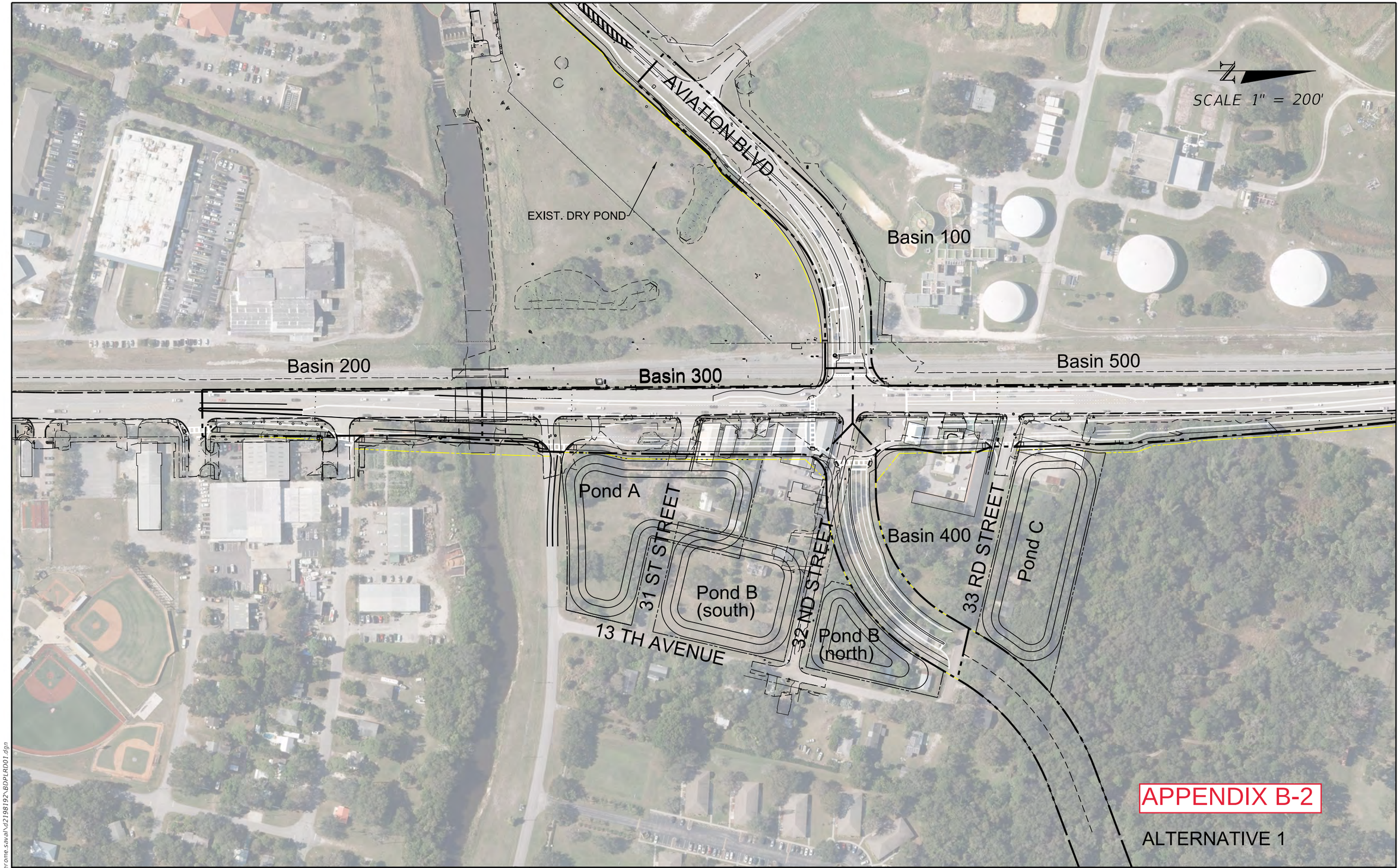

APPENDIX B-2

ALTERNATIVE 1

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			POST-DEVELOPMENT DRAINAGE MAP	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		

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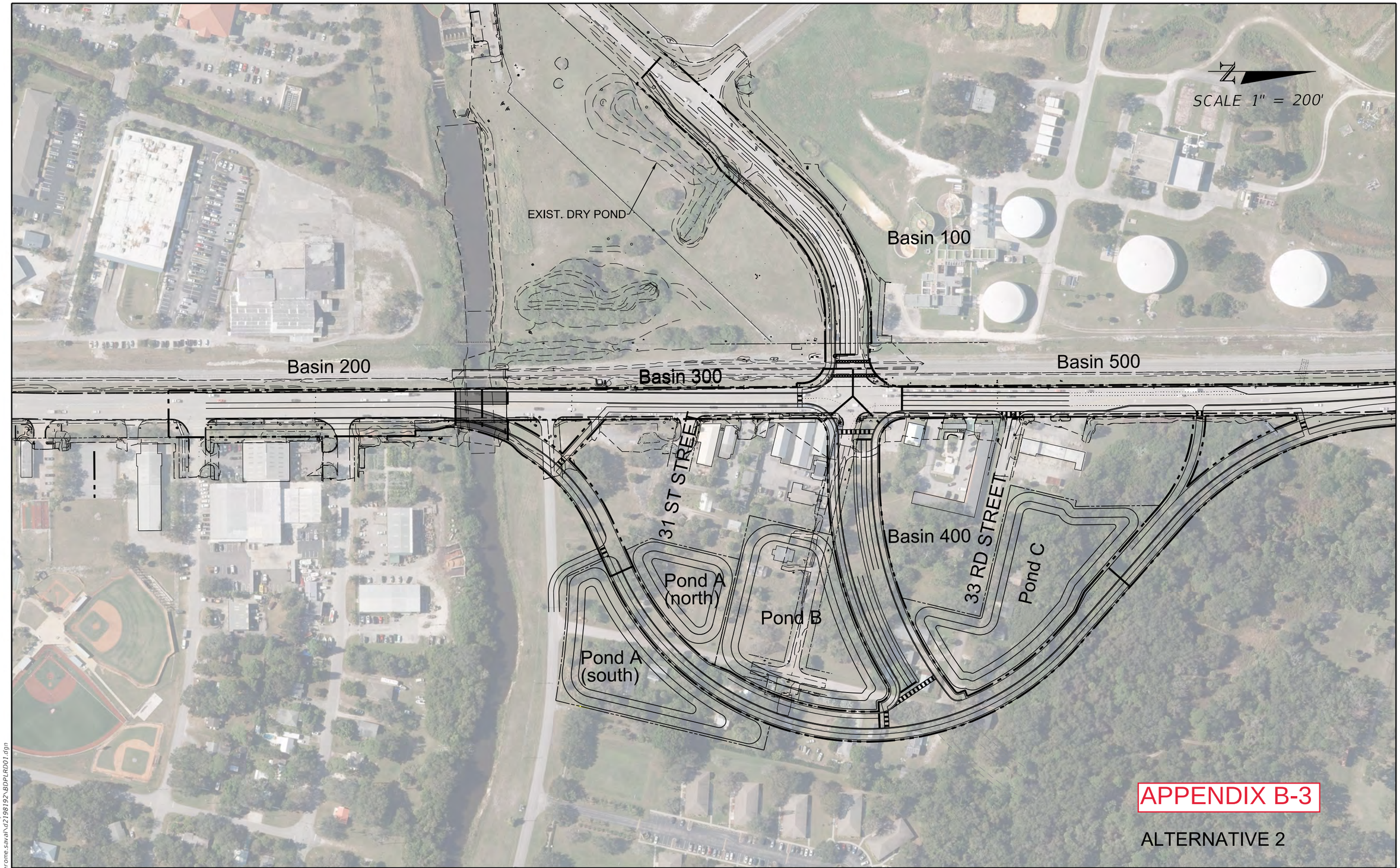

APPENDIX B-3

ALTERNATIVE 2

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

POST-DEVELOPMENT
DRAINAGE MAP

SHEET NO.

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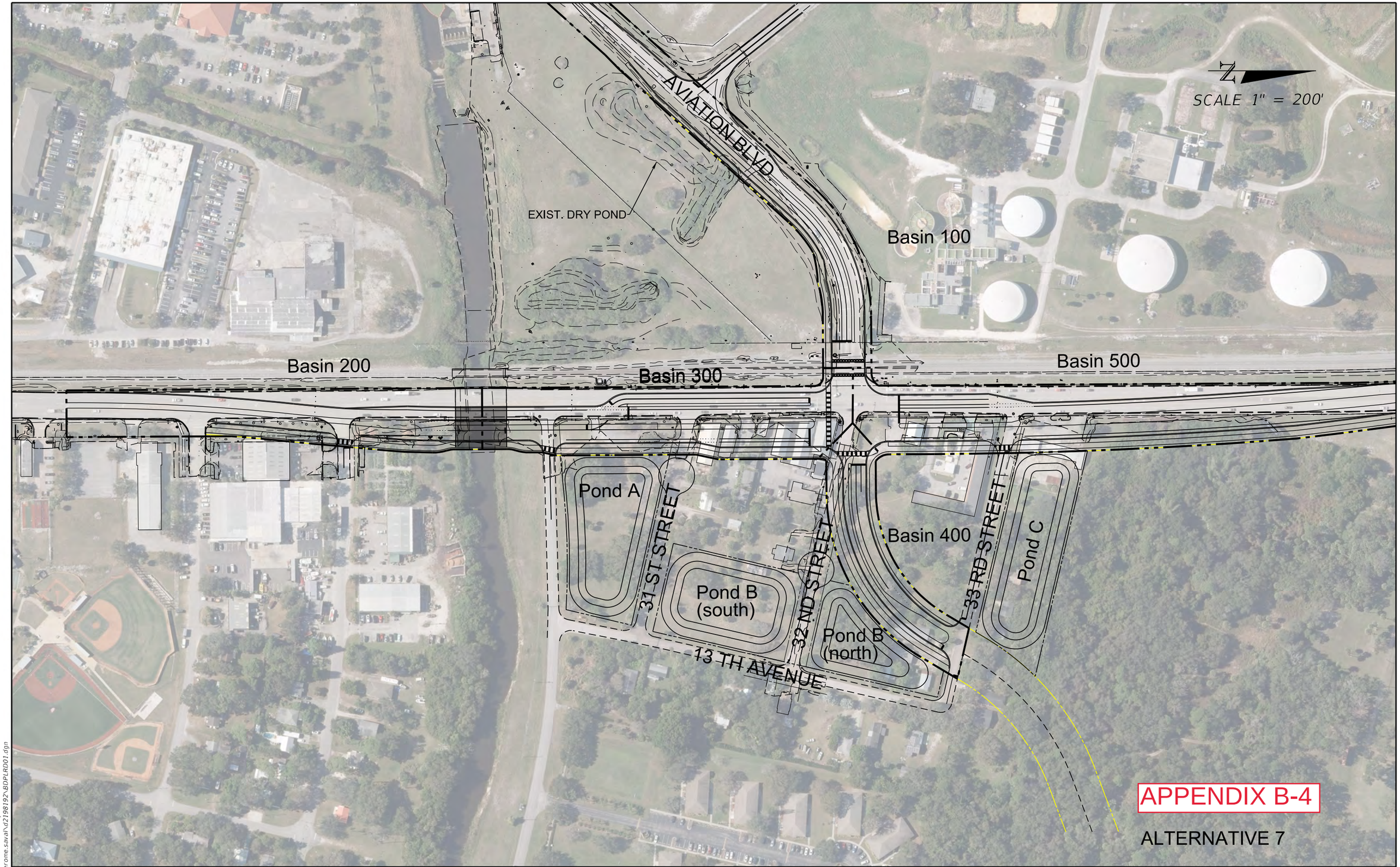

APPENDIX B-4

ALTERNATIVE 7

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			POST-DEVELOPMENT DRAINAGE MAP	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		

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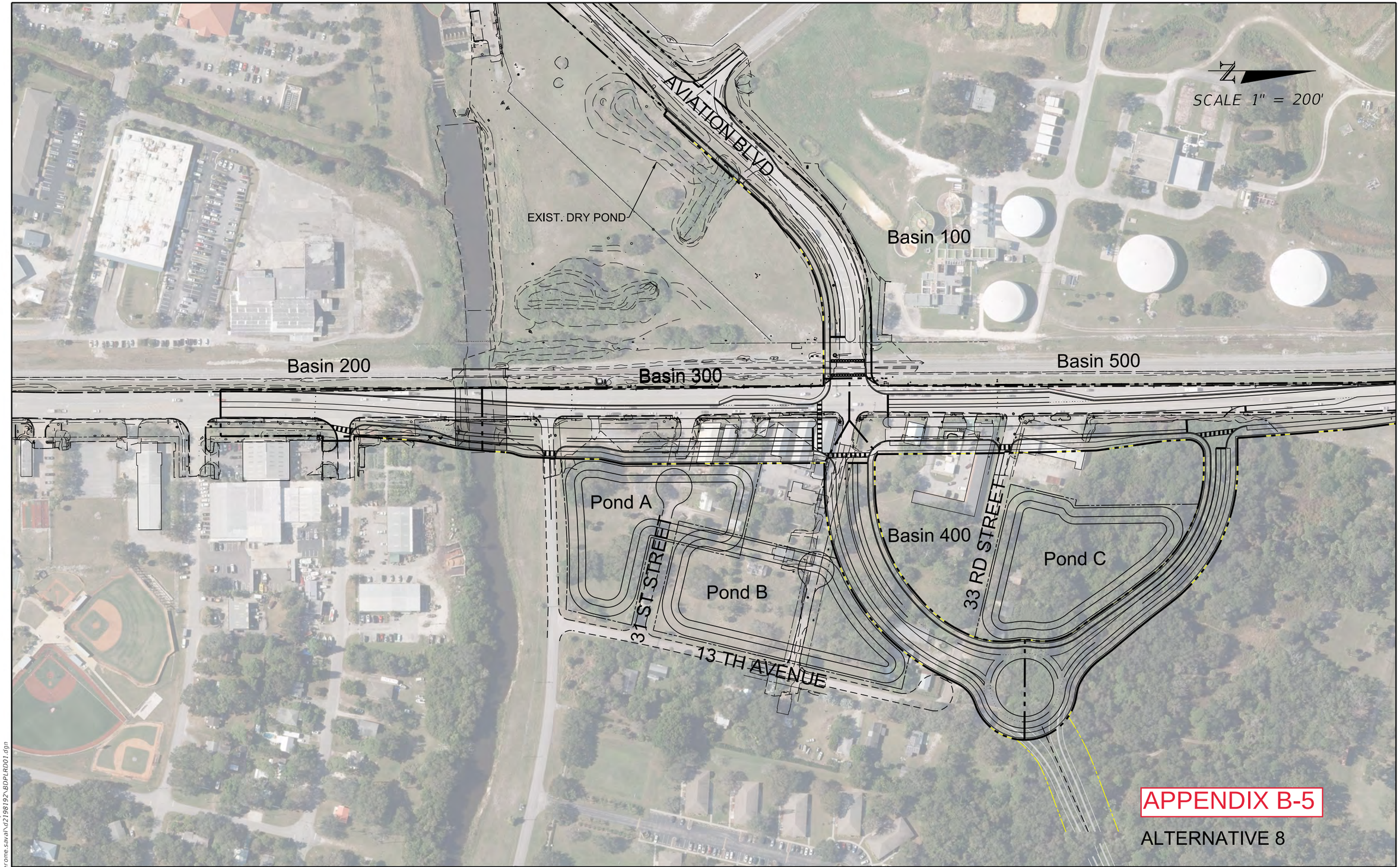

APPENDIX B-5

ALTERNATIVE 8

REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			POST-DEVELOPMENT DRAINAGE MAP	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		

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Appendix C
Pond Siting Calculations

- Pond Sizing Calculations for Alternatives 1, 2, 7, and 8
- ICPR Analysis for Alternative 1, Ponds A and C

APPENDIX C-1

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	2/12/2024
(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1

Pre-Developed Condition
Drainage Area:

Variables:

I = Impervious Area (ac.)
P = Pervious Area (ac.)
A_t = Total Basin Area (ac.) (excluding Pond area)

From Pre-Development Drainage Map:

$$A_t = I + P$$

Bain 300	A_t =	2.86 ac.		I =	1.91 ac.	P =	0.95 ac.
Bain 400	A_t =	1.52 ac.		I =	0.25 ac.	P =	1.27 ac.
Bain 500	A_t =	3.93 ac.		I =	2.66 ac.	P =	1.27 ac.
Total:	A_t =	8.31 ac.		I =	4.82 ac.	P =	3.49 ac.

Post-Developed Condition
Contributing Drainage Area for Proposed Pond:

Variables:

A_{tp} = Total Basin Area (ac) (excluding Pond area)
I_p = Impervious Area
P_p = Pervious Area

From Alternative Design Layout:

$$A_{tp} = I_p + P_p$$

Bain 300	A_{tp} =	2.86 ac.		I_p =	2.86 ac.	$P_{p=}$	0.00 ac.
Bain 400	A_{tp} =	1.52 ac.		I_p =	1.00 ac.	$P_{p=}$	0.52 ac.
Bain 500	A_{tp} =	3.93 ac.		I_p =	2.70 ac.	$P_{p=}$	1.23 ac.
Total:	A_{tp} =	8.31 ac.		I_p =	6.56 ac.	$P_{p=}$	1.75 ac.

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
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West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	2/12/2024
(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1

Treatment Volume Calculation

Treatment Volume Criteria - Chapter 40C-42 (14.2) F.A.C.

The required treatment volume is the greater of the following:

(a) one inch of runoff over the drainage area

(b) 2.5 inches times the impervious area (excluding water bodies).

(a)

Treatment Volume (V_t) = One inch of runoff from the contributing area

A_{pondp} = Approximate Pond Area = A_{tp} * **20%**

A_{pondp} = **1.66 ac.**

$V_t = (A_{tp} + A_{pondp}) * 1.0 \text{ in.})/12$

V_t = **0.83 ac-ft**

A_b = Total Pre-Dev. Basin Area Including Proposed Pond Site

A_b = **9.97 ac.**

A_{bp} = Total Post-Dev. Basin Area Including Proposed Pond Site

A_{bp} = **9.97 ac.**

(b)

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

$V_t = (I_p * 2.5 \text{ in.})/12$

V_t = **1.37 ac-ft**

Therefore use 1.37 ac-ft for the required treatment volume (unless Class I, II, OFW, or shellfishing waters)

Does basin discharge to Class I, II, OFW, or Shellfishing Waters?

Yes or No? **No** **1.37** **Acre-ft for the required Treatment Volume (TV)**

Compensatory Treatment Volume (TV) Calculations

I_{po} = Additional Impervious Area outside basin limits: **1.41 ac.**

Compensatory treatment area from Basin 100 & 200

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

$V_t = (I_p * 2.5 \text{ in.})/12$

V_t = **0.29 ac-ft**

Total Treatment Volume (V_t)

1.37 ac-ft + **0.29 ac-ft** = **1.66 ac-ft**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
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West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	2/12/2024
(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1

SCS Runoff and Curve Number (CN) Calculation

Pre-Development Condition

Basin Size: **9.97 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Pasture/Range, good	A	39	3.49	136.11
Impervious	Roadway	-	98	4.82	472.36
Pond Area	Pasture/Range, good	A	39	1.66	64.82
Offsite Impervious*	Roadway	-	98	1.41	138.18
			TOTAL	11.38	811.47

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **71.3**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **4.03 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **8.61 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **7.15 ac-ft**

Post-Development Condition

Basin Size: **9.97 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Lawns, Good	A	39	1.75	68.25
Impervious	Roadway	-	98	6.56	642.88
Pond Area	Lawns, Good	A	39	1.66	64.82
Offsite Impervious*	Roadway	-	98	1.41	138.18
			TOTAL	11.38	914.13

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **80.3**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **2.45 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **9.88 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **8.21 ac-ft**

$V_{post} - V_{pre}$ = **1.06 ac-ft**

= **46002 cubic feet**

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	(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1 - Dry Pond

R/W Requirement Estimate Pt. 1

Step No.1 - Pond Type

SHGWT Depth Estimation = **4.00 ft.** below exist. ground elevation (SCS Soil Survey)

Based upon the existing SHGWT the pond will be a:

Wet Pond or Dry Pond

Step No. 2 Storage Height Estimate (based upond SHGWT)

Based upon available information, the SHGWT is assumed to be below existing ground. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH).

Storage Height (SH) = Storage Berm Elevation - Freeboard - SHGWT Elevation

Exist. Ground Elevation =	**10.00 ft.**
Inside Berm Elevation =	**11.00 ft.**
Freeboard =	**1.00 ft.**
Pond Bottom Elevation =	**7.00 ft.**
SHGWT Elevation =	**6.00 ft.**
SH =	**3.00 ft.**

Note: Check CH (Step No. 7) before calculating pond configuration.

Step No.3 Total Peak Storage Volume Requirment

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume (V_t) + Estimated Peak Attenuation Volume ($V_{post} - V_{pre}$)

Volume (peak) = **118300 cubic feet (cf)**

Volume (peak) = **2.72 ac-ft**

Step No. 4 Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = *Length*Width*Height*

Where:

V =	Volume from Step No. 3
L =	Length of Pond
W =	Width of Pond
H =	Height from Step No. 2

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = L * (0.5 L) * H

118300 cf = L * (0.5 L) * H

The lesser of SH or CH =	**3.00 ft.**	SH (Step 2) or CH (Step 7)
L =	**281 ft.**	
W =	**140 ft.**	

Pond Bottom Area **0.91 acres**

Step No. 5 Accounting for Preliminary Information

Increasing Pond Area by: **20 %** to account for preceding information being preliminary (range between 10 and 20 percent).

Pond Bottom Area **1.09 acres**

L	**308 ft.**
W	**154 ft.**

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	(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1 - Dry Pond

R/W Requirement Estimate Pt. 2

Step No. 6 Top of Bank (Inside Berm) - Accounting for the Pond Side Slopes

Top of Bank Height = Storage Berm Elevation - SHGWT Elevation = **4.00 ft.**
Side slopes are 1: **4**

2 * (Bank Height * side slope) + L (step no. 4) = Length @ top of bank (L(top))
2 * (Bank Height * side slope) + W (step no. 4) = Width @ top of bank (W(top))

Length @ Top of Bank	=	**340 ft.**	L(top)
Width @ Top of Bank	=	**186 ft.**	W(top)

Top of Bank Area = L(top) * W(top)

Top of Bank Area = **63100 sq. ft.** **1.45 acres**

Step No. 7 Accounting for the Energy Loss

Urban section with closed stormsewer system therefore 3-year attenuation constrained to the following clareance height (CH).

Clareance Height (CH) = Low gutter point-Clearance-Est. Energy Loss-(Higher of SHGWT or Pond Bottom)

Low point in the gutter	=	**12.00 ft.**	(from existing plans)
Distance from Low Point to Pond	=	**400.00 ft.**	
Clearance	=	**1.00 ft.**	
Estimated Energy Loss	=	**0.60 ft.**	(Assume 0.15%)
Pond Bottom Elevation	=	**7.00 ft.**	
SHGWT Elevation	=	**6.00 ft.**	
CH	=	**4.40 ft.**	

Step No. 8 Maintenance Berms

Desired Maintenance Berm Width	=	**20 ft.**
Length = L(top) + 2(berm width)	=	**380 ft.**
Width = W(top) + 2(berm width)	=	**226 ft.**

TOTAL POND AREA REQUIREMENT **1.97 acres**

Step No. 9 Right-of-Way Area

Desired Buffer from Maintenance Berm	=	**5 ft.**
Length = L(top) + 2(berm width)	=	**390 ft.**
Width = W(top) + 2(berm width)	=	**236 ft.**

TOTAL RIGHT-OF-WAY REQUIREMENT **2.11 acres**

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
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	(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1 - Dry Pond

Stage-Storage Estimate

SHGWT = **6.00 ft.**

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.09 ac.		0.00 ac-ft	0.00 ac-ft
			1.22 ac.		
Freeboard	10.00 ft.	1.36 ac.		3.67 ac-ft	3.67 ac-ft
			1.40 ac.		
Inside Berm	11.00 ft.	1.45 ac.		1.40 ac-ft	5.07 ac-ft
			1.71 ac.		
Back of Berm	12.00 ft.	1.97 ac.		1.71 ac-ft	6.78 ac-ft
Right-of-Way Area		2.11 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	5.07 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.66 ac-ft of stormwater runoff Treatment Volume is **8.31 ft.** .

The minimum water surface elevation to detain the required
2.72 ac-ft of stormwater runoff peak volume is **9.14 ft.** .

Dry Pond 1 A

1 Pond Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.18 ac.		0.00 ac-ft	0.00 ac-ft
			1.35 ac.		
Freeboard	10.00 ft.	1.51 ac.		4.04 ac-ft	4.04 ac-ft
			1.57 ac.		
Inside Berm	11.00 ft.	1.62 ac.		1.57 ac-ft	5.60 ac-ft
			1.92 ac.		
Back of Berm	12.00 ft.	2.22 ac.		1.92 ac-ft	7.52 ac-ft
Right-of-Way Area		2.52 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	5.60 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.66 ac-ft of stormwater runoff Treatment Volume is **8.19 ft.** .

The minimum water surface elevation to detain the required
2.72 ac-ft of stormwater runoff peak volume is **8.94 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	2/12/2024
	(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1 - Dry Pond

Dry Pond 1 B - 2 Ponds Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.82 ac.		0.00 ac-ft	0.00 ac-ft
			0.93 ac.		
Freeboard	10.00 ft.	1.03 ac.		2.78 ac-ft	2.78 ac-ft
			1.07 ac.		
Inside Berm	11.00 ft.	1.10 ac.		1.07 ac-ft	3.84 ac-ft
			1.31 ac.		
Back of Berm	12.00 ft.	1.51 ac.		1.31 ac-ft	5.15 ac-ft
Right-of-Way Area		1.71 ac.			

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.20 ac.		0.00 ac-ft	0.00 ac-ft
			0.28 ac.		
Freeboard	10.00 ft.	0.35 ac.		0.83 ac-ft	0.83 ac-ft
			0.38 ac.		
Inside Berm	11.00 ft.	0.40 ac.		0.38 ac-ft	1.20 ac-ft
			0.57 ac.		
Back of Berm	12.00 ft.	0.73 ac.		0.57 ac-ft	1.77 ac-ft
Right-of-Way Area		0.90 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	5.04 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.66 ac-ft of stormwater runoff Treatment Volume is **8.32 ft.** .

The minimum water surface elevation to detain the required
2.72 ac-ft of stormwater runoff peak volume is **9.16 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	2/12/2024
	(561) 687-2220	Checked by:	CBC	Printed:	2/13/2024

BASINS 300, 400, & 500 - Alternative 1 - Dry Pond

Dry Pond 1 C

1 Pond Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.04 ac.		0.00 ac-ft	0.00 ac-ft
			1.18 ac.		
Freeboard	10.00 ft.	1.33 ac.		3.55 ac-ft	3.55 ac-ft
			1.37 ac.		
Inside Berm	11.00 ft.	1.42 ac.		1.37 ac-ft	4.92 ac-ft
			1.68 ac.		
Back of Berm	12.00 ft.	1.93 ac.		1.68 ac-ft	6.60 ac-ft
Right-of-Way Area		2.21 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	4.92 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.66 ac-ft of stormwater runoff Treatment Volume is **8.35 ft.** .

The minimum water surface elevation to detain the required
2.72 ac-ft of stormwater runoff peak volume is **9.21 ft.** .

WGI	WGI, INC. 2035 Vista Parkway West Palm Beach, FL 33411 (561) 687-2220	Project: Aviation Blvd. FPID: 4416931 Calced by: JBS Checked b CBC	County: District: Prepared: Printed:	Indian River 4 2/12/2024 2/13/2024

BASINS 300, 400, & 500 - Alternative 1 - Dry Pond

ALLOWABLE DISCHARGE CALCULATIONS

Pond	Basin Area			Max. 24hr Discharge Volume (Ac-Ft)					
	Total Existing Area (Ac)	Total Proposed Area (Ac)	Increase in Project Area (Ac)	Treatment Volume of 4" Over Total Existing Area (Ac-ft/day)	Treatment Volume of 2" Over Increase in Project Area (Ac-ft/day)	Maximum Discharge Volume Allowed (Ac-ft/day)[1]	Time at Maximum Discharge (hr)	Calculated Discharge Volume (ac-ft)	Maximum Discharge Volume Provided from ICPR Results (ac-ft)
1A	3.94	10.83	6.89	1.31	1.15	2.46	7.00-31.00 Hrs 31.00-55.00 Hrs 55.00-79.00 Hrs	2.27	**2.27**
1B	3.94	10.92	6.98	1.31	1.16	2.48	7.00-31.00 Hrs 31.00-55.00 Hrs 55.00-79.00 Hrs	2.16	**2.16**
1C	3.94	10.52	6.58	1.31	1.10	2.41	7.00-31.00 Hrs 31.00-55.00 Hrs 55.00-79.00 Hrs	2.31	**2.31**

[1]IRFWCD 24hr Max. Discharge - 4" Over Total Existing Area Plus 2" Over Increase in Project Area

APPENDIX C-2

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternative 2

Pre-Developed Condition
Drainage Area:

Variables:

I = Impervious Area (ac.)
P = Pervious Area (ac.)
A_t = Total Basin Area (ac.) (excluding Pond area)

From Pre-Development Drainage Map:

$$A_t = I + P$$

Bain 300	A_t =	1.99 ac.		I =	1.42 ac.	P =	0.57 ac.
Bain 400	A_t =	3.80 ac.		I =	0.36 ac.	P =	3.44 ac.
Bain 500	A_t =	3.26 ac.		I =	2.12 ac.	P =	1.14 ac.
Total:	A_t =	9.05 ac.		I =	3.90 ac.	P =	5.15 ac.

Post-Developed Condition
Contributing Drainage Area for Proposed Pond:

Variables:

A_{tp} = Total Basin Area (ac) (excluding Pond area)
I_p = Impervious Area
P_p = Pervious Area

From Alternative Design Layout:

$$A_{tp} = I_p + P_p$$

Bain 300	A_{tp} =	1.99 ac.		I_p =	1.21 ac.	$P_{p=}$	0.78 ac.
Bain 400	A_{tp} =	3.80 ac.		I_p =	3.01 ac.	$P_{p=}$	0.79 ac.
Bain 500	A_{tp} =	3.26 ac.		I_p =	2.48 ac.	$P_{p=}$	0.78 ac.
Total:	A_{tp} =	9.05 ac.		I_p =	6.70 ac.	$P_{p=}$	2.35 ac.

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternative 2

Treatment Volume Calculation

Treatment Volume Criteria - Chapter 40C-42 (14.2) F.A.C.

The required treatment volume is the greater of the following:

(a) one inch of runoff over the drainage area

(b) 2.5 inches times the impervious area (excluding water bodies).

(a)

Treatment Volume (V_t) = One inch of runoff from the contributing area

A_{pondp} = Approximate Pond Area = A_{tp} * **20%**

A_{pondp} = **1.81 ac.**

V_t = $(A_{tp} + A_{pondp}) * 1.0$ in.$)/12$

V_t = **0.91 ac-ft**

A_b = Total Pre-Dev. Basin Area Including Proposed Pond Site

A_b = **10.86 ac.**

A_{bp} = Total Post-Dev. Basin Area Including Proposed Pond Site

A_{bp} = **10.86 ac.**

(b)

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

V_t = (I_p * 2.5 in.)/12

V_t = **1.40 ac-ft**

Therefore use 1.40 ac-ft for the required treatment volume (unless Class I, II, OFW, or shellfishing waters)

Does basin discharge to Class I, II, OFW, or Shellfishing Waters?

Yes or No? **No** **1.40** **Acre-ft for the required Treatment Volume (TV)**

Compensatory Treatment Volume (TV) Calculations

N/A I_{po} = Additional Impervious Area outside basin limits: **0.81 ac.**

Compensatory treatment area from Basin 100 & 200

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

V_t = (I_p * 2.5 in.)/12

V_t = **0.17 ac-ft**

Total Treatment Volume (V_t)

1.40 ac-ft **+** **0.17 ac-ft** **=** **1.56 ac-ft**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternative 2

SCS Runoff and Curve Number (CN) Calculation

Pre-Development Condition

Basin Size: **10.86 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Pasture/Range, good	A	39	**5.15**	**200.85**
Impervious	Roadway	-	98	**3.90**	**382.20**
Pond Area	Pasture/Range, good	A	39	**1.81**	**70.59**
Offsite Impervious*	Roadway	-	98	**0.81**	**79.38**
			TOTAL	**11.67**	**733.02**

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **62.8**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **5.92 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.34 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **6.64 ac-ft**

Post-Development Condition

Basin Size: **10.86 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Lawns, Good	A	39	**2.35**	**91.65**
Impervious	Roadway	-	98	**6.70**	**656.60**
Pond Area	Lawns, Good	A	39	**1.81**	**70.59**
Offsite Impervious*	Roadway	-	98	**0.81**	**79.38**
			TOTAL	**11.67**	**898.22**

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **77.0**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **2.99 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **9.41 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **8.52 ac-ft**

$V_{post} - V_{pre}$ = **1.88 ac-ft**

= **81741 cubic feet**

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2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
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BASINS 300, 400, & 500 - Alternative 2 - Dry Pond

R/W Requirement Estimate Pt. 1

Step No.1 - Pond Type

SHGWT Depth Estimation = **4.00 ft.** below exist. ground elevation (SCS Soil Survey)

Based upon the existing SHGWT the pond will be a:

Wet Pond or Dry Pond

Step No. 2 Storage Height Estimate (based upond SHGWT)

Based upon available information, the SHGWT is assumed to be below existing ground. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH).

Storage Height (SH) = Storage Berm Elevation - Freeboard - SHGWT Elevation

Exist. Ground Elevation =	**10.00 ft.**
Inside Berm Elevation =	**11.00 ft.**
Freeboard =	**1.00 ft.**
Pond Bottom Elevation =	**7.00 ft.**
SHGWT Elevation =	**6.00 ft.**
SH =	**3.00 ft.**

Note: Check CH (Step No. 7) before calculating pond configuration.

Step No.3 Total Peak Storage Volume Requirment

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume (V_t) + Estimated Peak Attenuation Volume ($V_{post} - V_{pre}$)
Volume (peak) = **149900 cubic feet (cf)**
Volume (peak) = **3.44 ac-ft**

Step No. 4 Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = *Length*Width*Height*

Where:
V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height from Step No. 2

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = L * (0.5 L) * H
149900 cf = L * (0.5 L) * H

The lesser of SH or CH =	**3.00 ft.**	SH (Step 2) or CH (Step 7)
L =	**316 ft.**	
W =	**158 ft.**	

Pond Bottom Area **1.15 acres**

Step No. 5 Accounting for Preliminary Information

Increasing Pond Area by: **20 %** to account for preceding information being preliminary (range between 10 and 20 percent).

Pond Bottom Area **1.38 acres**

L	**346 ft.**
W	**173 ft.**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternative 2 - Dry Pond

R/W Requirement Estimate Pt. 2

Step No. 6 Top of Bank (Inside Berm) - Accounting for the Pond Side Slopes

Top of Bank Height = Storage Berm Elevation - SHGWT Elevation = **4.00 ft.**
Side slopes are 1: **4**

2 * (Bank Height * side slope) + L (step no. 4) = Length @ top of bank (L(top))
2 * (Bank Height * side slope) + W (step no. 4) = Width @ top of bank (W(top))

Length @ Top of Bank	=	**378 ft.**	L(top)
Width @ Top of Bank	=	**205 ft.**	W(top)

Top of Bank Area = L(top) * W(top)
Top of Bank Area = **77600 sq. ft.** **1.78 acres**

Step No. 7 Accounting for the Energy Loss

Urban section with closed stormsewer system therefore 3-year attenuation constrained to the following clareance height (CH).

Clareance Height (CH) = Low gutter point-Clearance-Est. Energy Loss-(Higher of SHGWT or Pond Bottom)

Low point in the gutter	=	**12.00 ft.**	(from existing plans)
Distance from Low Point to Pond	=	**400.00 ft.**	
Clearance	=	**1.00 ft.**	
Estimated Energy Loss	=	**0.60 ft.**	(Assume 0.15% Slope)
Pond Bottom Elevation	=	**7.00 ft.**	
SHGWT Elevation	=	**6.00 ft.**	
CH	=	**4.40 ft.**	

Step No. 8 Maintenance Berms

Desired Maintenance Berm Width	=	**20 ft.**
Length = L(top) + 2(berm width)	=	**418 ft.**
Width = W(top) + 2(berm width)	=	**245 ft.**

TOTAL POND AREA REQUIREMENT **2.35 acres**

Step No. 9 Right-of-Way Area

Desired Buffer from Maintenance Berm	=	**5 ft.**
Length = L(top) + 2(berm width)	=	**428 ft.**
Width = W(top) + 2(berm width)	=	**255 ft.**

TOTAL RIGHT-OF-WAY REQUIREMENT **2.51 acres**

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	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
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BASINS 300, 400, & 500 - Alternative 2 - Dry Pond

Stage-Storage Estimate

SHGWT = **6.00 ft.**

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.38 ac.		0.00 ac-ft	0.00 ac-ft
			1.53 ac.		
Freeboard	10.00 ft.	1.68 ac.		4.59 ac-ft	4.59 ac-ft
			1.73 ac.		
Inside Berm	11.00 ft.	1.78 ac.		1.73 ac-ft	6.32 ac-ft
			2.07 ac.		
Back of Berm	12.00 ft.	2.35 ac.		2.07 ac-ft	8.38 ac-ft
Right-of-Way Area		2.51 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	6.32 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required **1.56 ac-ft** of stormwater runoff Treatment Volume is **7.99 ft.** .

The minimum water surface elevation to detain the required **3.44 ac-ft** of stormwater runoff peak volume is **9.18 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
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	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternative 2 - Dry Pond

Stage-Storage Estimate

Dry Pond 2 A - 2 Ponds Option

SHGWT = **6.00 ft.**

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.66 ac.		0.00 ac-ft	0.00 ac-ft
			0.80 ac.		
Freeboard	10.00 ft.	0.95 ac.		2.41 ac-ft	2.41 ac-ft
			0.99 ac.		
Inside Berm	11.00 ft.	1.04 ac.		0.99 ac-ft	3.40 ac-ft
			1.35 ac.		
Back of Berm	12.00 ft.	1.65 ac.		1.35 ac-ft	4.75 ac-ft
Right-of-Way Area		1.86 ac.			

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.28 ac.		0.00 ac-ft	0.00 ac-ft
			0.35 ac.		
Freeboard	10.00 ft.	0.42 ac.		1.05 ac-ft	1.05 ac-ft
			0.45 ac.		
Inside Berm	11.00 ft.	0.47 ac.		0.45 ac-ft	1.50 ac-ft
			0.62 ac.		
Back of Berm	12.00 ft.	0.76 ac.		0.62 ac-ft	2.12 ac-ft
Right-of-Way Area		0.91 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	4.90 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required **1.56 ac-ft** of stormwater runoff Treatment Volume is **8.28 ft.** .

The minimum water surface elevation to detain the required **3.44 ac-ft** of stormwater runoff peak volume is **9.81 ft.** .

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	6/12/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternative 2 - Dry Pond

Dry Pond 2 B

1 Pond Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.36 ac.		0.00 ac-ft	0.00 ac-ft
			1.50 ac.		
Freeboard	10.00 ft.	1.65 ac.		4.51 ac-ft	4.51 ac-ft
			1.69 ac.		
Inside Berm	11.00 ft.	1.74 ac.		1.69 ac-ft	6.20 ac-ft
			2.02 ac.		
Back of Berm	12.00 ft.	2.29 ac.		2.02 ac-ft	8.22 ac-ft
Right-of-Way Area		2.49 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	6.20 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.56 ac-ft of stormwater runoff Treatment Volume is 8.01 ft. .

The minimum water surface elevation to detain the required
3.44 ac-ft of stormwater runoff peak volume is 9.22 ft. .

Dry Pond 2 C

1 Pond Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.14 ac.		0.00 ac-ft	0.00 ac-ft
			1.39 ac.		
Freeboard	10.00 ft.	1.65 ac.		4.18 ac-ft	4.18 ac-ft
			1.64 ac.		
Inside Berm	11.00 ft.	1.63 ac.		1.64 ac-ft	5.82 ac-ft
			1.96 ac.		
Back of Berm	12.00 ft.	2.29 ac.		1.96 ac-ft	7.78 ac-ft
Right-of-Way Area		2.54 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	5.82 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.56 ac-ft of stormwater runoff Treatment Volume is 8.08 ft. .

The minimum water surface elevation to detain the required
3.44 ac-ft of stormwater runoff peak volume is 9.37 ft. .

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
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(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7

Pre-Developed Condition
Drainage Area:

Variables:

I = Impervious Area (ac.)
P = Pervious Area (ac.)
A_t = Total Basin Area (ac.) (excluding Pond area)

From Pre-Development Drainage Map:

$$A_t = I + P$$

Bain 300	A_t =	2.98 ac.		I =	1.90 ac.	P =	1.08 ac.
Bain 400	A_t =	1.49 ac.		I =	0.22 ac.	P =	1.27 ac.
Bain 500	A_t =	4.08 ac.		I =	2.81 ac.	P =	1.27 ac.
Total:	A_t =	8.55 ac.		I =	4.93 ac.	P =	3.62 ac.

Post-Developed Condition
Contributing Drainage Area for Proposed Pond:

Variables:

A_{tp} = Total Basin Area (ac) (excluding Pond area)
I_p = Impervious Area
P_p = Pervious Area

From Alternative Design Layout:

$$A_{tp} = I_p + P_p$$

Bain 300	A_{tp} =	2.98 ac.		I_p =	1.98 ac.	$P_{p=}$	1.00 ac.
Bain 400	A_{tp} =	1.49 ac.		I_p =	0.92 ac.	$P_{p=}$	0.57 ac.
Bain 500	A_{tp} =	4.08 ac.		I_p =	2.51 ac.	$P_{p=}$	1.57 ac.
Total:	A_{tp} =	8.55 ac.		I_p =	5.41 ac.	$P_{p=}$	3.14 ac.

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7

Treatment Volume Calculation

Treatment Volume Criteria - Chapter 40C-42 (14.2) F.A.C.

The required treatment volume is the greater of the following:

(a) one inch of runoff over the drainage area

(b) 2.5 inches times the impervious area (excluding water bodies).

(a)

Treatment Volume (V_t) = One inch of runoff from the contributing area

A_{pondp} = Approximate Pond Area = A_{tp} * **20%**

A_{pondp} = **1.71 ac.**

V_t = $(A_{tp} + A_{pondp}) * 1.0$ in.$)/12$

V_t = **0.86 ac-ft**

A_b = Total Pre-Dev. Basin Area Including Proposed Pond Site

A_b = **10.26 ac.**

A_{bp} = Total Post-Dev. Basin Area Including Proposed Pond Site

A_{bp} = **10.26 ac.**

(b)

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

$V_t = (I_p * 2.5$ in.$)/12$

V_t = **1.13 ac-ft**

Therefore use 1.13 ac-ft for the required treatment volume (unless Class I, II, OFW, or shellfishing waters)

Does basin discharge to Class I, II, OFW, or Shellfishing Waters?

Yes or No? **No** **1.13** **Acre-ft for the required Treatment Volume (TV)**

Compensatory Treatment Volume (TV) Calculations

N/A I_{po} = Additional Impervious Area outside basin limits: **0.83 ac.**

Compensatory treatment area from Basin 100 & 200

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

$V_t = (I_p * 2.5$ in.$)/12$

V_t = **0.17 ac-ft**

Total Treatment Volume (V_t)

1.13 ac-ft **+** **0.17 ac-ft** **=** **1.30 ac-ft**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7

SCS Runoff and Curve Number (CN) Calculation

Pre-Development Condition

Basin Size: **10.26 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Pasture/Range, good	A	39	**3.62**	**141.18**
Impervious	Roadway	-	98	**4.93**	**483.14**
Pond Area	Pasture/Range, good	A	39	**1.71**	**66.69**
Offsite Impervious*	Roadway	-	98	**0.83**	**81.34**
			TOTAL	**11.09**	**772.35**

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **69.6**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **4.36 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **8.37 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **7.15 ac-ft**

Post-Development Condition

Basin Size: **10.26 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Lawns, Good	A	39	**3.14**	**122.46**
Impervious	Roadway	-	98	**5.41**	**530.18**
Pond Area	Lawns, Good	A	39	**1.71**	**66.69**
Offsite Impervious*	Roadway	-	98	**0.83**	**81.34**
			TOTAL	**11.09**	**800.67**

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **72.2**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **3.85 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **8.74 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **7.47 ac-ft**

$V_{post} - V_{pre}$ = **0.32 ac-ft**

= **13836 cubic feet**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7 - Dry Pond

R/W Requirement Estimate Pt. 1

Step No.1 - Pond Type

SHGWT Depth Estimation = **4.00 ft.** below exist. ground elevation (SCS Soil Survey)

Based upon the existing SHGWT the pond will be a:

Wet Pond or Dry Pond

Step No. 2 Storage Height Estimate (based upond SHGWT)

Based upon available information, the SHGWT is assumed to be below existing ground. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH).

Storage Height (SH) = Storage Berm Elevation - Freeboard - SHGWT Elevation

Exist. Ground Elevation =	**10.00 ft.**
Inside Berm Elevation =	**11.00 ft.**
Freeboard =	**1.00 ft.**
Pond Bottom Elevation =	**7.00 ft.**
SHGWT Elevation =	**6.00 ft.**
SH =	**3.00 ft.**

Note: Check CH (Step No. 7) before calculating pond configuration.

Step No.3 Total Peak Storage Volume Requirment

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume (V_t) + Estimated Peak Attenuation Volume ($V_{post} - V_{pre}$)
Volume (peak) = **70500 cubic feet (cf)**
Volume (peak) = **1.62 ac-ft**

Step No. 4 Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = *Length*Width*Height*

Where:
V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height from Step No. 2

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = L * (0.5 L) * H
70500 cf = L * (0.5 L) * H

The lesser of SH or CH =	**3.00 ft.**	SH (Step 2) or CH (Step 7)
L =	**217 ft.**	
W =	**108 ft.**	

Pond Bottom Area **0.54 acres**

Step No. 5 Accounting for Preliminary Information

Increasing Pond Area by: **20 %** to account for preceding information being preliminary (range between 10 and 20 percent).

Pond Bottom Area **0.65 acres**

L	**237 ft.**
W	**119 ft.**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7 - Dry Pond

R/W Requirement Estimate Pt. 2

Step No. 6 Top of Bank (Inside Berm) - Accounting for the Pond Side Slopes

Top of Bank Height = Storage Berm Elevation - SHGWT Elevation = **4.00 ft.**
Side slopes are 1: **4**

2 * (Bank Height * side slope) + L (step no. 4) = Length @ top of bank (L(top))
2 * (Bank Height * side slope) + W (step no. 4) = Width @ top of bank (W(top))

Length @ Top of Bank	=	**269 ft.**	L(top)
Width @ Top of Bank	=	**151 ft.**	W(top)

Top of Bank Area = L(top) * W(top)
Top of Bank Area = **40600 sq. ft.** **0.93 acres**

Step No. 7 Accounting for the Energy Loss

Urban section with closed stormsewer system therefore 3-year attenuation constrained to the following clareance height (CH).

Clareance Height (CH) = Low gutter point-Clearance-Est. Energy Loss-(Higher of SHGWT or Pond Bottom)

Low point in the gutter	=	**12.00 ft.**	(from existing plans)
Distance from Low Point to Pond	=	**400.00 ft.**	
Clearance	=	**1.00 ft.**	
Estimated Energy Loss	=	**0.60 ft.**	(Assume 0.15% Slope)
Pond Bottom Elevation	=	**7.00 ft.**	
SHGWT Elevation	=	**6.00 ft.**	
CH	=	**4.40 ft.**	

Step No. 8 Maintenance Berms

Desired Maintenance Berm Width	=	**20 ft.**
Length = L(top) + 2(berm width)	=	**309 ft.**
Width = W(top) + 2(berm width)	=	**191 ft.**

TOTAL POND AREA REQUIREMENT **1.36 acres**

Step No. 9 Right-of-Way Area

Desired Buffer from Maintenance Berm	=	**5 ft.**
Length = L(top) + 2(berm width)	=	**319 ft.**
Width = W(top) + 2(berm width)	=	**201 ft.**

TOTAL RIGHT-OF-WAY REQUIREMENT **1.47 acres**

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7 - Dry Pond

Stage-Storage Estimate

SHGWT = **6.00 ft.**

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.65 ac.		0.00 ac-ft	0.00 ac-ft
			0.75 ac.		
Freeboard	10.00 ft.	0.86 ac.		2.26 ac-ft	2.26 ac-ft
			0.90 ac.		
Inside Berm	11.00 ft.	0.93 ac.		0.90 ac-ft	3.16 ac-ft
			1.14 ac.		
Back of Berm	12.00 ft.	1.36 ac.		1.14 ac-ft	4.30 ac-ft
Right-of-Way Area		1.47 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	3.16 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.30 ac-ft of stormwater runoff Treatment Volume is **8.65 ft.** .

The minimum water surface elevation to detain the required
1.62 ac-ft of stormwater runoff peak volume is **9.05 ft.** .

Dry Pond 7 A

1 Pond Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.68 ac.		0.00 ac-ft	0.00 ac-ft
			0.79 ac.		
Freeboard	10.00 ft.	0.90 ac.		2.37 ac-ft	2.37 ac-ft
			0.93 ac.		
Inside Berm	11.00 ft.	0.97 ac.		0.93 ac-ft	3.30 ac-ft
			1.18 ac.		
Back of Berm	12.00 ft.	1.39 ac.		1.18 ac-ft	4.48 ac-ft
Right-of-Way Area		1.59 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	3.30 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.30 ac-ft of stormwater runoff Treatment Volume is **8.58 ft.** .

The minimum water surface elevation to detain the required
1.62 ac-ft of stormwater runoff peak volume is **8.96 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7 - Dry Pond

Dry Pond 7 B - 2 Ponds Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.57 ac.		0.00 ac-ft	0.00 ac-ft
			0.66 ac.		
Freeboard	10.00 ft.	0.76 ac.		1.99 ac-ft	1.99 ac-ft
			0.79 ac.		
Inside Berm	11.00 ft.	0.82 ac.		0.79 ac-ft	2.78 ac-ft
			1.00 ac.		
Back of Berm	12.00 ft.	1.18 ac.		1.00 ac-ft	3.78 ac-ft
Right-of-Way Area		1.37 ac.			

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.20 ac.		0.00 ac-ft	0.00 ac-ft
			0.28 ac.		
Freeboard	10.00 ft.	0.35 ac.		0.83 ac-ft	0.83 ac-ft
			0.38 ac.		
Inside Berm	11.00 ft.	0.40 ac.		0.38 ac-ft	1.20 ac-ft
			0.57 ac.		
Back of Berm	12.00 ft.	0.73 ac.		0.57 ac-ft	1.77 ac-ft
Right-of-Way Area		0.90 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	3.98 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.30 ac-ft of stormwater runoff Treatment Volume is **8.31 ft.** .

The minimum water surface elevation to detain the required
1.62 ac-ft of stormwater runoff peak volume is **8.63 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 7 - Dry Pond

Dry Pond 7 C

1 Pond Option

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	0.57 ac.		0.00 ac-ft	0.00 ac-ft
			0.69 ac.		
Freeboard	10.00 ft.	0.81 ac.		2.07 ac-ft	2.07 ac-ft
			0.85 ac.		
Inside Berm	11.00 ft.	0.89 ac.		0.85 ac-ft	2.92 ac-ft
			1.12 ac.		
Back of Berm	12.00 ft.	1.35 ac.		1.12 ac-ft	4.04 ac-ft
Right-of-Way Area		1.58 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	2.92 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required **1.30 ac-ft** of stormwater runoff Treatment Volume is **8.78 ft.** .

The minimum water surface elevation to detain the required **1.62 ac-ft** of stormwater runoff peak volume is **9.22 ft.** .

APPENDIX C-4

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8

Pre-Developed Condition
Drainage Area:

Variables:

I = Impervious Area (ac.)
P = Pervious Area (ac.)
A_t = Total Basin Area (ac.) (excluding Pond area)

From Pre-Development Drainage Map:

$$A_t = I + P$$

Bain 300	A_t =	3.05 ac.		I =	1.95 ac.	P =	1.10 ac.
Bain 400	A_t =	2.10 ac.		I =	0.23 ac.	P =	1.87 ac.
Bain 500	A_t =	5.50 ac.		I =	2.71 ac.	P =	2.79 ac.
Total:	A_t =	10.65 ac.		I =	4.89 ac.	P =	5.76 ac.

Post-Developed Condition
Contributing Drainage Area for Proposed Pond:

Variables:

A_{tp} = Total Basin Area (ac) (excluding Pond area)
I_p = Impervious Area
P_p = Pervious Area

From Alternative Design Layout:

$$A_{tp} = I_p + P_p$$

Bain 300	A_{tp} =	3.05 ac.		I_p =	1.97 ac.	$P_{p=}$	1.08 ac.
Bain 400	A_{tp} =	2.10 ac.		I_p =	1.61 ac.	$P_{p=}$	0.49 ac.
Bain 500	A_{tp} =	5.50 ac.		I_p =	3.95 ac.	$P_{p=}$	1.55 ac.
Total:	A_{tp} =	10.65 ac.		I_p =	7.53 ac.	$P_{p=}$	3.12 ac.

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8

Treatment Volume Calculation

Treatment Volume Criteria - Chapter 40C-42 (14.2) F.A.C.

The required treatment volume is the greater of the following:

(a) one inch of runoff over the drainage area

(b) 2.5 inches times the impervious area (excluding water bodies).

(a)

Treatment Volume (V_t) = One inch of runoff from the contributing area

A_{pondp} = Approximate Pond Area = A_{tp} * **20%**

A_{pondp} = **2.13 ac.**

V_t = $(A_{tp} + A_{pondp}) * 1.0$ in.$)/12$

V_t = **1.07 ac-ft**

A_b = Total Pre-Dev. Basin Area Including Proposed Pond Site

A_b = **12.78 ac.**

A_{bp} = Total Post-Dev. Basin Area Including Proposed Pond Site

A_{bp} = **12.78 ac.**

(b)

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

$V_t = (I_p * 2.5$ in.$)/12$

V_t = **1.57 ac-ft**

Therefore use 1.57 ac-ft for the required treatment volume (unless Class I, II, OFW, or shellfishing waters)

Does basin discharge to Class I, II, OFW, or Shellfishing Waters?

Yes or No? **No** **1.57** **Acre-ft for the required Treatment Volume (TV)**

Compensatory Treatment Volume (TV) Calculations

I_{po} = Additional Impervious Area outside basin limits: **0.97 ac.**

Compensatory treatment area from Basin 100 & 200

Treatment Volume (V_t) = 2.5 inches of runoff times the impervious area (excluding water bodies)

$V_t = (I_p * 2.5$ in.$)/12$

V_t = **0.20 ac-ft**

Total Treatment Volume (V_t)

1.57 ac-ft **+** **0.20 ac-ft** **=** **1.77 ac-ft**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8

SCS Runoff and Curve Number (CN) Calculation

Pre-Development Condition

Basin Size: **12.78 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Pasture/Range, good	A	39	5.76	224.64
Impervious	Roadway	-	98	4.89	479.22
Pond Area	Pasture/Range, good	A	39	2.13	83.07
Offsite Impervious*	Roadway	-	98	0.97	95.06
			TOTAL	13.75	881.99

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **64.1**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **5.59 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **7.54 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **8.03 ac-ft**

Post-Development Condition

Basin Size: **12.78 ac.**

Rainfall Depth: **12.40 in.** (100 yr, 24 hr Storm Event)

Landuse Description	Soil Description	Soil Group	Curve Number (CN)	Area (A)	A(CN)
Pervious	Lawns, Good	A	39	3.12	121.68
Impervious	Roadway	-	98	7.53	737.94
Pond Area	Lawns, Good	A	39	2.13	83.07
Offsite Impervious*	Roadway	-	98	0.97	95.06
			TOTAL	13.75	1037.75

*Pavement for compensatory treatment.

Weighted CN = $\frac{A(CN)}{A}$ = **75.5**

Soil Storage, S = $\frac{1000}{CN} - 10$ = **3.25 in.**

Runoff, R = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$ = **9.20 in.**

Runoff Volume, V = $\frac{R}{12} * AREA$ = **9.80 ac-ft**

$V_{post} - V_{pre}$ = **1.77 ac-ft**

= **77014 cubic feet**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8 - Dry Pond

R/W Requirement Estimate Pt. 1

Step No.1 - Pond Type

SHGWT Depth Estimation = **4.00 ft.** below exist. ground elevation (SCS Soil Survey)

Based upon the existing SHGWT the pond will be a:

Wet Pond or Dry Pond

Step No. 2 Storage Height Estimate (based upond SHGWT)

Based upon available information, the SHGWT is assumed to be below existing ground. Therefore the treatment volume and the peak attenuation volume are constrained to the following storage height (SH).

Storage Height (SH) = Storage Berm Elevation - Freeboard - SHGWT Elevation

Exist. Ground Elevation =	**10.00 ft.**
Inside Berm Elevation =	**11.00 ft.**
Freeboard =	**1.00 ft.**
Pond Bottom Elevation =	**7.00 ft.**
SHGWT Elevation =	**6.00 ft.**
SH =	**3.00 ft.**

Note: Check CH (Step No. 7) before calculating pond configuration.

Step No.3 Total Peak Storage Volume Requirment

The Total Peak Storage Volume Required is:

Volume (peak) = Treatment Volume (V_t) + Estimated Peak Attenuation Volume ($V_{post} - V_{pre}$)
Volume (peak) = **154200 cubic feet (cf)**
Volume (peak) = **3.54 ac-ft**

Step No. 4 Pond Configuration

Use the formula for a rectangular box to determine the water surface area of a pond with vertical sides.

Volume = *Length*Width*Height*

Where:
V = Volume from Step No. 3
L = Length of Pond
W = Width of Pond
H = Height from Step No. 2

Assume that the width (W) is half of the Length (L), therefore L/W = 2

Volume = L * (0.5 L) * H
154200 cf = L * (0.5 L) * H

The lesser of SH or CH =	**3.00 ft.**	SH (Step 2) or CH (Step 7)
L =	**321 ft.**	
W =	**160 ft.**	

Pond Bottom Area **1.18 acres**

Step No. 5 Accounting for Preliminary Information

Increasing Pond Area by: **20 %** to account for preceding information being preliminary (range between 10 and 20 percent).

Pond Bottom Area **1.42 acres**

L	**351 ft.**
W	**176 ft.**

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8 - Dry Pond

R/W Requirement Estimate Pt. 2

Step No. 6 Top of Bank (Inside Berm) - Accounting for the Pond Side Slopes

Top of Bank Height = Storage Berm Elevation - SHGWT Elevation = **4.00 ft.**
Side slopes are 1: **4**

2 * (Bank Height * side slope) + L (step no. 4) = Length @ top of bank (L(top))
2 * (Bank Height * side slope) + W (step no. 4) = Width @ top of bank (W(top))

Length @ Top of Bank	=	**383 ft.**	L(top)
Width @ Top of Bank	=	**208 ft.**	W(top)

Top of Bank Area = L(top) * W(top)
Top of Bank Area = **79600 sq. ft.** **1.83 acres**

Step No. 7 Accounting for the Energy Loss

Urban section with closed stormsewer system therefore 3-year attenuation constrained to the following clareance height (CH).

Clareance Height (CH) = Low gutter point-Clearance-Est. Energy Loss-(Higher of SHGWT or Pond Bottom)

Low point in the gutter	=	**12.00 ft.**	(from existing plans)
Distance from Low Point to Pond	=	**400.00 ft.**	
Clearance	=	**1.00 ft.**	
Estimated Energy Loss	=	**0.60 ft.**	(Assume 0.15%)
Pond Bottom Elevation	=	**7.00 ft.**	
SHGWT Elevation	=	**6.00 ft.**	
CH	=	**4.40 ft.**	

Step No. 8 Maintenance Berms

Desired Maintenance Berm Width	=	**20 ft.**
Length = L(top) + 2(berm width)	=	**423 ft.**
Width = W(top) + 2(berm width)	=	**248 ft.**

TOTAL POND AREA REQUIREMENT **2.41 acres**

Step No. 9 Right-of-Way Area

Desired Buffer from Maintenance Berm	=	**5 ft.**
Length = L(top) + 2(berm width)	=	**433 ft.**
Width = W(top) + 2(berm width)	=	**258 ft.**

TOTAL RIGHT-OF-WAY REQUIREMENT **2.56 acres**

WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
2035 Vista Parkway	FPID:	4416931	District:	4
West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8 - Dry Pond

Stage-Storage Estimate

SHGWT = **6.00 ft.**

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.42 ac.		0.00 ac-ft	0.00 ac-ft
			1.57 ac.		
Freeboard	10.00 ft.	1.72 ac.		4.71 ac-ft	4.71 ac-ft
			1.78 ac.		
Inside Berm	11.00 ft.	1.83 ac.		1.78 ac-ft	6.49 ac-ft
			2.12 ac.		
Back of Berm	12.00 ft.	2.41 ac.		2.12 ac-ft	8.60 ac-ft
Right-of-Way Area		2.56 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	6.49 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.77 ac-ft of stormwater runoff Treatment Volume is **8.09 ft.** .

The minimum water surface elevation to detain the required
3.54 ac-ft of stormwater runoff peak volume is **9.18 ft.** .

Dry Pond 8 A

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.10 ac.		0.00 ac-ft	0.00 ac-ft
			1.27 ac.		
Freeboard	10.00 ft.	1.43 ac.		3.80 ac-ft	3.80 ac-ft
			1.49 ac.		
Inside Berm	11.00 ft.	1.54 ac.		1.49 ac-ft	5.28 ac-ft
			1.84 ac.		
Back of Berm	12.00 ft.	2.14 ac.		1.84 ac-ft	7.12 ac-ft
Right-of-Way Area		2.40 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	5.28 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.77 ac-ft of stormwater runoff Treatment Volume is **8.34 ft.** .

The minimum water surface elevation to detain the required
3.54 ac-ft of stormwater runoff peak volume is **9.68 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8 - Dry Pond

Dry Pond 8 B

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.46 ac.		0.00 ac-ft	0.00 ac-ft
			1.63 ac.		
Freeboard	10.00 ft.	1.80 ac.		4.89 ac-ft	4.89 ac-ft
			1.85 ac.		
Inside Berm	11.00 ft.	1.91 ac.		1.85 ac-ft	6.74 ac-ft
			2.22 ac.		
Back of Berm	12.00 ft.	2.53 ac.		2.22 ac-ft	8.96 ac-ft
Right-of-Way Area		2.77 ac.			

Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	6.74 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required **1.77 ac-ft** of stormwater runoff Treatment Volume is **8.05 ft.** .

The minimum water surface elevation to detain the required **3.54 ac-ft** of stormwater runoff peak volume is **9.10 ft.** .

WGI	WGI, INC.	Project:	Aviation Blvd.	County:	Indian River
	2035 Vista Parkway	FPID:	4416931	District:	4
	West Palm Beach, FL 33411	Calced by:	JBS	Prepared:	7/18/2023
	(561) 687-2220	Checked by:	CBC	Printed:	2/4/2024

BASINS 300, 400, & 500 - Alternate 8 - Dry Pond

Dry Pond 8 C

Stage		Area	Average Area	Storage	
				Incremental	Cumulative
				Treatment Volume	
Pond Bottom	7.00 ft.	1.31 ac.		0.00 ac-ft	0.00 ac-ft
			1.46 ac.		
Freeboard	10.00 ft.	1.61 ac.		4.38 ac-ft	4.38 ac-ft
			1.66 ac.		
Inside Berm	11.00 ft.	1.71 ac.		1.66 ac-ft	6.04 ac-ft
			1.99 ac.		
Back of Berm	12.00 ft.	2.26 ac.		1.99 ac-ft	8.03 ac-ft
Right-of-Way Area		2.49 ac.			

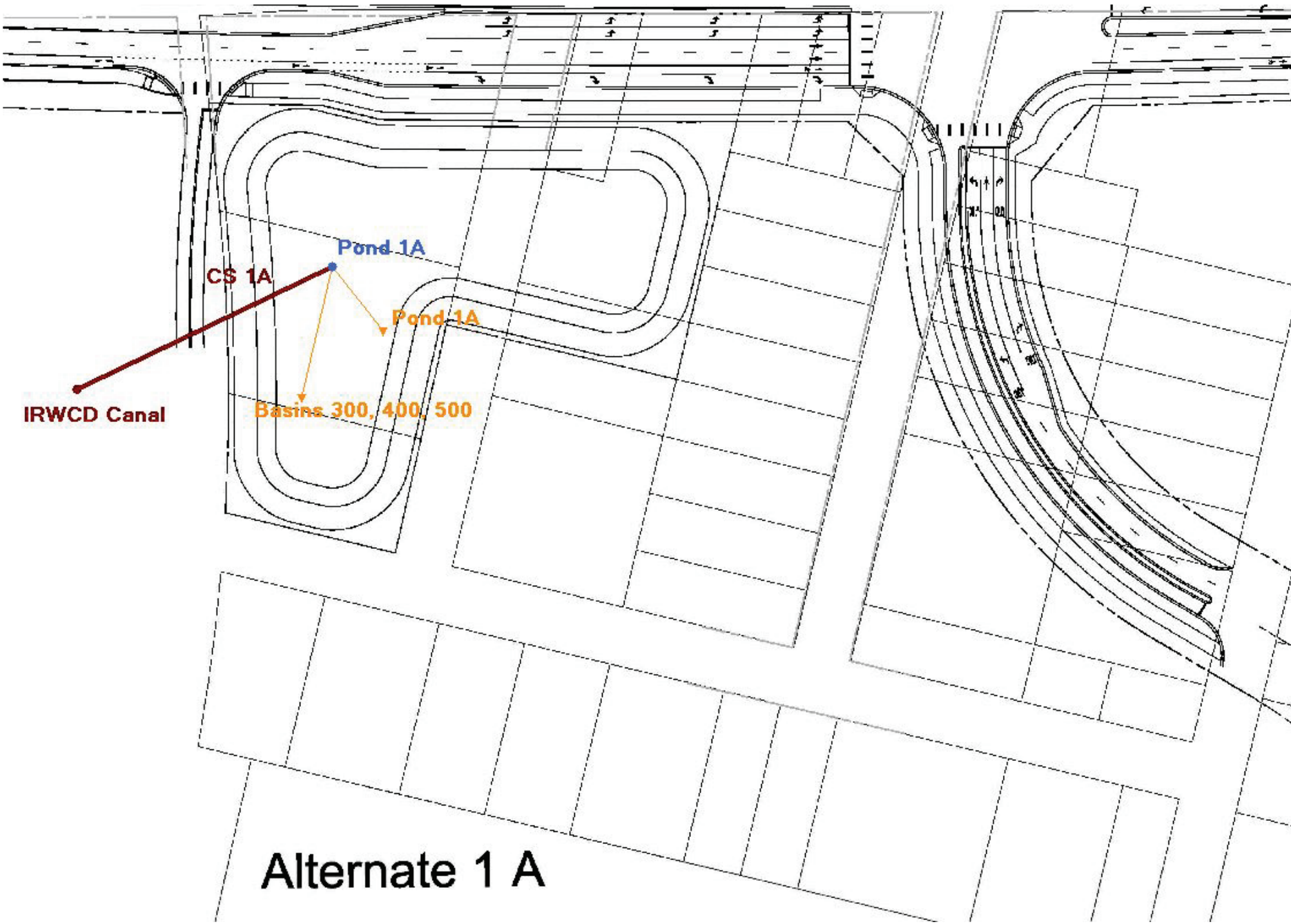
Water Quantity Elevation

Stage	Storage
7.00'	0.00 ac-ft
11.00'	6.04 ac-ft

Therefore, from linear interpolation the minimum water surface elevation to detain the required
1.77 ac-ft of stormwater runoff Treatment Volume is **8.17 ft.** .

The minimum water surface elevation to detain the required
3.54 ac-ft of stormwater runoff peak volume is **9.34 ft.** .

APPENDIX C-5



Alternate 1 A


Basins 300, 400, 500
IRWCD Canal
CS 1B
Pond 1B
Pond 1B
Alternate 1 B


Basins 300, 400, 500
Alternate 1 C
Pond 1C
Pond 1C
IRWCD Canal
CS 1C

APPENDIX C-6

Simple Basin: Basins 300, 400, 500

Scenario:	Pond 1A
Node:	Pond 1A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	20.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	8.3100 ac
Curve Number:	80.3
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	

Comment:

Simple Basin: Pond 1A

Scenario:	Pond 1A
Node:	Pond 1A
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	20.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	2.2200 ac
Curve Number:	39.0
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	

Comment:

Simple Basin: Basins 300, 400, 500

Scenario:	Pond 1B
Node:	Pond 1B
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	20.0000 min
Max Allowable Q:	0.00 cfs

Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	8.3100 ac
Curve Number:	80.3
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	

Comment:

Simple Basin: Pond 1D

Scenario:	Pond 1B
Node:	Pond 1B
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	20.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	2.2400 ac
Curve Number:	39.0
% Impervious:	0.00
% DCIA:	0.00
% Direct:	0.00
Rainfall Name:	

Comment:

Simple Basin: Basins 300, 400, 500

Scenario:	Pond 1C
Node:	Pond 1C
Hydrograph Method:	NRCS Unit Hydrograph
Infiltration Method:	Curve Number
Time of Concentration:	20.0000 min
Max Allowable Q:	0.00 cfs
Time Shift:	0.0000 hr
Unit Hydrograph:	UH256
Peaking Factor:	256.0
Area:	8.3100 ac
Curve Number:	80.3
% Impervious:	0.00
% DCIA:	0.00

% Direct: 0.00
Rainfall Name:

Comment:

Simple Basin: Pond 1C

Scenario: Pond 1C
Node: Pond 1C
Hydrograph Method: NRCS Unit Hydrograph
Infiltration Method: Curve Number
Time of Concentration: 20.0000 min
Max Allowable Q: 0.00 cfs
Time Shift: 0.0000 hr
Unit Hydrograph: UH256
Peaking Factor: 256.0
Area: 1.9300 ac
Curve Number: 39.0
% Impervious: 0.00
% DCIA: 0.00
% Direct: 0.00
Rainfall Name:

Comment:

Node: IRWCD Canal

Scenario: Pond 1A
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 2.00 ft
Warning Stage: 2.00 ft
Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	1000.0000	2.00

Comment:

Node: Pond 1A

Scenario: Pond 1A
Type: Stage/Area
Base Flow: 0.00 cfs

Initial Stage: 7.00 ft
Warning Stage: 10.00 ft

Stage [ft]	Area [ac]	Area [ft2]
7.00	1.1800	51401
11.00	1.6200	70567
12.00	2.2200	96703

Comment:

Node: IRWCD Canal

Scenario: Pond 1B
Type: Time/Stage
Base Flow: 0.00 cfs
Initial Stage: 2.00 ft
Warning Stage: 2.00 ft
Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	1000.0000	2.00

Comment:

Node: Pond 1B

Scenario: Pond 1B
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 7.00 ft
Warning Stage: 10.00 ft

Stage [ft]	Area [ac]	Area [ft2]
7.00	1.0200	44431
11.00	2.2400	97574
12.00	2.6100	113692

Comment:

Node: IRWCD Canal

Scenario: Pond 1C
Type: Time/Stage
Base Flow: 0.00 cfs

Initial Stage: 2.00 ft
Warning Stage: 2.00 ft
Boundary Stage:

Year	Month	Day	Hour	Stage [ft]
0	0	0	0.0000	2.00
0	0	0	1000.0000	2.00

Comment:

Node: Pond 1C

Scenario: Pond 1C
Type: Stage/Area
Base Flow: 0.00 cfs
Initial Stage: 7.00 ft
Warning Stage: 10.00 ft

Stage [ft]	Area [ac]	Area [ft2]
7.00	1.0400	45302
11.00	1.4200	61855
12.00	1.9300	84071

Comment:

Drop Structure Link: CS 1A

Scenario: Pond 1A
From Node: Pond 1A
To Node: IRWCD Canal
Link Count: 1
Flow Direction: Both
Solution: Combine
Increments: 0
Pipe Count: 1
Damping: 0.0000 ft
Length: 190.00 ft
FHWA Code: 0
Entr Loss Coef: 0.00
Exit Loss Coef: 0.50
Bend Loss Coef: 0.00
Bend Location: 0.00 dec
Energy Switch: Energy

Upstream Pipe		Downstream Pipe	
Invert:	2.50 ft	Invert:	1.00 ft
Manning's N:	0.0120	Manning's N:	0.0120
Geometry: Circular		Geometry: Circular	
Max Depth:	3.00 ft	Max Depth:	3.00 ft
Bottom Clip			
Default:	0.00 ft	Default:	0.00 ft
Op Table:		Op Table:	
Ref Node:		Ref Node:	
Manning's N:	0.0000	Manning's N:	0.0000
Top Clip			
Default:	0.00 ft	Default:	0.00 ft
Op Table:		Op Table:	
Ref Node:		Ref Node:	
Manning's N:	0.0000	Manning's N:	0.0000

Pipe Comment:

Weir Component

Weir: 1

Bottom Clip

Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Horizontal
Geometry Type:	Rectangular
Invert:	10.00 ft
Control Elevation:	10.00 ft
Max Depth:	3.08 ft
Max Width:	4.08 ft
Fillet:	0.00 ft

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment: Type D DBI

Weir Component

Weir:	2
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	8.50 ft
Control Elevation:	8.50 ft
Max Depth:	0.50 ft
Max Width:	0.50 ft
Fillet:	0.00 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Weir Component

Weir:	3
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Circular
Invert:	6.50 ft
Control Elevation:	7.00 ft
Max Depth:	0.25 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Drop Structure Comment:

Drop Structure Link: CS 1B		Upstream Pipe		Downstream Pipe	
Scenario:	Pond 1B	Invert:	2.50 ft	Invert:	1.00 ft
From Node:	Pond 1B	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	IRWCD Canal	Geometry: Circular		Geometry: Circular	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	Bottom Clip			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	400.00 ft	Top Clip			
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.00	Op Table:		Op Table:	
Exit Loss Coef:	0.50	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 dec				
Energy Switch:	Energy				

Pipe Comment:

Weir Component		Bottom Clip	
Weir:	1	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Horizontal	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	10.00 ft	Ref Node:	
Control Elevation:	10.00 ft	Discharge Coefficients	
Max Depth:	3.08 ft	Weir Default:	3.200
Max Width:	4.08 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Weir Comment: Type D DBI

Weir Component		Bottom Clip	
Weir:	2	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	Top Clip	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	8.50 ft	Ref Node:	
Control Elevation:	8.50 ft	Discharge Coefficients	
Max Depth:	0.50 ft	Weir Default:	3.200
Max Width:	0.50 ft	Weir Table:	
Fillet:	0.00 ft	Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Weir Component		Bottom Clip	
Weir:	3	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	**Top Clip**	
Weir Type:	Sharp Crested Vertical	Default:	0.00 ft
Geometry Type:	Circular	Op Table:	
Invert:	6.50 ft	Ref Node:	
Control Elevation:	7.00 ft	**Discharge Coefficients**	
Max Depth:	0.25 ft	Weir Default:	3.200
		Weir Table:	
		Orifice Default:	0.600
		Orifice Table:	

Weir Comment:

Drop Structure Comment:

Drop Structure Link: CS 1C		Upstream Pipe		Downstream Pipe	
Scenario:	Pond 1C	Invert:	2.50 ft	Invert:	1.00 ft
From Node:	Pond 1C	Manning's N:	0.0120	Manning's N:	0.0120
To Node:	IRWCD Canal	**Geometry: Circular**		**Geometry: Circular**	
Link Count:	1	Max Depth:	3.00 ft	Max Depth:	3.00 ft
Flow Direction:	Both	**Bottom Clip**			
Solution:	Combine	Default:	0.00 ft	Default:	0.00 ft
Increments:	0	Op Table:		Op Table:	
Pipe Count:	1	Ref Node:		Ref Node:	
Damping:	0.0000 ft	Manning's N:	0.0000	Manning's N:	0.0000
Length:	1300.00 ft	**Top Clip**			
FHWA Code:	0	Default:	0.00 ft	Default:	0.00 ft
Entr Loss Coef:	0.00	Op Table:		Op Table:	
Exit Loss Coef:	0.50	Ref Node:		Ref Node:	
Bend Loss Coef:	0.00	Manning's N:	0.0000	Manning's N:	0.0000
Bend Location:	0.00 dec				
Energy Switch:	Energy				

Pipe Comment:

Weir Component		Bottom Clip	
Weir:	1	Default:	0.00 ft
Weir Count:	1	Op Table:	
Weir Flow Direction:	Both	Ref Node:	
Damping:	0.0000 ft	**Top Clip**	
Weir Type:	Horizontal	Default:	0.00 ft
Geometry Type:	Rectangular	Op Table:	
Invert:	10.10 ft	Ref Node:	
Control Elevation:	10.10 ft		

Max Depth:	3.08 ft
Max Width:	4.08 ft
Fillet:	0.00 ft

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment: Type D DBI

Weir Component

Weir:	2
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Rectangular
Invert:	8.75 ft
Control Elevation:	8.75 ft
Max Depth:	0.50 ft
Max Width:	0.50 ft
Fillet:	0.00 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Weir Component

Weir:	3
Weir Count:	1
Weir Flow Direction:	Both
Damping:	0.0000 ft
Weir Type:	Sharp Crested Vertical
Geometry Type:	Circular
Invert:	6.50 ft
Control Elevation:	7.00 ft
Max Depth:	0.25 ft

Bottom Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Top Clip

Default:	0.00 ft
Op Table:	
Ref Node:	

Discharge Coefficients

Weir Default:	3.200
Weir Table:	
Orifice Default:	0.600
Orifice Table:	

Weir Comment:

Drop Structure Comment:

Simulation: 025-Year 1A

Scenario:	Pond 1A
Run Date/Time:	2/12/2024 2:33:09 PM
Program Version:	ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	90.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

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

Surface Hydraulics

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

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	9.25 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 100-Year 1A

Scenario: Pond 1A
Run Date/Time: 2/12/2024 2:33:21 PM
Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

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

Surface Hydraulics

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

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	12.40 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 025-Year 1B

Scenario: Pond 1B
Run Date/Time: 2/12/2024 2:33:26 PM

Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	90.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

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

Surface Hydraulics

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

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	9.25 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 100-Year 1B

Scenario: Pond 1B
Run Date/Time: 2/12/2024 2:33:43 PM
Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

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

Surface Hydraulics

Year	Month	Day	Hour [hr]	Time Increment [min]

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

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	12.40 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 025-Year 1C

Scenario: Pond 1C
Run Date/Time: 2/12/2024 2:52:53 PM
Program Version: ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	90.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

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

Surface Hydraulics

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

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:

Conductivity Set:	
Leakage Set:	

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	9.25 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

Simulation: 100-Year 1C

Scenario:	Pond 1C
Run Date/Time:	2/12/2024 2:53:03 PM
Program Version:	ICPR4 4.07.08

General

Run Mode: Normal

	Year	Month	Day	Hour [hr]
Start Time:	0	0	0	0.0000
End Time:	0	0	0	30.0000

	Hydrology [sec]	Surface Hydraulics [sec]	Groundwater [sec]
Min Calculation Time:	60.0000	0.1000	900.0000
Max Calculation Time:		30.0000	

Output Time Increments

Hydrology

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

Surface Hydraulics

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

Groundwater

Year	Month	Day	Hour [hr]	Time Increment [min]
0	0	0	0.0000	60.0000

Restart File

Save Restart: False

Resources & Lookup Tables

Resources

Rainfall Folder:
Reference ET Folder:
Unit Hydrograph Folder:

Lookup Tables

Boundary Stage Set:
Extern Hydrograph Set:
Curve Number Set:
Green-Ampt Set:
Vertical Layers Set:
Impervious Set:
Roughness Set:
Crop Coef Set:
Fillable Porosity Set:
Conductivity Set:
Leakage Set:

Tolerances & Options

Time Marching:	SAOR	IA Recovery Time:	24.0000 hr
Max Iterations:	6	ET for Manual Basins:	False
Over-Relax Weight Fact:	0.5 dec		
dZ Tolerance:	0.0010 ft	Smp/Man Basin Rain Opt:	Global
Max dZ:	1.0000 ft	OF Region Rain Opt:	Global
Link Optimizer Tol:	0.0001 ft	Rainfall Name:	~FLMOD
		Rainfall Amount:	12.40 in
Edge Length Option:	Automatic	Storm Duration:	24.0000 hr
Dflt Damping (2D):	0.0050 ft	Dflt Damping (1D):	0.0050 ft
Min Node Srf Area (2D):	100 ft2	Min Node Srf Area (1D):	100 ft2
Energy Switch (2D):	Energy	Energy Switch (1D):	Energy

Comment:

APPENDIX C-7

Simple Basin Runoff Summary [Pond 1A]

Basin Name	Sim Name	Max Flow [cfs]	Time to Max Flow [hrs]	Total Rainfall [in]	Total Runoff [in]	Area [ac]	Equivalent Curve Number	% Imperv	% DCIA
Basins 300, 400, 500	025-Year 1A	29.09	12.1500	9.25	6.84	8.3100	80.3	0.00	0.00
Pond 1A	025-Year 1A	1.48	12.3333	9.25	1.72	2.2200	39.0	0.00	0.00
Basins 300, 400, 500	100-Year 1A	41.46	12.1500	12.40	9.87	8.3100	80.3	0.00	0.00
Pond 1A	100-Year 1A	3.45	12.2500	12.40	3.45	2.2200	39.0	0.00	0.00

Simple Basin Runoff Summary [Pond 1B]

Basin Name	Sim Name	Max Flow [cfs]	Time to Max Flow [hrs]	Total Rainfall [in]	Total Runoff [in]	Area [ac]	Equivalent Curve Number	% Imperv	% DCIA
Basins 300, 400, 500	025-Year 1B	29.09	12.1500	9.25	6.84	8.3100	80.3	0.00	0.00
Pond 1D	025-Year 1B	1.50	12.3333	9.25	1.72	2.2400	39.0	0.00	0.00
Basins 300, 400, 500	100-Year 1B	41.46	12.1500	12.40	9.87	8.3100	80.3	0.00	0.00
Pond 1D	100-Year 1B	3.48	12.2500	12.40	3.45	2.2400	39.0	0.00	0.00

Simple Basin Runoff Summary [Pond 1C]

Basin Name	Sim Name	Max Flow [cfs]	Time to Max Flow [hrs]	Total Rainfall [in]	Total Runoff [in]	Area [ac]	Equivalent Curve Number	% Imperv	% DCIA
Basins 300, 400, 500	025-Year 1C	29.09	12.1500	9.25	6.84	8.3100	80.3	0.00	0.00
Pond 1C	025-Year 1C	1.29	12.3333	9.25	1.72	1.9300	39.0	0.00	0.00
Basins 300, 400, 500	100-Year 1C	41.46	12.1500	12.40	9.87	8.3100	80.3	0.00	0.00
Pond 1C	100-Year 1C	3.00	12.2500	12.40	3.45	1.9300	39.0	0.00	0.00

APPENDIX C-8

Node Max Conditions [Pond 1A]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
IRWCD Canal	025-Year 1A	2.00	2.00	0.0000	1.60	0.00	0
Pond 1A	025-Year 1A	10.00	9.76	0.0010	30.42	1.60	64606
IRWCD Canal	100-Year 1A	2.00	2.00	0.0000	10.03	0.00	0
Pond 1A	100-Year 1A	10.00	10.32	0.0010	44.81	10.04	67285

Node Max Conditions [Pond 1B]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
IRWCD Canal	025-Year 1B	2.00	2.00	0.0000	1.50	0.00	0
Pond 1B	025-Year 1B	10.00	9.62	0.0010	30.43	1.50	79228
IRWCD Canal	100-Year 1B	2.00	2.00	0.0000	6.27	0.00	0
Pond 1B	100-Year 1B	10.00	10.21	0.0010	44.84	6.27	87071

Node Max Conditions [Pond 1C]

Node Name	Sim Name	Warning Stage [ft]	Max Stage [ft]	Min/Max Delta Stage [ft]	Max Total Inflow [cfs]	Max Total Outflow [cfs]	Max Surface Area [ft2]
IRWCD Canal	025-Year 1C	2.00	2.00	0.0000	1.65	0.00	0
Pond 1C	025-Year 1C	10.00	10.05	0.0010	30.25	1.65	57926
IRWCD Canal	100-Year 1C	2.00	2.00	0.0000	13.02	0.00	0
Pond 1C	100-Year 1C	10.00	10.49	0.0010	44.37	13.03	59741

APPENDIX C-9

Scenario	Sim	Relative Time [hrs]	Stage [ft]	Total Outflow Volume [ac_ft]
Pond 1A	025-Year 1A	0.0000	7.00	0.00
Pond 1A	025-Year 1A	0.2511	7.00	0.00
Pond 1A	025-Year 1A	0.5050	7.00	0.00
Pond 1A	025-Year 1A	0.7527	7.00	0.00
Pond 1A	025-Year 1A	1.0027	7.00	0.00
Pond 1A	025-Year 1A	1.2527	7.00	0.00
Pond 1A	025-Year 1A	1.5027	7.00	0.00
Pond 1A	025-Year 1A	1.7527	7.00	0.00
Pond 1A	025-Year 1A	2.0027	7.00	0.00
Pond 1A	025-Year 1A	2.2527	7.00	0.00
Pond 1A	025-Year 1A	2.5027	7.00	0.00
Pond 1A	025-Year 1A	2.7527	7.00	0.00
Pond 1A	025-Year 1A	3.0027	7.00	0.00
Pond 1A	025-Year 1A	3.2527	7.00	0.00
Pond 1A	025-Year 1A	3.5027	7.00	0.00
Pond 1A	025-Year 1A	3.7527	7.00	0.00
Pond 1A	025-Year 1A	4.0027	7.00	0.00
Pond 1A	025-Year 1A	4.2527	7.00	0.00
Pond 1A	025-Year 1A	4.5027	7.00	0.00
Pond 1A	025-Year 1A	4.7527	7.00	0.00
Pond 1A	025-Year 1A	5.0027	7.00	0.00
Pond 1A	025-Year 1A	5.2527	7.00	0.00
Pond 1A	025-Year 1A	5.5027	7.01	0.00
Pond 1A	025-Year 1A	5.7527	7.01	0.00
Pond 1A	025-Year 1A	6.0027	7.01	0.00
Pond 1A	025-Year 1A	6.2527	7.02	0.00
Pond 1A	025-Year 1A	6.5027	7.02	0.00
Pond 1A	025-Year 1A	6.7527	7.03	0.00
Pond 1A	025-Year 1A	7.0027	7.03	0.00
Pond 1A	025-Year 1A	7.2527	7.04	0.01
Pond 1A	025-Year 1A	7.5027	7.05	0.01
Pond 1A	025-Year 1A	7.7527	7.06	0.01
Pond 1A	025-Year 1A	8.0027	7.07	0.01
Pond 1A	025-Year 1A	8.2527	7.08	0.01
Pond 1A	025-Year 1A	8.5027	7.09	0.01
Pond 1A	025-Year 1A	8.7527	7.11	0.01
Pond 1A	025-Year 1A	9.0027	7.12	0.01
Pond 1A	025-Year 1A	9.2527	7.14	0.02
Pond 1A	025-Year 1A	9.5027	7.16	0.02
Pond 1A	025-Year 1A	9.7527	7.18	0.02
Pond 1A	025-Year 1A	10.0027	7.21	0.02
Pond 1A	025-Year 1A	10.2527	7.23	0.02

Scenario	Sim	Relative Time [hrs]	Stage [ft]	Total Outflow Volume [ac_ft]
Pond 1A	025-Year 1A	21.0028	9.73	1.11
Pond 1A	025-Year 1A	21.2528	9.72	1.15
Pond 1A	025-Year 1A	21.5028	9.72	1.18
Pond 1A	025-Year 1A	21.7528	9.71	1.21
Pond 1A	025-Year 1A	22.0028	9.70	1.24
Pond 1A	025-Year 1A	22.2528	9.70	1.28
Pond 1A	025-Year 1A	22.5028	9.69	1.31
Pond 1A	025-Year 1A	22.7528	9.69	1.34
Pond 1A	025-Year 1A	23.0028	9.68	1.37
Pond 1A	025-Year 1A	23.2528	9.68	1.40
Pond 1A	025-Year 1A	23.5028	9.67	1.44
Pond 1A	025-Year 1A	23.7528	9.66	1.47
Pond 1A	025-Year 1A	24.0028	9.65	1.50
Pond 1A	025-Year 1A	24.2528	9.64	1.53
Pond 1A	025-Year 1A	24.5028	9.63	1.56
Pond 1A	025-Year 1A	24.7528	9.61	1.59
Pond 1A	025-Year 1A	25.0028	9.59	1.62
Pond 1A	025-Year 1A	25.2528	9.57	1.65
Pond 1A	025-Year 1A	25.5028	9.55	1.68
Pond 1A	025-Year 1A	25.7528	9.53	1.71
Pond 1A	025-Year 1A	26.0028	9.51	1.74
Pond 1A	025-Year 1A	26.2528	9.49	1.77
Pond 1A	025-Year 1A	26.5028	9.47	1.80
Pond 1A	025-Year 1A	26.7528	9.45	1.83
Pond 1A	025-Year 1A	27.0028	9.43	1.86
Pond 1A	025-Year 1A	27.2528	9.41	1.89
Pond 1A	025-Year 1A	27.5028	9.39	1.91
Pond 1A	025-Year 1A	27.7528	9.38	1.94
Pond 1A	025-Year 1A	28.0028	9.36	1.97
Pond 1A	025-Year 1A	28.2528	9.34	2.00
Pond 1A	025-Year 1A	28.5028	9.32	2.02
Pond 1A	025-Year 1A	28.7528	9.30	2.05
Pond 1A	025-Year 1A	29.0028	9.28	2.07
Pond 1A	025-Year 1A	29.2528	9.27	2.10
Pond 1A	025-Year 1A	29.5028	9.25	2.12
Pond 1A	025-Year 1A	29.7528	9.23	2.15
Pond 1A	025-Year 1A	30.0028	9.21	2.17
Pond 1A	025-Year 1A	30.2528	9.20	2.20
Pond 1A	025-Year 1A	30.5028	9.18	2.22
Pond 1A	025-Year 1A	30.7528	9.16	2.24
Pond 1A	025-Year 1A	31.0028	9.15	2.27
Pond 1A	025-Year 1A	31.2528	9.13	2.29

Scenario	Sim	Relative Time [hrs]	Stage [ft]	Total Outflow Volume [ac_ft]
Pond 1B	025-Year 1B	4.2527	7.00	0.00
Pond 1B	025-Year 1B	4.5027	7.00	0.00
Pond 1B	025-Year 1B	4.7527	7.00	0.00
Pond 1B	025-Year 1B	5.0027	7.00	0.00
Pond 1B	025-Year 1B	5.2527	7.00	0.00
Pond 1B	025-Year 1B	5.5027	7.01	0.00
Pond 1B	025-Year 1B	5.7527	7.01	0.00
Pond 1B	025-Year 1B	6.0027	7.01	0.00
Pond 1B	025-Year 1B	6.2527	7.02	0.00
Pond 1B	025-Year 1B	6.5027	7.02	0.00
Pond 1B	025-Year 1B	6.7527	7.03	0.00
Pond 1B	025-Year 1B	7.0027	7.04	0.00
Pond 1B	025-Year 1B	7.2527	7.05	0.01
Pond 1B	025-Year 1B	7.5027	7.06	0.01
Pond 1B	025-Year 1B	7.7527	7.07	0.01
Pond 1B	025-Year 1B	8.0027	7.08	0.01
Pond 1B	025-Year 1B	8.2527	7.09	0.01
Pond 1B	025-Year 1B	8.5027	7.11	0.01
Pond 1B	025-Year 1B	8.7527	7.12	0.01
Pond 1B	025-Year 1B	9.0027	7.14	0.02
Pond 1B	025-Year 1B	9.2527	7.16	0.02
Pond 1B	025-Year 1B	9.5027	7.18	0.02
Pond 1B	025-Year 1B	9.7527	7.20	0.02
Pond 1B	025-Year 1B	10.0027	7.23	0.02
Pond 1B	025-Year 1B	10.2519	7.26	0.03
Pond 1B	025-Year 1B	10.5001	7.29	0.03
Pond 1B	025-Year 1B	10.7508	7.33	0.03
Pond 1B	025-Year 1B	11.0011	7.38	0.03
Pond 1B	025-Year 1B	11.2524	7.43	0.04
Pond 1B	025-Year 1B	11.5011	7.49	0.04
Pond 1B	025-Year 1B	11.7511	7.60	0.04
Pond 1B	025-Year 1B	12.0005	7.88	0.05
Pond 1B	025-Year 1B	12.2505	8.32	0.05
Pond 1B	025-Year 1B	12.5006	8.69	0.06
Pond 1B	025-Year 1B	12.7502	8.94	0.07
Pond 1B	025-Year 1B	13.0000	9.11	0.09
Pond 1B	025-Year 1B	13.2515	9.24	0.12
Pond 1B	025-Year 1B	13.5014	9.32	0.14
Pond 1B	025-Year 1B	13.7504	9.39	0.17
Pond 1B	025-Year 1B	14.0011	9.43	0.20
Pond 1B	025-Year 1B	14.2552	9.46	0.23
Pond 1B	025-Year 1B	14.5052	9.48	0.25

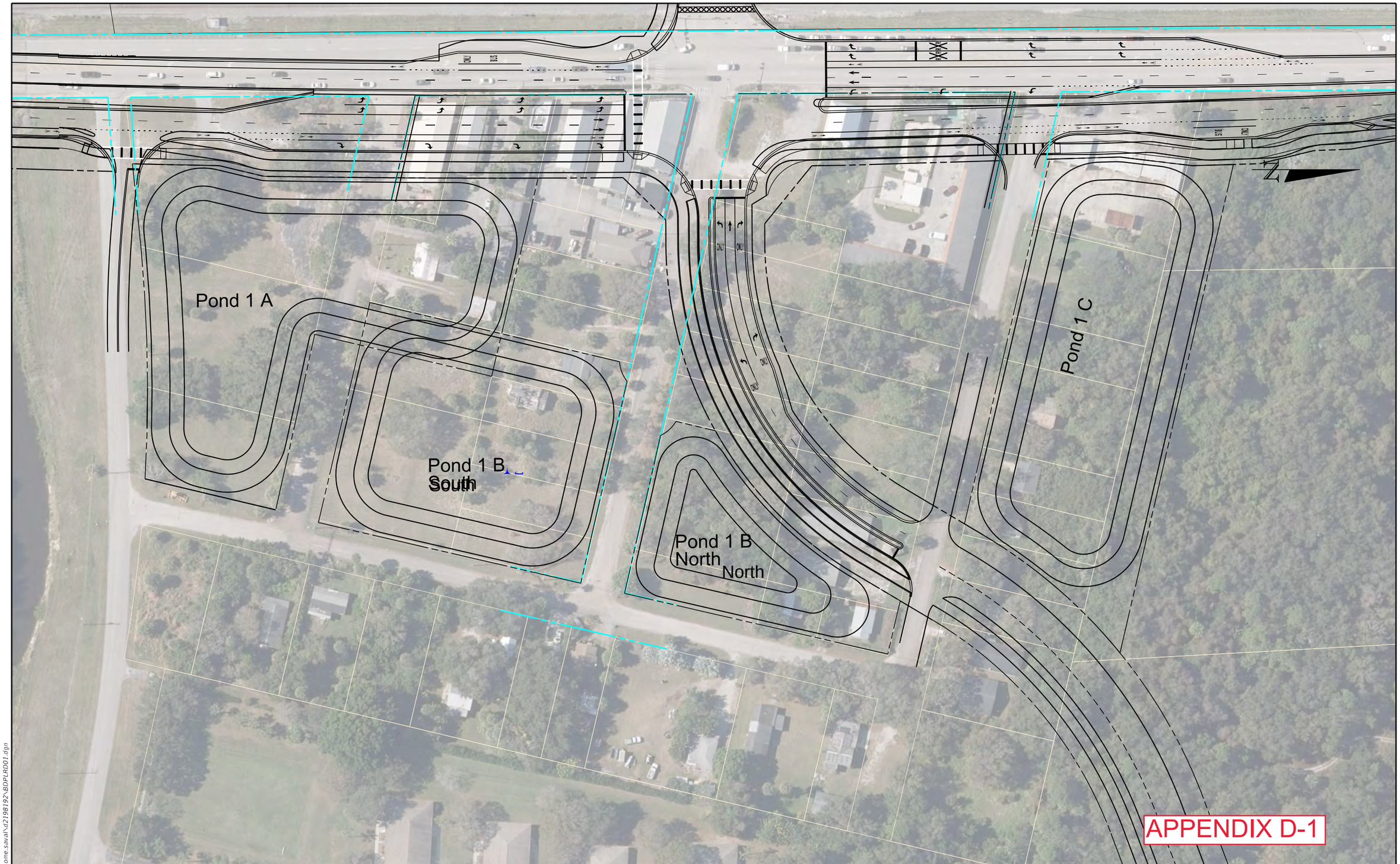
Scenario	Sim	Relative Time [hrs]	Stage [ft]	Total Outflow Volume [ac_ft]
Pond 1B	025-Year 1B	25.2552	9.49	1.57
Pond 1B	025-Year 1B	25.5052	9.48	1.59
Pond 1B	025-Year 1B	25.7552	9.46	1.62
Pond 1B	025-Year 1B	26.0052	9.45	1.65
Pond 1B	025-Year 1B	26.2552	9.43	1.68
Pond 1B	025-Year 1B	26.5052	9.41	1.71
Pond 1B	025-Year 1B	26.7552	9.40	1.74
Pond 1B	025-Year 1B	27.0052	9.38	1.76
Pond 1B	025-Year 1B	27.2552	9.37	1.79
Pond 1B	025-Year 1B	27.5052	9.35	1.82
Pond 1B	025-Year 1B	27.7552	9.34	1.84
Pond 1B	025-Year 1B	28.0052	9.32	1.87
Pond 1B	025-Year 1B	28.2552	9.30	1.90
Pond 1B	025-Year 1B	28.5052	9.29	1.92
Pond 1B	025-Year 1B	28.7552	9.28	1.95
Pond 1B	025-Year 1B	29.0052	9.26	1.97
Pond 1B	025-Year 1B	29.2552	9.25	2.00
Pond 1B	025-Year 1B	29.5052	9.23	2.02
Pond 1B	025-Year 1B	29.7552	9.22	2.05
Pond 1B	025-Year 1B	30.0052	9.20	2.07
Pond 1B	025-Year 1B	30.2552	9.19	2.09
Pond 1B	025-Year 1B	30.5052	9.17	2.12
Pond 1B	025-Year 1B	30.7552	9.16	2.14
Pond 1B	025-Year 1B	31.0052	9.15	2.16
Pond 1B	025-Year 1B	31.2552	9.13	2.19
Pond 1B	025-Year 1B	31.5052	9.12	2.21
Pond 1B	025-Year 1B	31.7552	9.11	2.23
Pond 1B	025-Year 1B	32.0052	9.09	2.25
Pond 1B	025-Year 1B	32.2552	9.08	2.27
Pond 1B	025-Year 1B	32.5052	9.07	2.30
Pond 1B	025-Year 1B	32.7552	9.06	2.32
Pond 1B	025-Year 1B	33.0052	9.04	2.34
Pond 1B	025-Year 1B	33.2552	9.03	2.36
Pond 1B	025-Year 1B	33.5052	9.02	2.38
Pond 1B	025-Year 1B	33.7552	9.01	2.39
Pond 1B	025-Year 1B	34.0052	9.00	2.41
Pond 1B	025-Year 1B	34.2552	8.99	2.43
Pond 1B	025-Year 1B	34.5052	8.97	2.45
Pond 1B	025-Year 1B	34.7552	8.96	2.47
Pond 1B	025-Year 1B	35.0052	8.95	2.48
Pond 1B	025-Year 1B	35.2552	8.94	2.50
Pond 1B	025-Year 1B	35.5052	8.93	2.52

Scenario	Sim	Relative Time [hrs]	Stage [ft]	Total Outflow Volume [ac_ft]
Pond 1B	025-Year 1B	88.2552	7.96	3.94
Pond 1B	025-Year 1B	88.5052	7.96	3.94
Pond 1B	025-Year 1B	88.7552	7.95	3.95
Pond 1B	025-Year 1B	89.0052	7.95	3.95
Pond 1B	025-Year 1B	89.2552	7.95	3.96
Pond 1B	025-Year 1B	89.5052	7.94	3.96
Pond 1B	025-Year 1B	89.7552	7.94	3.97
Pond 1B	025-Year 1B	90.0052	7.94	3.97
Pond 1C	025-Year 1C	0.0000	7.00	0.00
Pond 1C	025-Year 1C	0.2511	7.00	0.00
Pond 1C	025-Year 1C	0.5050	7.00	0.00
Pond 1C	025-Year 1C	0.7527	7.00	0.00
Pond 1C	025-Year 1C	1.0027	7.00	0.00
Pond 1C	025-Year 1C	1.2527	7.00	0.00
Pond 1C	025-Year 1C	1.5027	7.00	0.00
Pond 1C	025-Year 1C	1.7527	7.00	0.00
Pond 1C	025-Year 1C	2.0027	7.00	0.00
Pond 1C	025-Year 1C	2.2527	7.00	0.00
Pond 1C	025-Year 1C	2.5027	7.00	0.00
Pond 1C	025-Year 1C	2.7527	7.00	0.00
Pond 1C	025-Year 1C	3.0027	7.00	0.00
Pond 1C	025-Year 1C	3.2527	7.00	0.00
Pond 1C	025-Year 1C	3.5027	7.00	0.00
Pond 1C	025-Year 1C	3.7527	7.00	0.00
Pond 1C	025-Year 1C	4.0027	7.00	0.00
Pond 1C	025-Year 1C	4.2527	7.00	0.00
Pond 1C	025-Year 1C	4.5027	7.00	0.00
Pond 1C	025-Year 1C	4.7527	7.00	0.00
Pond 1C	025-Year 1C	5.0027	7.00	0.00
Pond 1C	025-Year 1C	5.2527	7.00	0.00
Pond 1C	025-Year 1C	5.5027	7.01	0.00
Pond 1C	025-Year 1C	5.7527	7.01	0.00
Pond 1C	025-Year 1C	6.0027	7.01	0.00
Pond 1C	025-Year 1C	6.2527	7.02	0.00
Pond 1C	025-Year 1C	6.5027	7.02	0.00
Pond 1C	025-Year 1C	6.7527	7.03	0.00
Pond 1C	025-Year 1C	7.0027	7.04	0.00
Pond 1C	025-Year 1C	7.2527	7.05	0.01
Pond 1C	025-Year 1C	7.5027	7.06	0.01
Pond 1C	025-Year 1C	7.7527	7.07	0.01
Pond 1C	025-Year 1C	8.0027	7.08	0.01
Pond 1C	025-Year 1C	8.2527	7.09	0.01

Scenario	Sim	Relative Time [hrs]	Stage [ft]	Total Outflow Volume [ac_ft]
Pond 1C	025-Year 1C	29.5080	9.46	2.17
Pond 1C	025-Year 1C	29.7580	9.44	2.19
Pond 1C	025-Year 1C	30.0080	9.42	2.22
Pond 1C	025-Year 1C	30.2580	9.40	2.24
Pond 1C	025-Year 1C	30.5080	9.38	2.26
Pond 1C	025-Year 1C	30.7580	9.37	2.29
Pond 1C	025-Year 1C	31.0080	9.35	2.31
Pond 1C	025-Year 1C	31.2580	9.33	2.33
Pond 1C	025-Year 1C	31.5080	9.31	2.35
Pond 1C	025-Year 1C	31.7580	9.30	2.37
Pond 1C	025-Year 1C	32.0080	9.28	2.39
Pond 1C	025-Year 1C	32.2580	9.27	2.41
Pond 1C	025-Year 1C	32.5080	9.25	2.43
Pond 1C	025-Year 1C	32.7580	9.24	2.45
Pond 1C	025-Year 1C	33.0080	9.22	2.47
Pond 1C	025-Year 1C	33.2580	9.21	2.49
Pond 1C	025-Year 1C	33.5080	9.19	2.50
Pond 1C	025-Year 1C	33.7580	9.18	2.52
Pond 1C	025-Year 1C	34.0080	9.17	2.54
Pond 1C	025-Year 1C	34.2580	9.15	2.55
Pond 1C	025-Year 1C	34.5080	9.14	2.57
Pond 1C	025-Year 1C	34.7580	9.13	2.58
Pond 1C	025-Year 1C	35.0080	9.12	2.60
Pond 1C	025-Year 1C	35.2580	9.11	2.61
Pond 1C	025-Year 1C	35.5080	9.09	2.63
Pond 1C	025-Year 1C	35.7580	9.08	2.64
Pond 1C	025-Year 1C	36.0080	9.07	2.65
Pond 1C	025-Year 1C	36.2580	9.06	2.67
Pond 1C	025-Year 1C	36.5080	9.05	2.68
Pond 1C	025-Year 1C	36.7580	9.04	2.69
Pond 1C	025-Year 1C	37.0080	9.03	2.70
Pond 1C	025-Year 1C	37.2580	9.02	2.71
Pond 1C	025-Year 1C	37.5080	9.01	2.73
Pond 1C	025-Year 1C	37.7580	9.00	2.74
Pond 1C	025-Year 1C	38.0080	9.00	2.75
Pond 1C	025-Year 1C	38.2580	8.99	2.76
Pond 1C	025-Year 1C	38.5080	8.98	2.77
Pond 1C	025-Year 1C	38.7580	8.97	2.78
Pond 1C	025-Year 1C	39.0080	8.96	2.79
Pond 1C	025-Year 1C	39.2580	8.95	2.80
Pond 1C	025-Year 1C	39.5080	8.95	2.81
Pond 1C	025-Year 1C	39.7580	8.94	2.82

Appendix D
Pond Alternatives Layouts

- Alternative 1
- Alternative 2
- Alternative 7
- Alternative 8



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 1

SHEET NO.

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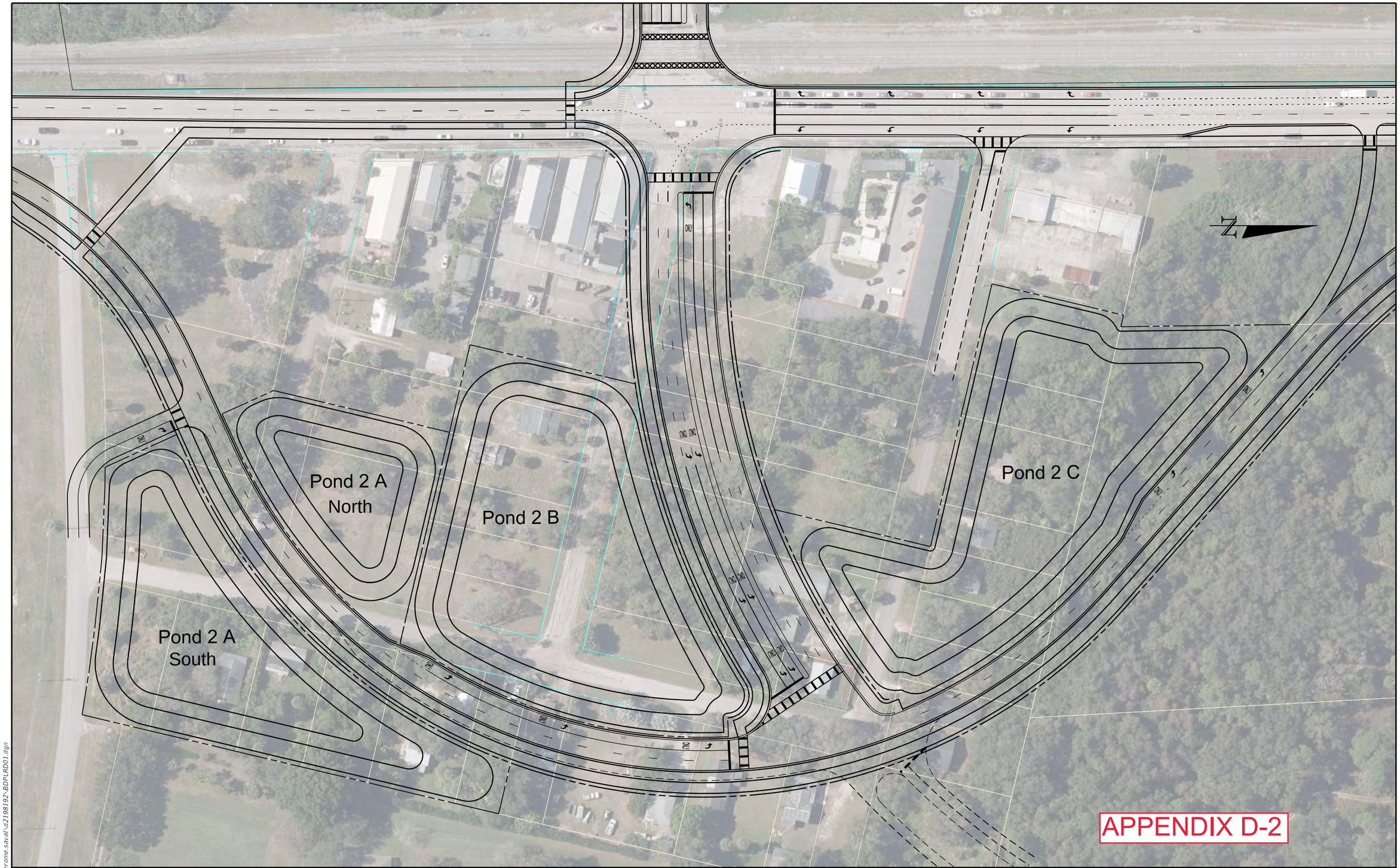

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 2

SHEET NO.

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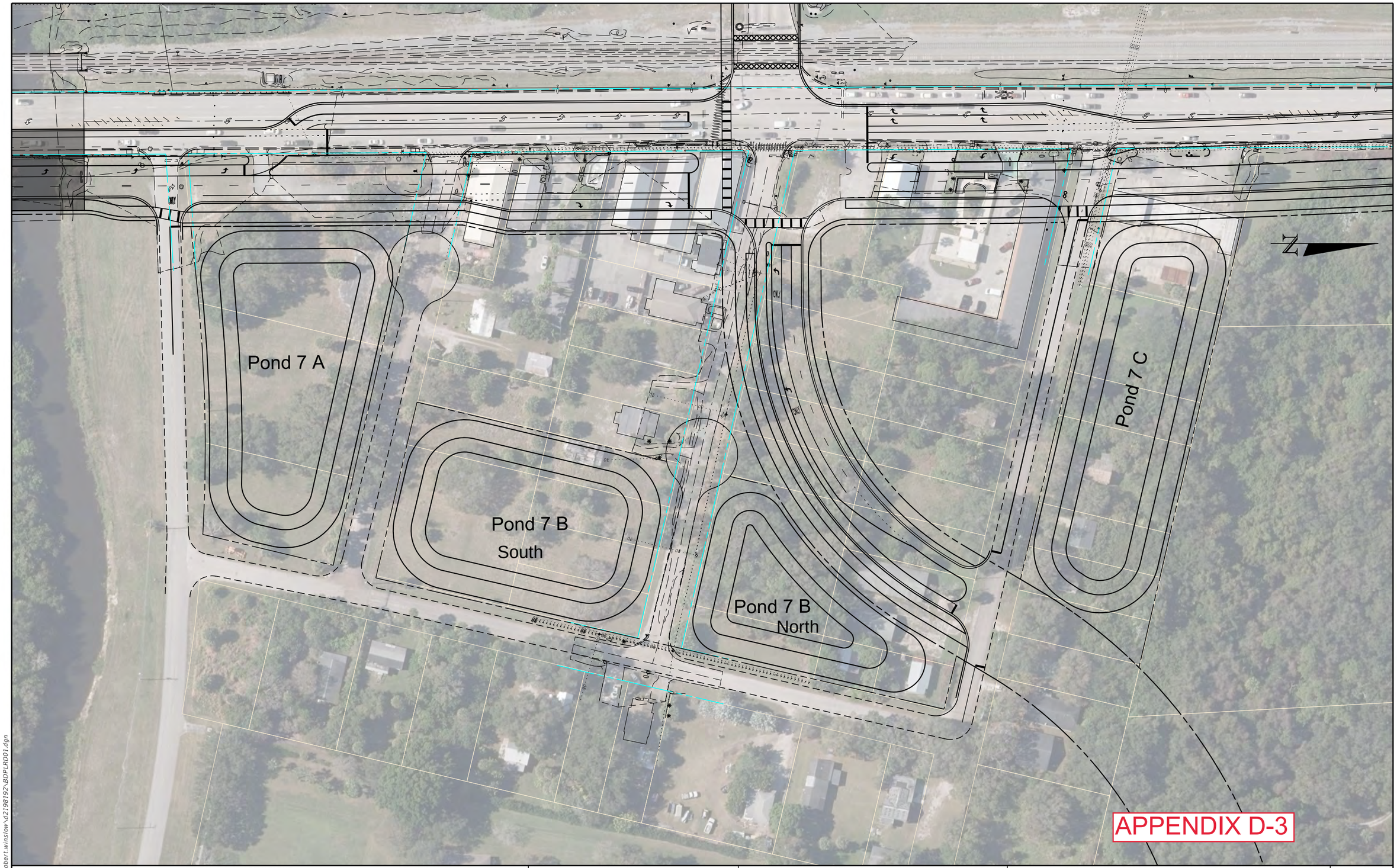

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
5	INDIAN RIVER	441693-1-22-02

ALTERNATIVE 7

SHEET NO.

8/21/2023 4:15:24 PM Robert.Winslow
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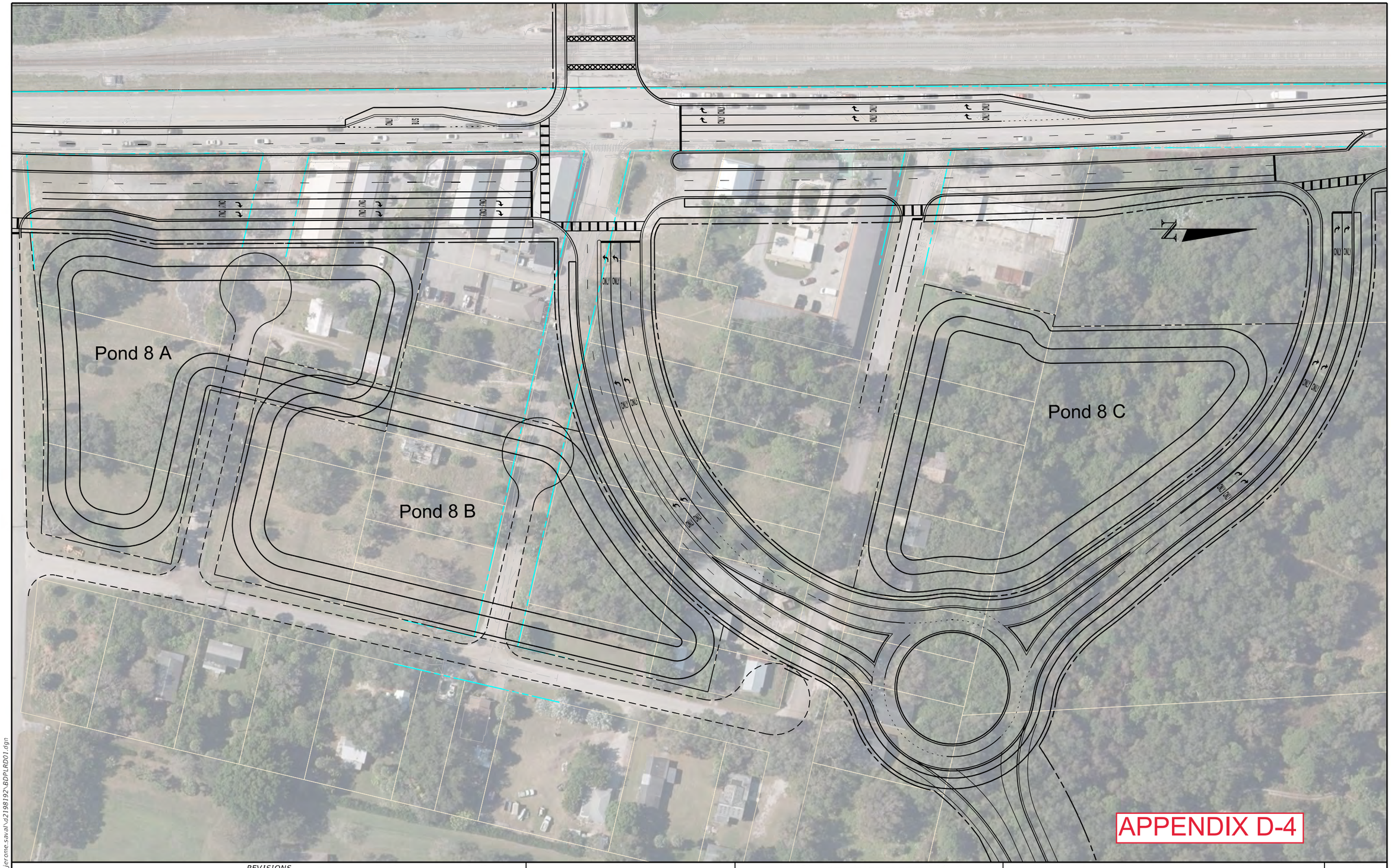

APPENDIX D-4

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 8

SHEET NO.

7/18/2023 3:57:28 PM Jerome.Saval
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Appendix E
Pond Site Evaluation Matrices

APPENDIX E

Pond Siting Evaluation Matrix

Item	Weight Factor*	Factor	Score**	Weighted Score	Score**	Weighted Score	Score**	Weighted Score
	1 to 5	**PD&E Build Alternative 1 Conventional Intersecion**	1 to 5		1 to 5		1 to 5	
		Pond Alternative Number	**1-A**		**1-B**		**1-C**	
		Brief Description of Pond Alternative	Utilizes 1 full block between 30th and 31st St		Closes 32nd Street		North of 33rd Street	
		Number of parcels effected	3		9		6	
		Existing property use	vacant parcel		vacant with 2 active residential units impacted by pond		Abondonded houses and a commercial business (roadway widening acquires the commercial structure)	
		Pond Size (Acres)	1.61		1.81		1.81	
	*	** Weight factors are 1 for least critical and 5 for most critical* *** Score factors are 1 for most negative effect and 5 for most positive effect*	**		**		**	
1	4	**Right of Way (number of properties required)**	4	16	1	4	2	8
2	4	**Right of Way (number of relocations)**	5	20	1	4	2	8
3	2	**Economic Development**	3	6	1	2	4	8
4	2	**Right-of-Way Costs**	5	10	1	2	3	6
5	3	**Drainage Considerations**	5	15	4	12	3	9
6	2	**FEMA Flood Zone**	3	6	3	6	3	6
7	3	**Contamination/Hazardous Materials**	4	12	3	9	1	3
8	3	**Utilities**	4	12	4	12	4	12
9	4	**Threatened/Endangered Species**	4	16	4	16	3	12
10	4	**Wetlands/Protected Uplands**	5	20	5	20	5	20
11	5	**Cultural Resources Involvement**	1	5	5	25	3	15
12	5	**Section 4(f)**	5	25	5	25	5	25
13	4	**Public Wellfield**	5	20	5	20	4	16
14	3	**Construction**	5	15	3	9	5	15
15	3	**Maintenance**	5	15	3	9	5	15
16	3	**Aesthetics**	4	12	4	12	4	12
17	4	**Public Opinion/Adjacent Residency Concerns**	3	12	3	12	3	12
18	1	**Other**	3	3	3	3	3	3
		Score	240		202		205	
		Ranking	**1**		3		2	

Note: Rankings are from 1-5, with 5 being the highest or most desired score.

SR 5/US-1 at Aviation Boulevard PDE Study
FM 441693-1-22-02

Pond Siting Evaluation Matrix

Item	Weight Factor*	Factor	Score**	Weighted Score	Score**	Weighted Score	Score**	Weighted Score
	1 to 5	**PD&E Build Alternative 2 One Way Pairs**	1 to 5		1 to 5		1 to 5	
		Pond Alternative Number	**2-A**		**2-B**		**2-C**	
		Brief Description of Pond Alternative	Two pond cells around 30th St and 15th Ave.		Closes 32nd Street		North of 33rd Street	
		Number of parcels effected	10 (6 parcels are part of roadway r/w)		14 (6 parcels are part of roadway r/w)		10 (5 parcels are part of roadway r/w)	
		Existing property use	vacant land with 3 residential units impacted by pond		vacant land with 2 residential units impacted by pond		vacant and forested land with 3 abandoned residential units impacted by pond	
		Pond Size (Acres)	1.86		2.49		2.54	
	*	** Weight factors are 1 for least critical and 5 for most critical* *** Score factors are 1 for most negative effect and 5 for most positive effect*	**		**		**	
1	4	**Right of Way (number of properties required)**	2	8	1	4	2	8
2	4	**Right of Way (number of relocations)**	1	4	2	8	3	12
3	2	**Economic Development**	4	8	3	6	4	8
4	2	**Right-of-Way Costs**	2	4	3	6	5	10
5	3	**Drainage Considerations**	5	15	4	12	3	9
6	2	**FEMA Flood Zone**	3	6	3	6	3	6
7	3	**Contamination/Hazardous Materials**	4	12	3	9	2	6
8	3	**Utilities**	3	9	3	9	4	12
9	4	**Threatened/Endangered Species**	4	16	4	16	3	12
10	4	**Wetlands/Protected Uplands**	5	20	5	20	5	20
11	5	**Cultural Resources Involvement**	1	5	5	25	3	15
12	5	**Section 4(f)**	5	25	5	25	5	25
13	4	**Public Wellfield**	5	20	5	20	4	16
14	3	**Construction**	3	9	5	15	4	12
15	3	**Maintenance**	3	9	5	15	4	12
16	3	**Aesthetics**	4	12	4	12	3	9
17	4	**Public Opinion/Adjacent Residency Concerns**	2	8	3	12	3	12
18	1	**Other**	3	3	3	3	3	3
		Score	193		223		207	
		Ranking	3		1		2	

Note: Rankings are from 1-5, with 5 being the highest or most desired score.

Pond Siting Evaluation Matrix

Item	Weight Factor*	Factor	Score**	Weighted Score	Score**	Weighted Score	Score**	Weighted Score
	1 to 5	**PD&E Build Alternative 7 Displaced Left Turn**	1 to 5		1 to 5		1 to 5	
		Pond Alternative Number	**7-A**		**7-B**		**7-C**	
		Brief Description of Pond Alternative	Utilizes 1 full block between 30th and 31st St.		Closes 32nd Street		North of 33rd Street	
		Number of parcels effected	3		9		6	
		Existing property use	vacant parcel		vacant with 2 active residential units impacted by pond		Abondonded houses and a commercial business (roadway widening acquires the building structure)	
		Pond Size (Acres)	1.59		1.81		1.58	
	*	** Weight factors are 1 for least critical and 5 for most critical* *** Score factors are 1 for most negative effect and 5 for most positive effect*	**		**		**	
1	4	**Right of Way (number of properties required)**	4	16	1	4	2	8
2	4	**Right of Way (number of relocations)**	5	20	1	4	2	8
3	2	**Economic Development**	3	6	1	2	4	8
4	2	**Right-of-Way Costs**	5	10	1	2	3	6
5	3	**Drainage Considerations**	5	15	4	12	3	9
6	2	**FEMA Flood Zone**	3	6	3	6	3	6
7	3	**Contamination/Hazardous Materials**	4	12	3	9	1	3
8	3	**Utilities**	4	12	4	12	4	12
9	4	**Threatened/Endangered Species**	4	16	4	16	3	12
10	4	**Wetlands/Protected Uplands**	5	20	5	20	5	20
11	5	**Cultural Resources Involvement**	1	5	5	25	3	15
12	5	**Section 4(f)**	5	25	5	25	5	25
13	4	**Public Wellfield**	5	20	5	20	4	16
14	3	**Construction**	5	15	3	9	5	15
15	3	**Maintenance**	5	15	3	9	5	15
16	3	**Aesthetics**	4	12	4	12	4	12
17	4	**Public Opinion/Adjacent Residency Concerns**	3	12	3	12	3	12
18	1	**Other**	3	3	3	3	3	3
		Score	240		202		205	
		Ranking	**1**		3		2	

Note: Rankings are from 1-5, with 5 being the highest or most desired score.

Pond Siting Evaluation Matrix

Item	Weight Factor*	Factor	Score	Weighted Score	Score	Weighted Score	Score	Weighted Score
	1 to 5	**PD&E Build Alternative 8 Median U-turn with Roundabout**	1 to 5		1 to 5		1 to 5	
		Pond Alternative Number	**8-A**		**8-B**		**8-C**	
		Brief Description of Pond Alternative	Utilizes 1.5 full blocks between 30th and 32nd St.		Utilizes 1.5 full blocks between 31st and 33rd St.		North of 33rd Street	
		Number of parcels effected	5		11 (3 parcels are part of roadway r/w)		6 (2 parcels are part of roadway r/w)	
		Existing property use	vacant parcels with 2 businesses (includes multi-unit apts.)		vacant parcels with 1 businesses and 2 residential units		Vacant land with abondonded houses	
		Pond Size (Acres)	2.40		2.77		2.49	
	*	** Weight factors are 1 for least critical and 5 for most critical* *** Score factors are 1 for most negative effect and 5 for most positive effect*	**		**		**	
1	4	**Right of Way (number of properties required)**	4	16	1	4	2	8
2	4	**Right of Way (number of relocations)**	1	4	2	8	4	16
3	2	**Economic Development**	3	6	2	4	2	4
4	2	**Right-of-Way Costs**	3	6	1	2	5	10
5	3	**Drainage Considerations**	5	15	4	12	3	9
6	2	**FEMA Flood Zone**	3	6	3	6	3	6
7	3	**Contamination/Hazardous Materials**	4	12	3	9	2	6
8	3	**Utilities**	3	9	3	9	4	12
9	4	**Threatened/Endangered Species**	4	16	4	16	3	12
10	4	**Wetlands/Protected Uplands**	5	20	5	20	5	20
11	5	**Cultural Resources Involvement**	1	5	5	25	3	15
12	5	**Section 4(f)**	5	25	5	25	5	25
13	4	**Public Wellfield**	5	20	5	20	4	16
14	3	**Construction**	4	12	5	15	5	15
15	3	**Maintenance**	4	12	5	15	5	15
16	3	**Aesthetics**	3	9	4	12	4	12
17	4	**Public Opinion/Adjacent Residency Concerns**	3	12	3	12	4	16
18	1	**Other**	3	3	3	3	3	3
		Score	208		217		220	
		Ranking	**3**		**2**		**1**	

Note: Rankings are from 1-5, with 5 being the highest or most desired score.

Appendix F
Correspondence and Excerpts from SJRWMD Permits

- City & County Coordination Meeting Minutes 6/16/2023
- Pond Siting Kickoff Meeting Minutes 6/28/2023
- Pond-Siting Meeting #2 Minutes 7/26/2023
- IRFWCD - Phone Notes-2023-07-27
- IRFWCD - Meeting Notes-2023-08-04
- FDOT Drainage and Proposed Ponds Meeting Minutes 8/14/2023
- Pond-Siting Meeting #3 Minutes 8/30/2023
- Draft Cultural Resource Review for Pond Siting Memo 2023-08-22
- Indian River Memorial Hospital (1987) - Permit 40-061-0027
- Alcohope of the Treasure Coast (2003) - Permit 42-061-86755-3
- Aviation Boulevard Roadway Widening (2010) - Permit 40-061-123418-1
- All Aboard Florida - Fiber Optic Cable (2015) - Permit 144190-1
- FAA Advisory Circular 150-5200-33C
- IRFWCD System Evaluation Report Excerpts and Memo

APPENDIX F-1

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

JARED W. PERDUE, P.E.
SECRETARY

MEETING NOTES

DATE: June 16, 2023 at 9:30 AM via TEAMS call

TO: Rich Szpyrka, William Howard, Jason Jefferies, John Thompson, Jim Mann, Laurie McDermott, Mary Soderstrum

FROM: Vandana Nagole

COPIES: Bill Evans, Jim Hughes, Brian Freeman, Matthew Mitts

SUBJECT: **Local Coordination Meeting**
SR 5/US 1 at Aviation Boulevard PD&E Study
Indian River County
FM: 441693-1-22-02
ETDM: 14475

Agenda Topics:

The purpose of the meeting is to present the FDOT SR 5 PD&E build alternatives, screening evaluation matrix, and gain input from the local public works and planning departments. The meeting was attended by Indian River County, City of Vero Beach, Vero Beach Regional Airport and Indian River County MPO public works and/or planning managers.

Meeting Notes:

1. An update was provided by Jason Jefferies, City Planning, regarding the May 16th City Council Meeting and resolution.
    a. Resolution was tabled and will be reconsidered when the RPZ analysis is complete.
    b. The alternative that was mentioned during the Council meeting isn't feasible as it goes through the archaeological site.
2. Rich Szpyrka, IRC County Public Works, provided an update on the status of the Aviation Blvd extension project.
    a. The Aviation Blvd extension Project is moving ahead and property is being appraised and purchased. ROW is being coordinated with FDOT District 4 ROW office to ensure county acquired property is according to FDOT regulations.
    b. The county will adjust their project as needed to match the outcome of the PD&E study. Construction start dates will be better known when ROW is finalized and design is complete. Design is currently at 30-45%.

3. Mary Soderstrum (FDOT aviation consultant) provided an update on the findings of the Runway Protection Zone analysis that FDOT District 4 conducted.
    a. FDOT conducted the study at the request of the FAA and the Vero Beach Airport.
    b. RPZ analysis considered the 8 PD&E alternatives and another 6 RPZ alternatives. The RPZ alternatives were developed to evaluate options to move either the RPZ or Aviation Blvd from occupying the same space and clear the RPZ area.
    The RPZ analysis recommends Alternative 1 (at grade) due to the least impact to the existing RPZ, cost and need to service the airport.
    c. Jason Jefferies noted the city and airport master plans require Aviation Blvd to be in place to provide mobility for the planned growth and relocating Aviation Blvd traffic to the south via 26th Street is not feasible due to probable impacts and existing traffic congestion on the other roadways.
    d. The Vero Beach Airport reviewed and commented on the RPZ report.
    e. The RPZ report will be updated and sent to FAA with copies sent to the Airport, city and county public works. The RPZ report will be sent to FAA the week of 6/19/23.
    f. FAA will offer a formal response after their review which is anticipated to conclude the RPZ analysis process.
4. The discussion of the eight (8) PD&E alternatives and the screening evaluation matrix was led by Bill Evans. Two new alternatives were presented as a recommendation from the Intersection Control Evaluation (ICE) analysis. The two new concepts are Alternative 7 (displaced left turn) and Alternative 8 (median u-turn and roundabout).
5. The screening evaluation matrix was presented and the following comments obtained.
    a. The local government and public support criteria and ratings were discussed.
        i. Rich Szpyrka, IRC disagreed with the lack of independent utility as a negative factor for Alternative 6 (Aviation Blvd overpass) since the roadway is in the design phase. Bill Evans noted the main factors for the elimination of Alternative 6 were conflicts within the airport RPZ due to the elevated roadway, impacts to access and splitting of the properties east of SR 5, city and public opposition to an overpass, and the overpass did not have an existing connecting road, hence no independent utility.
    b. Bill Evans stated that all participants review the local support item and provide positions on the alternatives if they are different than shown on the matrix.
        i. Following the meeting, Jason Jeffries, City of Vero Beach, provided a response from the City Manager regarding the city's support:
            - Alternative 1, at grade, City Supports
            - Alternative 2, twin intersections, City Opposed, due to impacts to adjacent properties and property owner opposition
            - Alternative 7, deflective left turn, City Neutral, need property owner input prior to offering City position

- Alternative 8, median u-turn roundabout, City Neutral, need property owner input prior to offering City position
- City Opposed to any overpass alternative.

c. FEC RR criteria: IRC noted the FEC RR is asking for lane-per-lane closure to match any intersection expansions and asked what city street was being proposed for closure for the Aviation Blvd expansion, since Aviation Blvd is a city street at the railroad crossing. Bill Evans noted the FEC had identified 14th Avenue as a potential crossing closure candidate. The city noted it may have reviewed that crossing in the past and it may have needs to access downtown. It was agreed that the FDOT will reach out to FEC again to obtain clarification.

d. Right of way criteria: The portion of Aviation Blvd within the airport property is under the regulations of the federal Surplus Property Act of 1944 and Section 163 of the FAA Reauthorization Act of 2018 that provides FAA approval authority on improvements. The FDOT ROW office will be reviewing the ROW requirements for the alternatives and follow-up coordination with the airport is anticipated.

e. An additional right of way amount of 2 acres is being considered for potential pond sites. The city will be contacted as the pond sitting process is conducted.

f. The city and county requested copies of the ROW acquisition sheets that will be utilized for the ROW acquisition estimates.

6. The four viable alternatives to advance into detailed PD&E analysis are:
   a. Alternative 1: Conventional Intersection
   b. Alternative 2: Twin Intersections or One-way Pairs
   c. Alternative 7: Displaced Left Turn
   d. Alternative 8: Median U-turn with Roundabout
7. Coordination dates with City Council, County Commission, MPO Board prior to workshop was discussed.
   a. The county noted the best way to coordinate with the county officials is through the MPO Board meeting. The September 13th MPO Board meeting and August 25th MPO TAC meetings will be scheduled.
   b. The City will get back to FDOT on whether the city council needs to be briefed prior to the public meeting.
8. Tentative Public Alternatives Workshop
   a. November 14th (virtual)
   b. November 15th (in person) at City Community Center in Pocahontas Park

The attendance report follows on the next page.

Attendance Report:

Meeting title	**Project Alternatives Call - 441693-1 SR 5 at Aviation Blvd**	
Attended participants	**10**	
Start time	6/16/23, 9:19:57 AM	
End time	6/16/23, 11:52:45 AM	
Average attendance time	1h 16m 33s	
2. Participants		
Name	**First Join**	**Email**
William Evans	6/16/23, 9:26:19 AM	William.Evans@wginc.com
Rick Joseph	6/16/23, 9:26:32 AM	Rick.Joseph@wginc.com
Soderstrum, Mary	6/16/23, 9:28:21 AM	msoderstrum@avconinc.com
Rich Szpyrka (Guest)	6/16/23, 9:28:21 AM	rszpyrka@ircgov.com
Will KVRB (Guest)	6/16/23, 9:28:21 AM	whoward@covb.org
McDermott, Laurie	6/16/23, 9:29:11 AM	Laurie.McDermott@dot.state.fl.us
Jim Mann	6/16/23, 9:29:11 AM	jmann@ircgov.com
John Thompson	6/16/23, 9:30:49 AM	JThompson@hanson-inc.com
Nagole, Vandana	6/16/23, 9:31:17 AM	Vandana.Nagole@dot.state.fl.us
Jason Jeffries (Guest)	6/16/23, 9:31:21 AM	jjeffries@covb.org

Vn:wte

APPENDIX F-2

NOTES
POND SITING KICKOFF MEETING

June 28, 2023

Project Name: SR 5 / US-1 at Aviation Blvd PD&E Study **WGI Project:** 02217003.00

Client Name: FDOT District 4 **Client Contract:** CAI127 **FDOT FM:** 441693-1-22-02

The pond sitting kickoff meeting was held to brief the participants on the project alternatives and discuss the process.

1. The participants were a multi-disciplinary team from WGI and FDOT consultant management, drainage, right of way, environment, cultural resources, and PD&E departments.
    a. FDOT PM: Vandana Nagole
    b. WGI PM: Bill Evans
    c. WGI Drainage Engineer: Jerry Saval
    d. FDOT key discipline contacts are Robert Vater, Drainage; Maria Salgado, Environment, Dan Marwood, R/W.
2. **Project Presentation**
    a. A brief project presentation introduced the project alternatives, initial pond sites, right of way needs for each of the four alternatives.
    b. The existing drainage system has ponds on the airport property, however the airport has stated those ponds are not to be expanded. This same location is the area of the Vero Man Ice Age archeological site and deep excavation is not recommended. The existing drainage outfalls are into the Main Canal east and west of the main canal bridge.
    c. The two agencies are Indian River Farms Water Control District and St Johns River Water Management District. FDOT noted that the consultant may contact the agencies directly with FDOT copied on the correspondence.
    d. Proposed ponds will be dry ponds due to the aviation requirements.
3. **Pond Siting Process**
    a. The general process was discussed.
        i. Nutrient loading into the Indian River Lagoon will be a top concern for the agencies.
        ii. After the meeting James Poole posted on TEAMS the WATERSS Guide and sample evaluation matrix for reference
    b. The 2nd Pond site meeting – Wednesday, July 26, 2023 3:30 PM-4:30 PM
        i. Initial ponds and evaluation criteria will be developed and circulated to the team.
        ii. Environmental Look Around is planned for July 21st (contact Bill Evans) for any interested persons. Maria Salgado requested to join others in the site review.
        iii. It was recommended that the team reach out to the county and city for input on pond sites.
        iv. **Action item:** After the meeting WGI contacted the city and county.
    c. 3rd Meeting date: **Wednesday, August 30, 2023 2:00 PM-3:00 PM**
        i. Review Evaluation Matrix
        ii. Select ponds to move forward
    d. Target completion date for the pond siting process is August 31.

Attendance list follows on the next page.

Attendance List

1. Summary		
Meeting title	**441693-1: SR 5 at Aviation Blvd-Pond Siting Kick off meeting**	
Attended	14	
Start time	6/28/23, 1:03:02 PM	
End time	6/28/23, 1:57:08 PM	
Meeting duration	**54m 6s**	
2. Participants		
Name	**First join**	**Email**
William Davis	6/28/23, 1:03:14 PM	William.Davis@wginc.com
Vater, Robert	6/28/23, 1:03:34 PM	Robert.Vater@dot.state.fl.us
William Evans	6/28/23, 1:05:57 PM	William.Evans@wginc.com
Lynn Zolezzi	6/28/23, 1:06:03 PM	Lynn.Zolezzi@wginc.com
Jerome Saval	6/28/23, 1:10:54 PM	Jerome.Saval@wginc.com
Boyer, Alex	6/28/23, 1:15:03 PM	Alex.Boyer@dot.state.fl.us
Brown, Christina	6/28/23, 1:15:20 PM	Christina.Brown@dot.state.fl.us
Arias, Juanita	6/28/23, 1:15:23 PM	Juanita.Arias@dot.state.fl.us
Martinez, Cesar	6/28/23, 1:15:25 PM	Cesar.Martinez@dot.state.fl.us
Poole, James	6/28/23, 1:15:27 PM	James.Poole@dot.state.fl.us
Robert Winslow	6/28/23, 1:15:30 PM	Robert.Winslow@wginc.com
Nagole, Vandana	6/28/23, 1:18:08 PM	Vandana.Nagole@dot.state.fl.us
Salgado, Maria	6/28/23, 1:19:48 PM	Maria.Salgado@dot.state.fl.us
Kelley, Lynn	6/28/23, 1:21:23 PM	Lynn.Kelley@dot.state.fl.us

APPENDIX F-3

MEETING NOTES

POND SITING MEETING (2) Alternatives Review

July 26, 2023

Project Name: SR 5 / US-1 at Aviation Blvd PD&E Study **WGI Project:** 02217003.00

Client Name: FDOT District 4 **Client Contract:** CAI127 **FDOT FM:** 441693-1-22-02

Attendees: Robert Vater, Ivana Robinson, Dan Marwood, Victor Ramos, Alex Boyer, Christina Brown, Jerry Saval, Bill Evans, Fernando Ascanio, Geysa Sosa.

The meeting opened with a presentation of the four alternatives, pond sites, and evaluation matrix. The matrix weighting, scoring and ranking methodology was presented along with the initial scoring of the pond sites.

The following topics were discussed by the group.

The group was encouraged to provide any thoughts or observations on the pond sites as the process continues.

The FDOT R/W office will prepare the R/w cost estimates for pond sites ahead of the August 30th pond site meeting. The four PD&E build alternatives will advance to the public alternatives workshop in October. R/W mentioned that it is good evaluate a wide range of pond sites. It can be anticipated that land sales will occur once the preferred alternative is known by the public.

A follow up meeting with FDOT will be scheduled before the next pond site meeting to discuss if the pond investigation by the natural and archaeological and historic consultants will be added to the scope of work.

The PD&E consultant will set up a coordination meeting with the city and county to present the pond sites and obtain input from the two local governments.

FDOT will set up a meeting with the District 4 drainage department to identify any specific requests. The two drainage agencies are Indian River Farms Water Control District (IRFWCD) and St. Johns River Water Management District (SJRWCD). Coordination with IRFWCD was initiated and is continuing. Once the preferred alternative is selected after the public alternatives workshop, a stormwater concept meeting with SJRWMD will be organized.

The next steps are to conduct the ranking of the pond sites and hold the third pond site meeting on August 30th. The public alternatives workshop will be held October 10/11, 2023. The Value Engineering study may be moved to November 13, 2023 which is ahead of the scheduled December 4th date.

The meeting concluded at 4:00 PM.

APPENDIX F-4

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

JARED W. PERDUE, P.E.
SECRETARY

TELEPHONE CALL NOTES

DATE: July 27, 2023

TO: George Simons, IRFWCD Consultant

FROM: Bill Evans (WGI)

COPIES: Vandana Nagole (FDOT), David Gunter (IRWCD), Attendees

SUBJECT: **Pond Sites and Main Canal Bridge**
SR 5/US 1 at Aviation Boulevard PD&E Study
Indian River County
FM: 441693-1-22-02
ETDM: 14475

Attendees: George Simons, Bill Evans, Robert Carballo, Jerry Saval

Purpose:
The purpose of the call was to identify the best method of coordination and introduce the FDOT SR 5/US-1 PD&E Study and build alternatives and gain input related to the design requirements of IRFWCD related to the project pond sites and widening or replacement of the low level bridge over the Main Canal.

Notes:
The project alternatives, pond sites and bridge were briefly presented to George Simons, Consultant for Indian River Farms Water Control District (IRFWCD).

1. Permit Application and Review:
    a. Mr. Simons mentioned that general information can be provided, but that any detailed reviews would require a permit application and associated review fees. It was discussed that the detailed reviews typically happened with final design and what the study team was looking for at this time is clarity on design and permitting requirements as well as identifications of fatal flaw opinions on the concepts.

2. Pond Sites
    a. Three pond sites per PD&E roadway alternative were presented. Each pond will be a dry pond due to the nearby aviation runway located just west of the railroad. The roadway alternative would require one pond that may range in size from 1.6 acres to 2.8 acres depending on the alternative.

b. IRCWCD noted typically the ponds are required to outfall to a sub-lateral canal to allow for spillage to be contained outside of the main lateral connections. In the case of this project, there are no sublateral canals in proximity to the proposed improvements. The outfalls would need to be directly connect to the Main Canal. The use of oil separators were discussed to assist in controlling contamination from entering the canal. It was agreed that his would be a practical approach combined with the use of dry detention swales.

3. The main canal and bridge was discussed. It is anticipated the existing four span bridge will be replaced with potentially a three span bridge.
   a. IRFWCD noted the bridge requirements are discussed on a case-by-case basis. David Gunter will provide input on the maintenance requirements and historical major storm observations. A follow up meeting was scheduled for a later date.
   b. Downstream or east of the bridge is a salinity weir structure.
   c. Upstream or west of the bridge is a county owned water control structure that collects floating debris and plant material prior to reach the Indian River Lagoon.
   d. The IRFWCD has model information that can be provided for the peak stage elevation, tailwater elevation and clearance above high water. It was mentioned that the department typically seeks to obtain stage and flow information for the 10, 25, 50 and 100-year recurrence events. Mr. Simmons indicated that they have information on all events except the 50-yr.
   e. The IRFWCD requires a minimum of 25 ft horizontal clearance between the central spans which is consistent with what the design team is proposing with the three-span structure. Robert Carballo indicated that the three-span concept places a new line of pile 5-ft from the existing intermediate bents on either side of the channel thus creating a larger center span than the 25-ft minimum in the permanent condition. He did mention that during construction the separation between the new intermediate bents and the existing center bent (to be removed) would be less than 25-ft.
   f. IRFWCD noted, if during construction, clearance is reduced for end bent construction or slope stabilization, sheet pile cofferdams have been allowed one foot above the low water elevation. The top elevation of the cofferdams must be low enough to allow water to flow over the top during the large storm events that result in the higher water levels. This allows better flow and reduces upstream flood levels.
   g. It was mentioned that IRFWCD will accept rip-rap for bank protection, but does not want it placed along the bottom of the canal beyond the toe of slope since this impacts their ability to dredge sediment build-up. Riprap up and downstream of the bridge will be required, keep the center canal bottom clear of riprap to facilitate maintenance operations, and no riprap placement under the center bridge span.

h. Further discussion is needed to identify the IRFWCD bridge maintenance access requirements. Access is open along the north canal bank. Access is available from 12th Avenue to the south canal bank.
i. The Main Canal right of way (ROW) is approximately 300 ft wide east of the bridge and 30th Street pavement is shown within the IRFWCD right of way. A right of way permit will be required for work on 30th Street. There is some current encroachments into the canal ROW along the south bank.
j. The two US-1 outfalls are located adjacent to the Main Canal Bridge along the east side of the bridge. Two new outfalls will be constructed, one on each bank of the canal, east of the new bridge.

4. Public Alternatives Workshop dates:
   a. October 10th (virtual) at 5:30 PM
   b. October 11th (in person) at 5:30 PM in the Vero Beach Community Center
   c. A meeting announcement will be sent to the IRFWCD.

WE:wte

APPENDIX F-5

Florida Department of Transportation

RON DESANTIS
GOVERNOR

3400 West Commercial Boulevard
Fort Lauderdale, FL 33309

JARED W. PERDUE, P.E.
SECRETARY

MEETING NOTES

DATE: August 04, 2023

TO: Attendees

FROM: Bill Evans, Project Manager (WGI)

COPIES: Vandana Nagole, Project Manager (FDOT)

SUBJECT: **Pond Sites and Main Canal Bridge**
SR 5/US 1 at Aviation Boulevard PD&E Study
Indian River County
FM: 441693-1-22-02
ETDM: 14475

Attendees:
IRFWCD: George Simons, David Gunter, Ward Gunter
WGI FDOT PD&E Team: Bill Evans, Robert Carballo, Jerry Saval

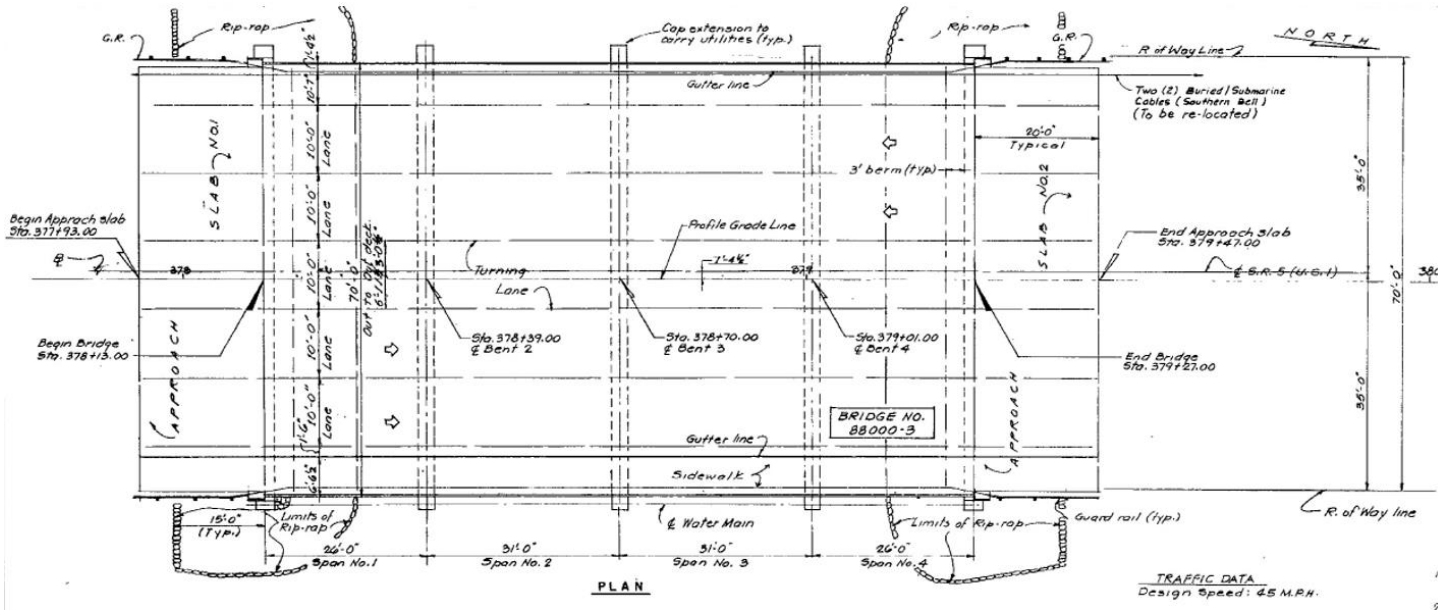
Purpose:
The purpose of the teleconference meeting was to introduce the FDOT SR 5/US-1 PD&E Study build alternatives (Alt. 1, 2, 7 and 8, attached), preliminary pond sites, and bridge replacement concepts to gain input from the Indian River Farms Water Control District (IRFWCD) design requirements.

Notes:
The project alternatives, pond sites and bridge were presented to Indian River Farms Water Control District (IRFWCD).

1. Ponds site discussion:
    a. Each roadway alternative contained three pond site alternatives A, B, and C. One pond (A, B or C) is required for a roadway alternative.
    b. IRFWCD noted there is a shallow hard pan layer that is deeper on the west side of US-1 and shallower on the east side of US-1. Pond site "B" and "C" locations may encounter the hard pan layer and may need underdrain to dry the ponds in 72 hours. Typically, the underdrains have one foot of cover and one foot of good drainage below the pond. Pond sites "A" are located where the prior natural creek flowed from near the main canal bridge, to the northeast, towards the existing pond site and Indian River Lagoon. Pond sites "A" are more likely to have less hard pan and some soils suitable for fill than sites "B" and "C".

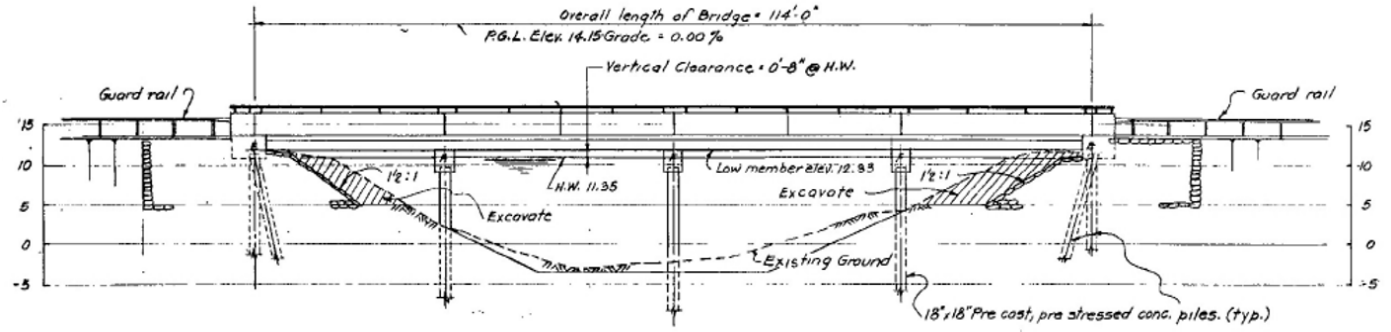
c. Dry ponds are to recover within 72 hours per Saint John's Water Management District (SJRWMD) permitting requirements.
d. IRFWCD suggested providing underdrains within the dry ponds to ensure timely storage recovery period and to include the cost in the PD&E alternatives. If during final design a more detailed geotechnical investigation determines that they are not needed then they could be removed at that time from the project. This approach ensures the initial budget accounts for the possible need for an underdrain system.
e. The petroleum skimmer located just prior to the outfall is preferred by IRFWCD.

2. Main Canal and Bridge
   a. The study team provided a brief overview of the existing bridge configuration as seen below. Reference: FDOT Plans 88010-3510, The existing bridge consists of 4 spans (26ft, 31ft, 31ft, 26ft).



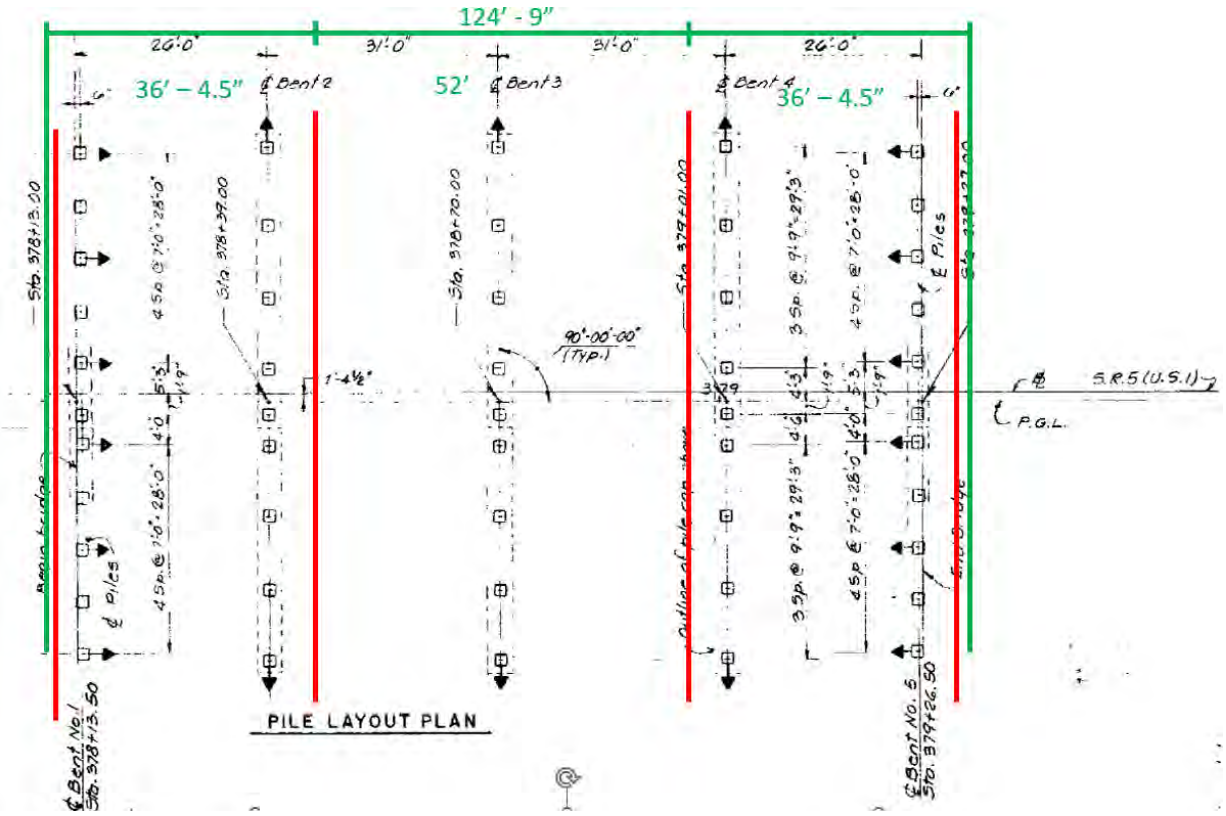
b. The existing bridge elevation reflects a low member elevation of 12.33-ft NGVD and a highwater elevation of 11.35-ft NGVD. See Bridge Elevation View below.

c. The study team mentioned that the existing 4 span bridge is anticipated to be replaced with a new 3 span bridge with a 52 ft center span and 36 ft 4.5-inch end spans. The proposed piles would be located approximately five feet away from existing piles. See layout presented during the meeting of the existing bridge pile locations and the proposed new center of pile lines depicted in RED.



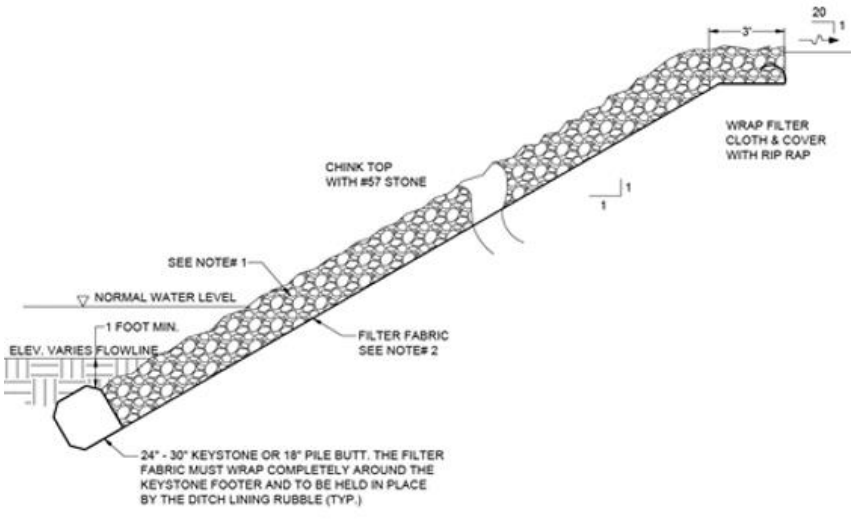
ELEVATION

NOTE: Drive one unloaded test pile 46 Ft. long (18") in each Bent 1 and 5, and one unloaded test pile 50 Ft. long (18") in Bent No. 3, in the position of a permanent plumb pile located as directed by the Engineer.



PILE LAYOUT PLAN

d. The study team inquired about IRFWCD minimum horizontal clearance requirements for the bridge main span. IRFWCD noted the minimum horizontal clearance should be at least 25 ft.
e. IRFWCD noted the center of the bridge should be located on the center of the canal cross section. The study team explained that to facilitate construction and maximize the horizontal opening for the main span over the channel a three-span arrangement is being incorporated into the concepts. This would remove the existing center pier. The team also explained that the bridge would need to be constructed in phases to accommodate traffic along SR 5 / US-1. During construction of the first phase of the bridge the new intermediate pier locations will reduce the spacing between the center line of the proposed piles and the existing center intermediate bent piles from 31-ft to 26-ft. Given that the intermediate bent caps are approximately 4-ft in width this would temporarily reduce the horizontal opening between caps to approximately 22-ft during construction. IRFWCD indicated that they could work with the department given that this was a temporary condition during construction and the permanent horizontal opening would be greater the 25-ft (currently estimated to be 48-ft (52-ft minus 4-ft for caps) between front face of intermediate bent to front face of intermediate bent assuming 18-inch prestressed precast concrete piling.
f. IRFWCD indicated that a sacrificial pile located upstream of the intermediate piers is desired to avoid damaging the bridge structure during debris removal maintenance.
g. IRFWCD asked if the existing piles would be extracted. The study team indicated that once the bridge is removed the existing intermediate and end bent piles would be cut and removed 2 ft below permanent canal bottom grade.
h. IRFWCD does not want any soil bench under the deck along the embankment slopes into the water as depicted in the existing bridge cross section above. They indicated that a sloped riprap is preferred with a pile cap and liner and presented the detail below during the meeting. IRFWCD will provide canal riprap armor and liner detail sheet.



RUBBLE RIPRAP ALONG IRFWCD CANAL
N.T.S.

i. The study team asked about the design water elevations for the bridge crossing and reviewed the existing bridge elevations and the bridge hydraulics sheet information from the 88010-3510 plans. The study team indicated that there appeared to be discrepancies between the information on IRFWCD's website data, FEMA Maps and the BHRS information. IRFWCD reviewed their model information during the meeting and noted the following elevations below. They confirmed that they do not have data on the 50 yr storm event.

	Storm	NGVD	NAVD
ii.	100 yr.	9.8	8.3
iii.	25 yr.	8.7	7.2
iv.	10 yr.	7.9	6.4

j. The highwater elevation of 11.35-ft NGVD noted on the existing bridge elevations was discussed with the assumption that it accounted for potential effects of storm surge. IRFWCD will run the flood model to evaluate storm surge to assist with determining the low member elevations. It was agreed that the existing low member elevation of 12.33-ft NGVD should be maintained. They indicated that they have not seen elevations in the canal reach those levels in the past.

k. The study team asked when IRFWCD could complete their modeling analysis of the water elevations since the study team had an upcoming Alternatives Workshop with the Public on October 10 and 11, 2023. IRFWCD indicated that they would try an have some results by the end of September.

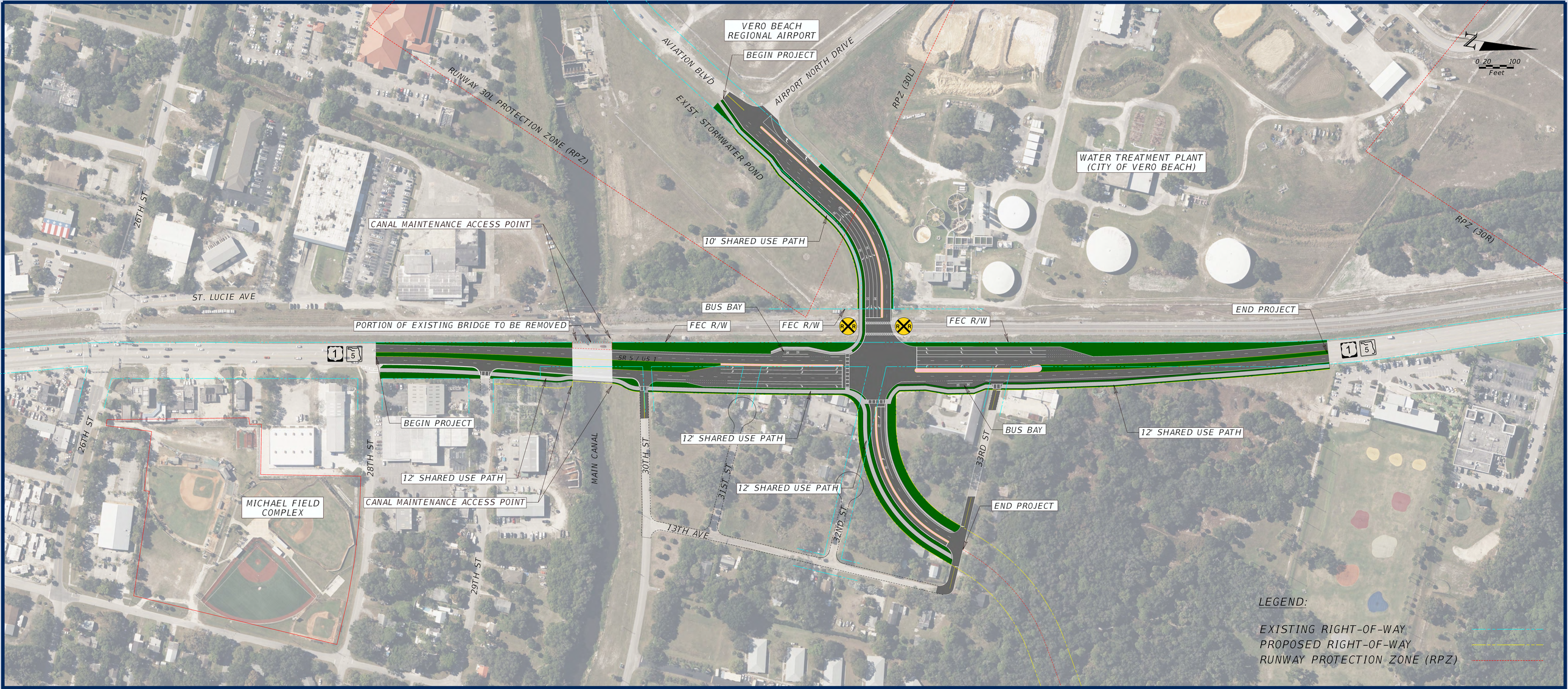
l. IRFWCD indicated that the salinity weir located in the main canal approximately 4000 feet east of US-1 has a top elevation of approximately 1.5 NGVD or 0.0 NAVD.

m. The potential construction sequencing of the bridge was discussed along with the implications of the existing 12-inch watermain on the east side of the structure. IRFWCD concurred that the existing bridge mounted utilities should be removed and a new utility lines horizontally directional drilled under the canal to facilitate construction of the bridge and associated sequencing.

n. IRFWCD desires access to each quadrant of the bridge for maintenance. A width of 15 feet is desired. Along the northbound US-1 approach to the canal, a 15 ft wide access was requested to access the canal. Details of this access will be discussed further after the preferred alternative has been selected.

3. Right of Way (ROW)
   a. The existing canal right of way is approximately 300 feet wide and has the existing pavement of 30th Street located within a portion of canal ROW. IRFWCD noted this ROW condition should be investigated for ownership or existing agreements. They suggested reaching out to Richard Glass (Glass Land Acquisition) who they have coordinated with in the past.

WE:wte



Alternative 1 - Conventional Intersection

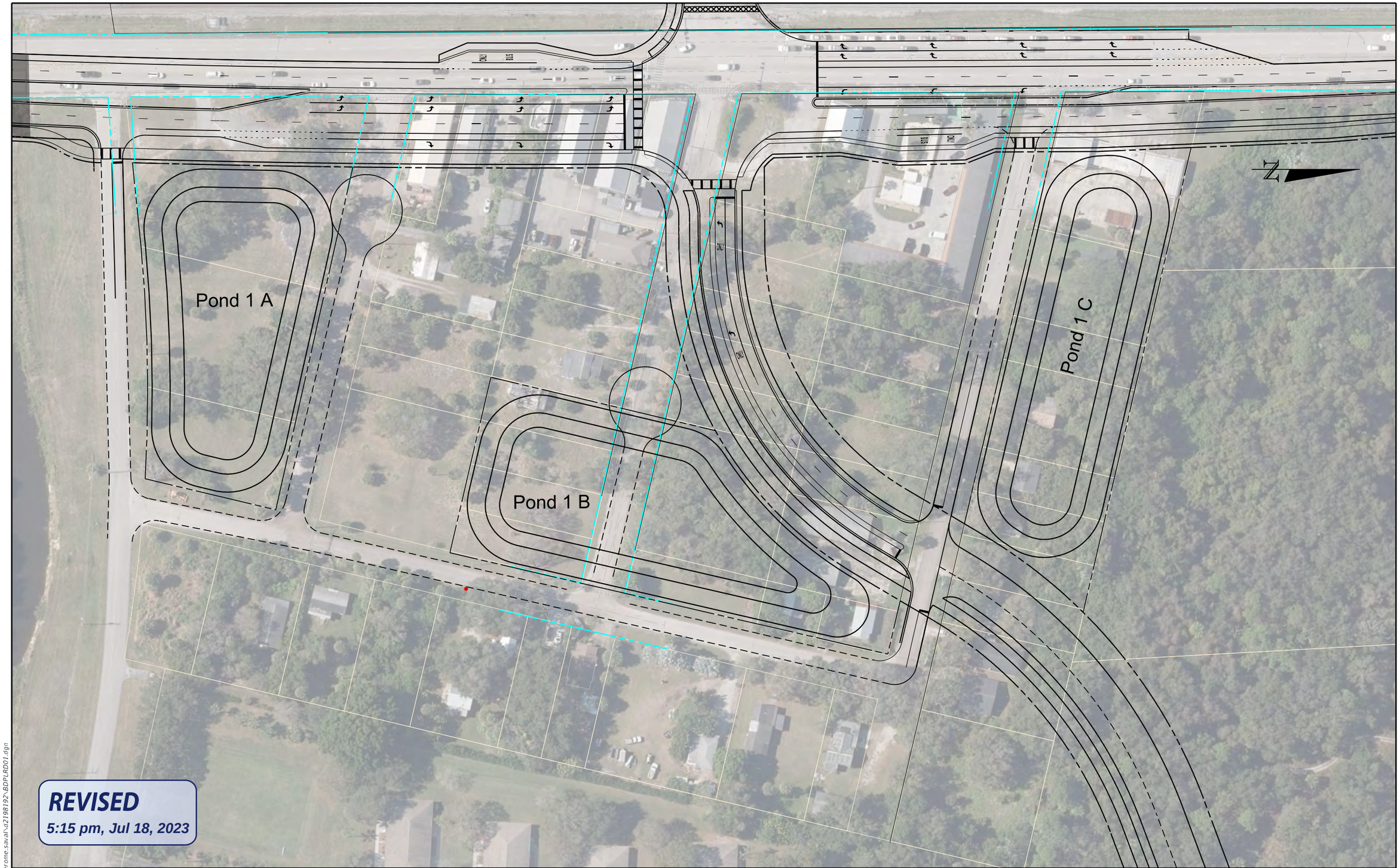
SR 5 at Aviation Boulevard

State Road (SR) 5/US 1 at Aviation Boulevard

Project Development and Environment (PD&E) Study
Indian River County, Florida
Financial Project ID: 441693-1-22-02
Efficient Transportation Decision Making (ETDM) Number: 14475

Draft Alternative

June 6th, 2023



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 1

SHEET NO.

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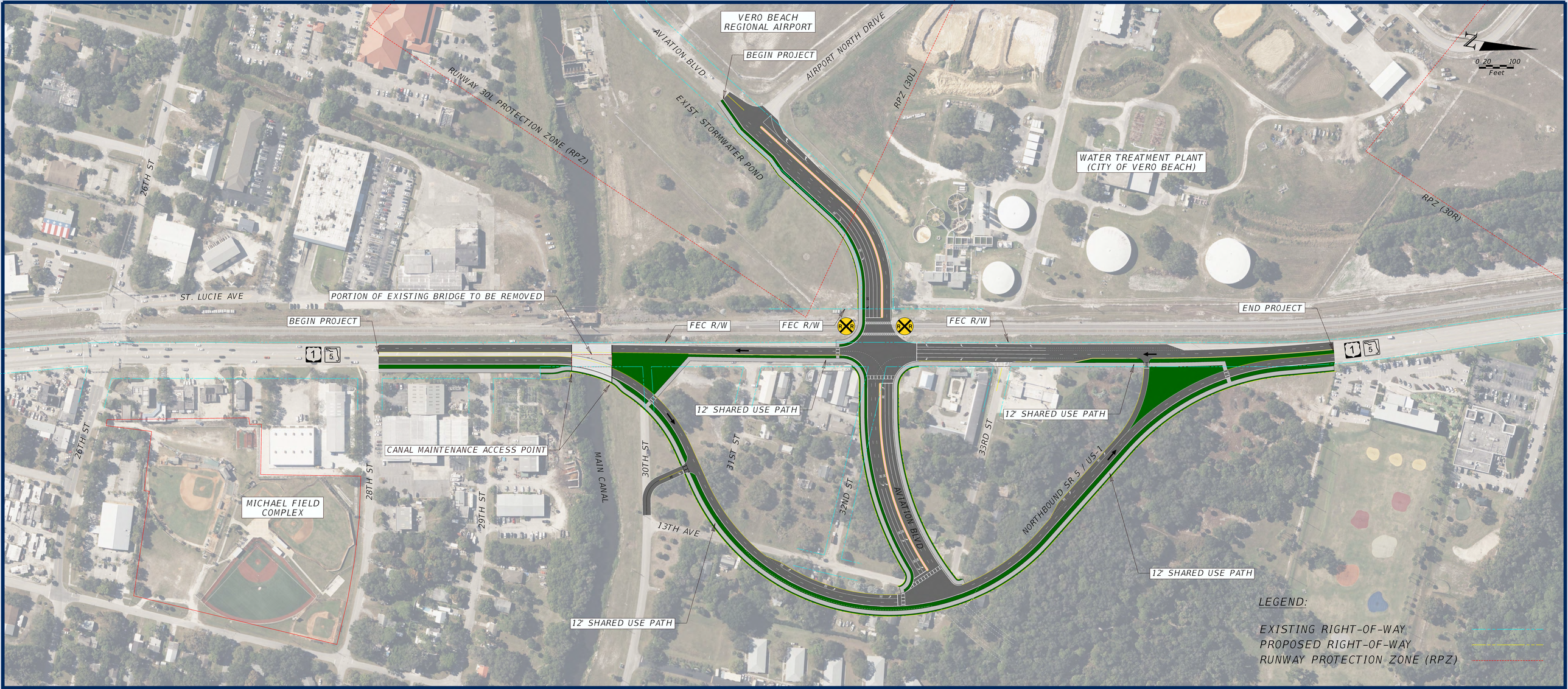


Alternative 2 - One-Way Pair

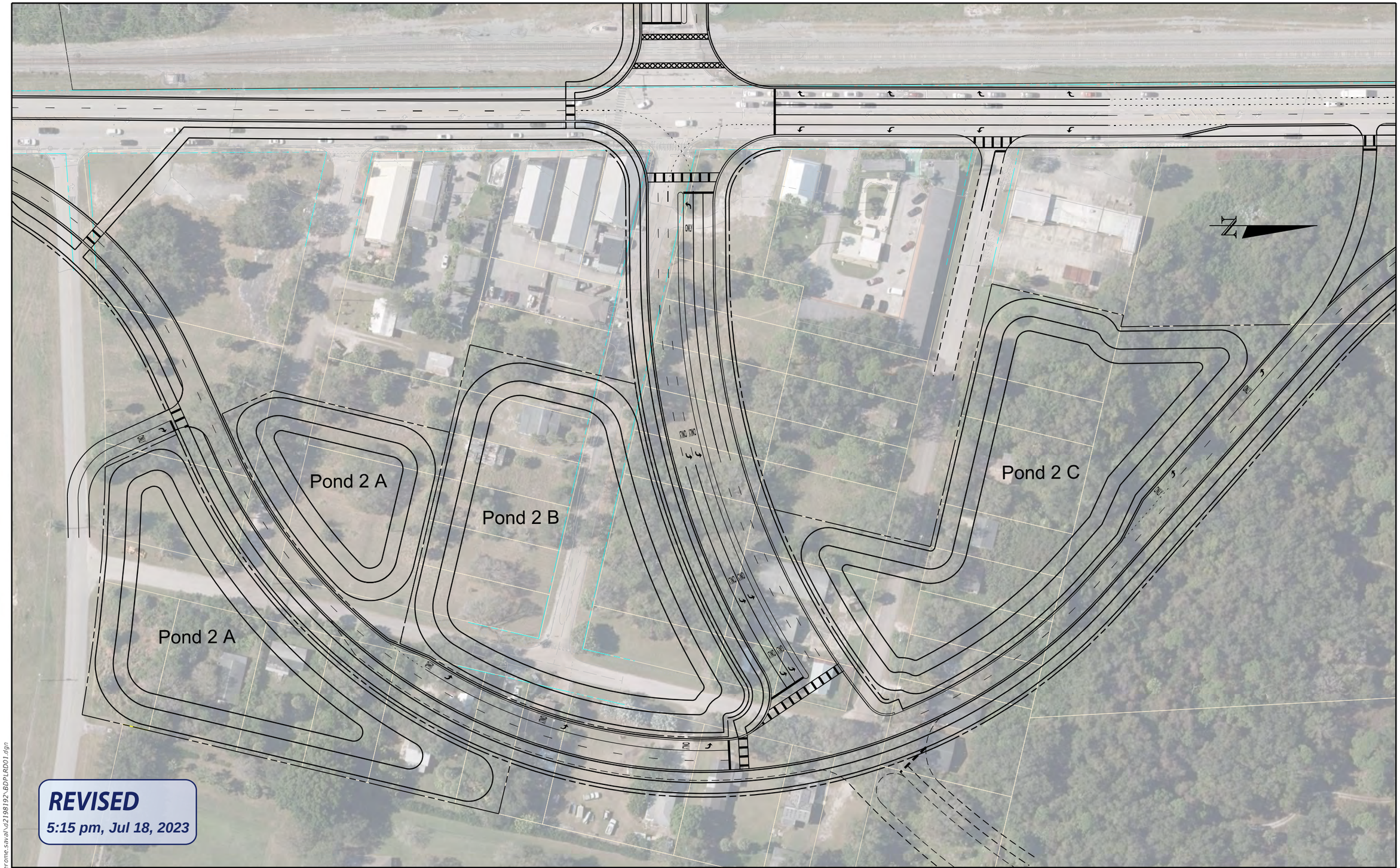
SR 5 at Aviation Boulevard

State Road (SR) 5/US 1 at Aviation Boulevard

Project Development and Environment (PD&E) Study
Indian River County, Florida
Financial Project ID: 441693-1-22-02
Efficient Transportation Decision Making (ETDM) Number: 14475

Draft Alternative

June 6th, 2023



REVISED
5:15 pm, Jul 18, 2023

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 2

SHEET NO.

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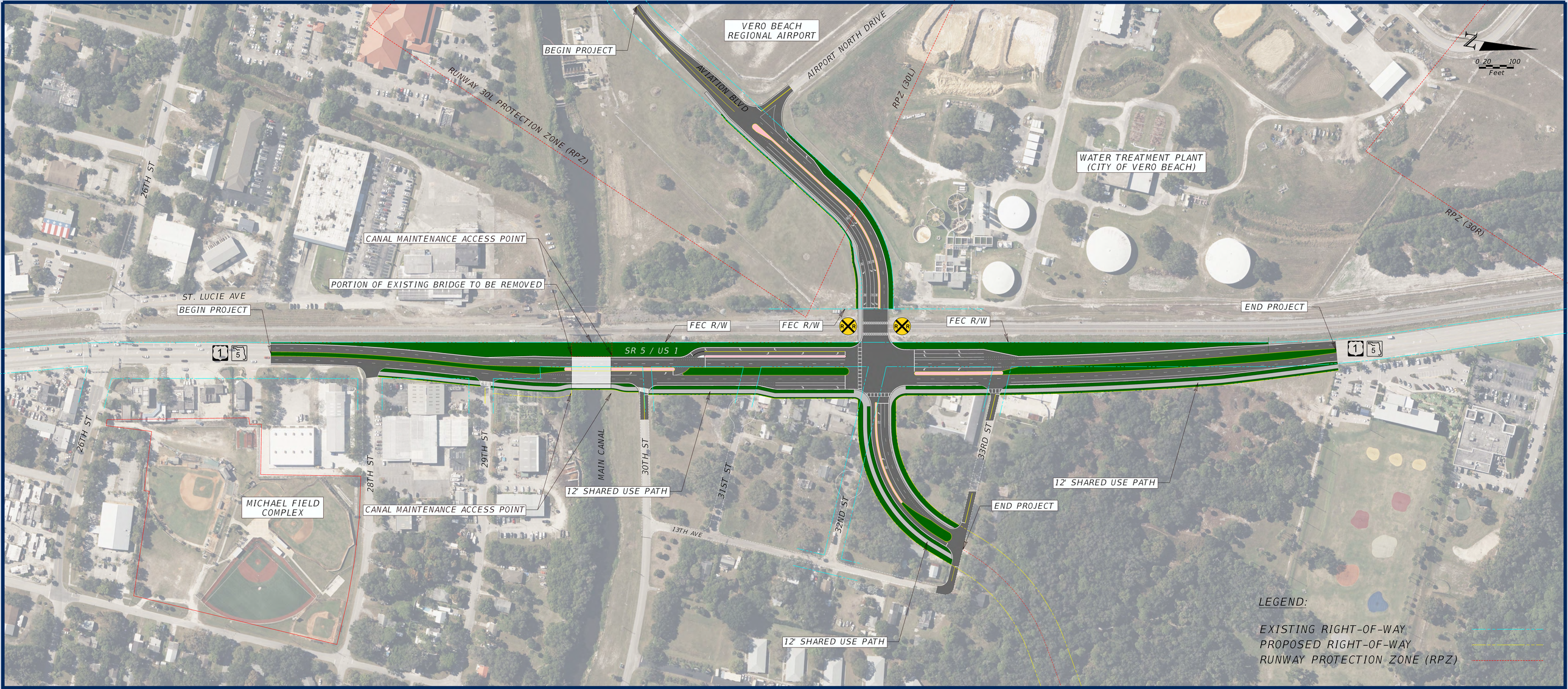


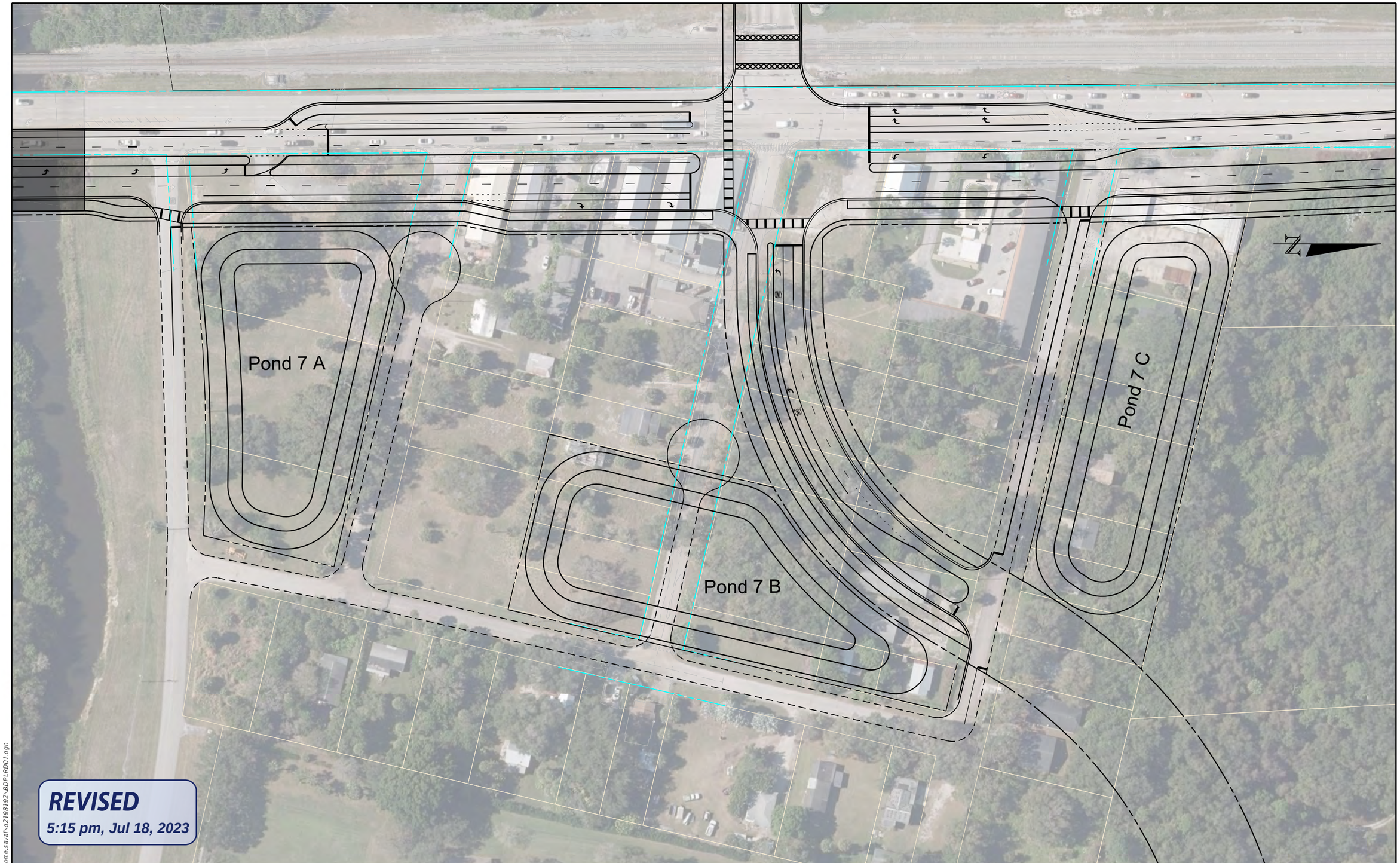
Alternative 7 - Displaced Left Turn Intersection
SR 5 at Aviation Boulevard

State Road (SR) 5/US 1 at Aviation Boulevard

Project Development and Environment (PD&E) Study
Indian River County, Florida
Financial Project ID: 441693-1-22-02
Efficient Transportation Decision Making (ETDM) Number: 14475

Draft Alternative

June 6th, 2023



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 7

SHEET NO.

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

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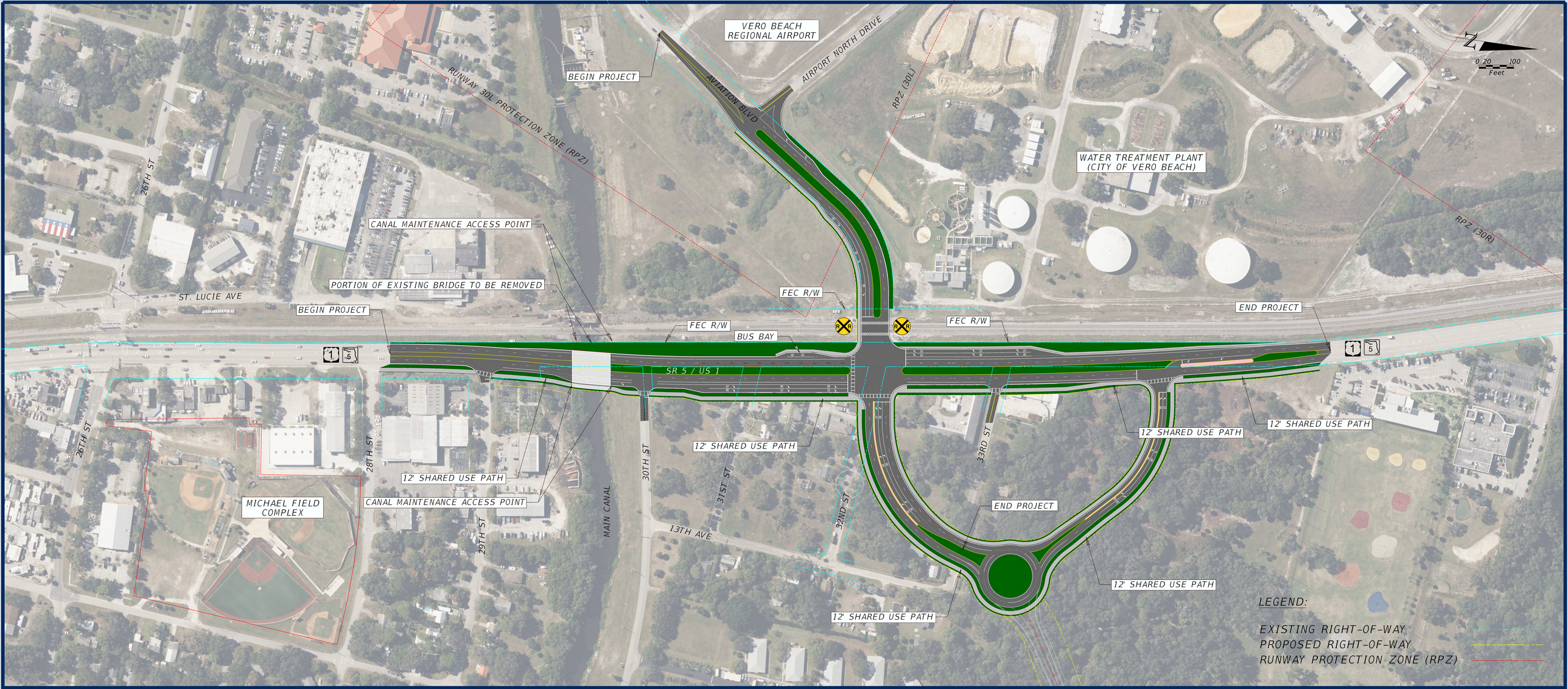


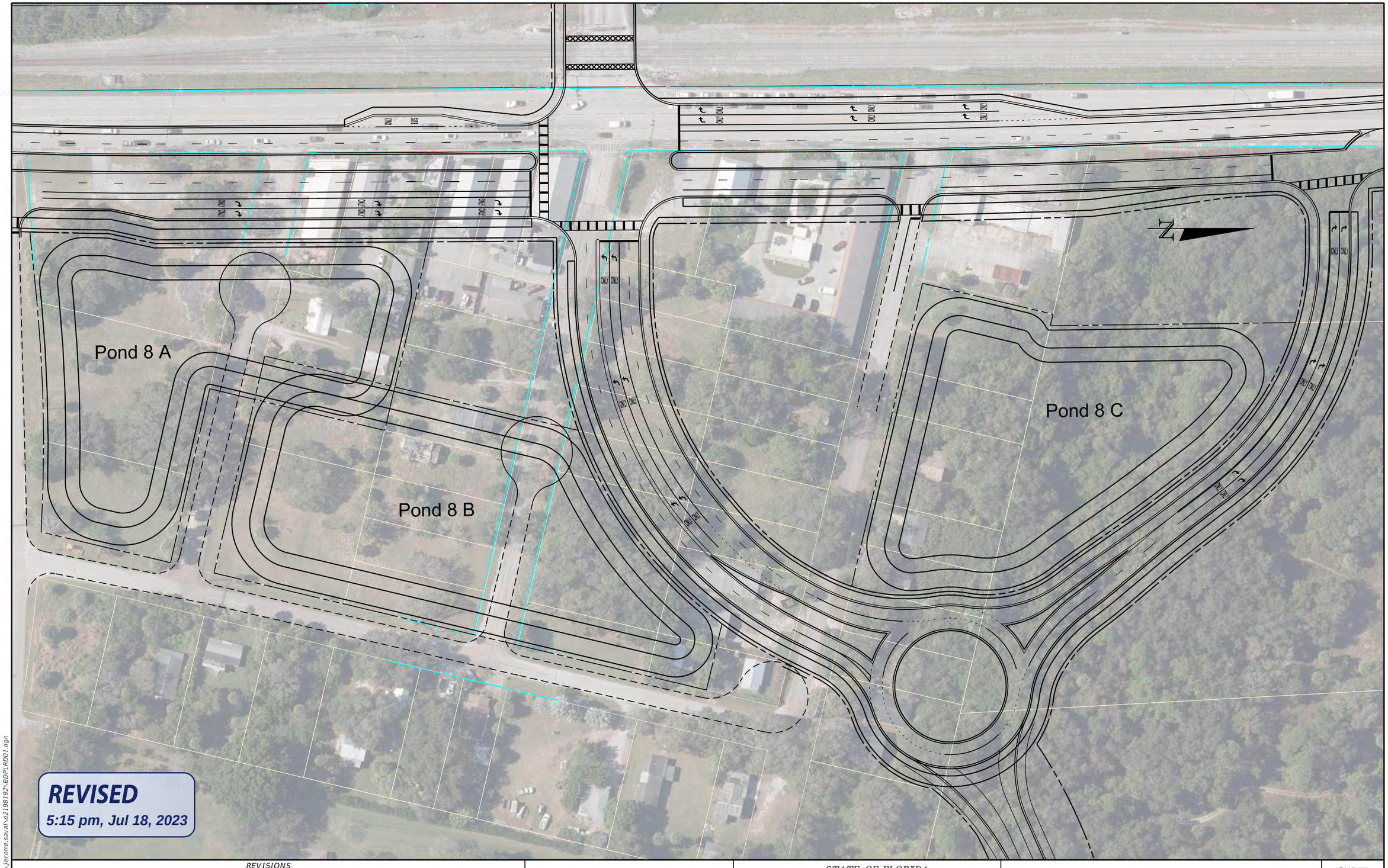
Alternative 8 - Median U-Turn with Roundabout SR 5 at Aviation Boulevard

State Road (SR) 5/US 1 at Aviation Boulevard

Project Development and Environment (PD&E) Study
Indian River County, Florida
Financial Project ID: 441693-1-22-02
Efficient Transportation Decision Making (ETDM) Number: 14475

Draft Alternative

June 6th, 2023



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
	INDIAN RIVER	

ALTERNATIVE 8

SHEET NO.

7/18/2023 3:57:28 PM Jerome.Saval
c:\pwworking\wgi\jerome.saval\d2198192\BDPLRD01.dgn

THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE DIGITALLY SIGNED AND SEALED UNDER RULE 61G15-23.004, F.A.C.

APPENDIX F-6

From: George Simons
To: William Evans; Elaine Mercado; David Gunter
Cc: Vandana Nagole; Poole, James; Jerome Saval
Subject: [EXTERNAL] RE: IRFWCD Invoice - FDOT US Hwy 1 / Aviation Blvd- (FDOT Project 441693-1-22-02)
Date: Thursday, November 16, 2023 3:30:22 PM
Attachments: image001.png
image002.png
image003.png
image004.png
image005.png
image006.png
B_Results - Lidar Channels.pdf
22850615201 SR#-5 US-1 FED HWY BR 3 from-BRIDGE NUMBER 880003TO -88010-3510.TIF
IRFWCD Study 100 yr peak flow.pdf

Hello Bill,

Sorry for the delay. The bulk of this work has been completed for a while. I have been waiting until I discussed with David Gunter, and it inadvertently got delayed. Please see the attached results of the analysis. For a 100-year event we used the flowing assumptions,

1. max flow of 3700 CFS
2. trapezoidal channel sections that incorporate some out of bank cross sectional area with a high n factor (.4), see attached.
3. all elevations are in NGVD 29.
4. Simulations were run with the tailwater (Indian River Lagoon) constant for elevations 2 through 8.

The previous FDOT Bridge Design is attached for comparison, see TIF page 14 of 25, for comparison. The design HW appears to be 8.2. A vertical drift clearance allowance is 3 feet (8.2 +3 = 11.2). The low member is 12.33 NGVD, approximately 10.9 NAVD.

In summary, with the tailwater at elevation "8 NGVD", our results indicate a peak of 11.43 NGVD which is approximately 10.0 NAVD. The IRFWCD drift clearance policy is 1 foot, (min). Therefore, 10.0 + 1 = 11 NAVD low member minimum elevation.

Please review and call to discuss if you have questions or comments.

Thanks,

George A. Simons, P.E.
President

Carter Associates, Inc. | An LJA Company
O: 1708 21st St., Vero Beach, FL 32960
P: 772.562.4191 | C: 772.473.9446
GSimons@carterassoc.com
Facebook • Twitter • LinkedIn

#4 Top Workplaces USA | 2022

From: William Evans <William.Evans@wginc.com>
Sent: Thursday, November 9, 2023 9:43 AM
To: Elaine Mercado <EMercado@FLBB.net>; David Gunter <DGunter@FLBB.net>
Cc: Vandana Nagole <Vandana.Nagole@dot.state.fl.us>; Poole, James <James.Poole@dot.state.fl.us>; George Simons <gsimons@carterassoc.com>; Jerome Saval <Jerome.Saval@wginc.com>
Subject: IRFWCD Invoice - FDOT US Hwy 1 / Aviation Blvd- (FDOT Project 441693-1-22-02)

[EXTERNAL EMAIL]

Good morning Elaine and David:
The prior IRFWCD invoice is being processed for payment by FDOT. The invoice received 10/31/23, has an additional amount of $2700.00 and which is forwarded to FDOT for payment.
We are in need of the IRFWCD analysis and main canal water elevation data that IRFWCD was calculating, which was scheduled to be ready in October.
Please provide that data as the bridge structural engineering is in need of the data at this time.

Thank you
Bill Evans

William Evans, PE, AICP
PD&E Market Leader
2035 Vista Parkway
West Palm Beach, FL 33411
561.687.2220 (office) | **561.209.7774** (direct)

From: emercado@flbb.net <emercado@flbb.net>

Sent: Tuesday, October 31, 2023 2:21 PM
To: William Evans <William.Evans@wginc.com>
Subject: [EXTERNAL] FDOT US Hwy 1 / Aviation Blvd

Good Afternoon,
Please see the attached billing that is now due.

Thank You,

Elaine Mercado
Indian River Farms Water Control District
7305 4th Street
Vero Beach, FL 32968
Phone: 772-562-2141
Fax: 772-562-2532
www.irfwcd.com

6.2 System Flow and Volume Summary

The total discharge for the District under various storms were found to be as follows:

	100 Year	25 Year	10 Year
South Canal Avg. Peak 24-Hr. Discharge	3706.9 CFS	3133.8 CFS	2576.2 CFS
Main Canal Avg. Peak 24-Hr. Discharge	3699.2 CFS	3079.2 CFS	2595.5 CFS
North Canal Avg. Peak 24-Hr. Discharge	2622.1 CFS	2138.3 CFS	1806.8 CFS
Total Volume Discharged in 96 Hours	33068 Ac-Ft	26854 Ac-Ft	22269 Ac-Ft

Overall, the average peak discharge capacity of the system is:

100 Year	4.8"/24 Hr.	(128.4 CSM)
25 Year	4.0"/24 Hr.	(106.9 CSM)
10 Year	3.3"/24 Hr.	(89.3 CSM)

The above flow capacities are achieved with the system experiencing some flooding. Generally speaking, locations east of the Coastal east ridge will not experience flooding because of the District's canals. Some areas between the coastal & western ridges show flooding due to general low ground conditions.

For those sublaterals through the eastern ridge, any proposed culverting should have a high invert to keep the flows within the control of the radial gate. Otherwise, lower inverts would allow flows to bypass the radial gates.

A flow summary is provided for each of the design storms. See Insert Figure 6.2. Also for each of the design storms, a stage contour map was made from Extran simulation data and is summarized in Appendix C. See Insert Figures 6.3 - 6.5. Comparison of stage can be made with Existing Ground Elevation Contour Map, see Insert Figure 6.6.

7. Recommendations

Based on examination of the SWMM Model results as well as other information gathered on the District, the following recommendations are presented.

1) For any culvert, proposed to be installed in the District's sublaterals, the District should require the following sizes.

Size	Location
84" RCP	On sublateral located within 1/2 mile of a lateral
72" RCP	On sublateral located between 1/2 mile to 1 mile of a lateral
60" RCP	On sublateral located beyond 1 mile of a lateral

78 | 1

THIS CONTRACT PLAN SET INCLUDES
SUMMARY OF PAY ITEMS (3 SHEETS)
ROADWAY AND PAVEMENT MARKING PLANS
STRUCTURE PLANS

FOR INDEX OF STRUCTURE PLANS
SEE STRUCTURE PLANS

INDEX OF ROADWAY & PAVEMENT MARKING PLANS

SHEET NO.	SHEET DESCRIPTION
1	KEY SHEET
2	TYPICAL SECTIONS & SUMMARY OF QUANTITIES
3	DETAIL SHEET - WARNING DEVICES
4-5	PLAN AND PROFILES
6	CHANNEL CROSS SECTIONS
7	PAVEMENT MARKINGS
8	CONC. APPROACH SLAB-INDEX NO. 12522

ROAD DESIGN STANDARDS (BOOKLET DATED JANUARY 1978)

BGR-01-1	GUARDRAIL CONSTRUCTION (5 SHEETS)
GEC-04	EROSION CONTROL DEVICES, SILT BARRIERS
GSA-01	STANDARD ABBREVIATIONS
GSS-01	STANDARD SYMBOLS FOR KEY MAPS AND PLAN SHEETS (3 SHEETS)
PCG-01	CURB, CURB AND GUTTER

TRAFFIC OPERATIONS STANDARDS (BOOKLET DATED JANUARY 1978)

17346-A	SPECIAL MARKING AREAS (6 SHEETS)
17352	TYPICAL PLACEMENT OF REFLECTIVE PAVEMENT MARKINGS

NOTE: UTILITY ADJUSTMENTS ARE SHOWN ON ROADWAY PLAN AND PROFILE SHEETS.

Total Field Books

Book Number	Description
019192	Misc. pay item rdwy. book
019203	Align & Ref.
021423	BM's, X-sec, Canal Exc. X-sec
021287	Pile Data

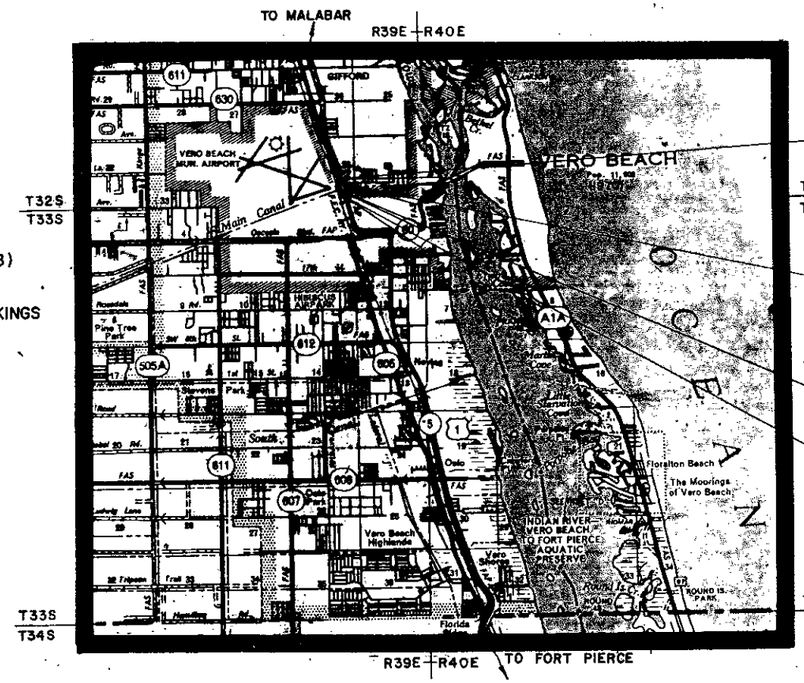
IF ANY
DIRECTLY BEHIND
KEY SHEET

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION
AS BUILT PLANS
OF [redacted]

STATE HIGHWAY

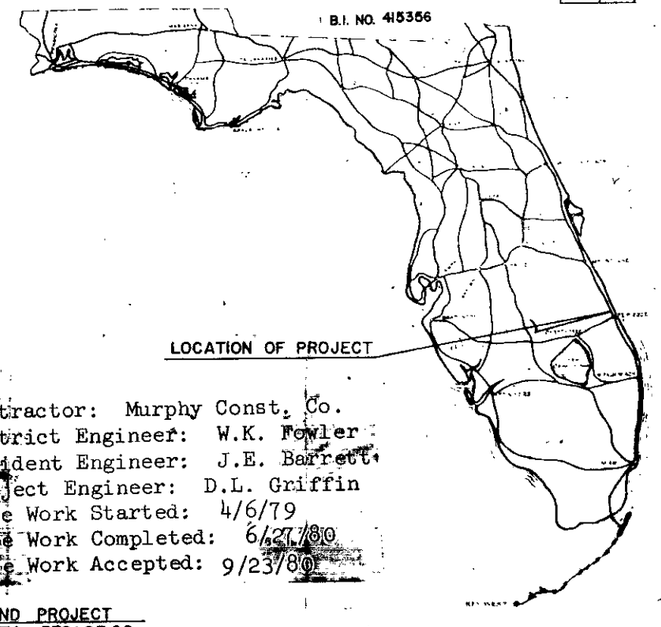
STATE PROJECT NO. 88010-3510
INDIAN RIVER COUNTY

STATE ROAD NO. 5 (US 1)



LENGTH OF PROJECT		
	LINEAR FEET	MILES
ROADWAY	170.00	0.032
BRIDGES	114.00	0.021
NET LENGTH OF PROJECT	284.00	0.053
EXCEPTIONS	0.00	0.000
GROSS LENGTH OF PROJECT	284.00	0.053

PROJECT MANAGER: J.L. LOWRY



Contractor: Murphy Const. Co.
District Engineer: W.K. Fowler
Resident Engineer: J.E. Barrett
Project Engineer: D.L. Griffin
Date Work Started: 4/6/79
Date Work Completed: 6/27/80
Date Work Accepted: 9/23/80

END PROJECT
STA. 379+97.00

END BRIDGE 880003
STA. 379+27.00

BEGIN BRIDGE 880003
STA. 378+13.00

BEGIN PROJECT
STA. 377+13.00

1-MILE

ATTENTION IS DIRECTED TO THE FACT THAT THESE PLANS MAY HAVE BEEN REDUCED IN SIZE BY REPRODUCTION. THIS MUST BE CONSIDERED WHEN OBTAINING SCALED DATA

GOVERNING SPECIFICATIONS: STATE OF FLORIDA, DEPARTMENT OF TRANSPORTATION, STANDARD SPECIFICATIONS, DATED 1977 AND SUPPLEMENTS THERETO IF NOTED IN THE SPECIAL PROVISIONS FOR THIS PROJECT.

SUBMITTED BY

DIRECTOR OF ROAD OPERATIONS

APPROVED DATE

DIVISION ENGINEER
FEDERAL HIGHWAY ADMINISTRATION

88010-3510

SUMMARY OF ROADWAY PAY ITEMS

ALT	ITEM NUMBER	ITEM		UNIT	88010-3510 FA NON PART				QUANTITY TOTAL
	101- 1-	MOBILIZATION		LS	1.000	✓			1.000
	102- 1-	MAINT OF TRAFFIC		LS	1.000	✓			1.000
	104- 11-	FLOATING SILT BARRIER		LF	110.000	✓			110.000
	110- 1-	CLEARING & GRUBBING		LS	1.000	✓			1.000
	120- 1-	REGULAR EXCAV		CY	465.000	✓			465.000
	120- 5-	CHANNEL EXCAVATION		CY	847.000	✓			847.000
	200- 1- 2	LIMEROCK BASE	(8") (D-CSE)	SY	1112.000	✓			1112.000
	300- 1- 1	BIT MATL	(PRIME COAT)	GA	167.000	✓			167.000
	300- 1- 3	BIT MATL	(TACK COAT)	GA	270.000	✓			270.000
	300- 1- 13	BIT MATL (PLANT MIX)	(ASPH CEM 20)	GA	4647.000	✓			4647.000
	331- 2-	TYPE S-I ASPH CONC		TN	240.000	✓			240.000
	333- 2- 9	TYPE 111 ASPH CONC	(1000 LB STAB)	TN	55.000	✓			55.000
	339- 1-	MISC ASPHALT PAVEMENT		TN	7.000	✓			7.000
	360- 1-	CONC APPRH SLABS		EA	2.000	✓			2.000
	425- 5-	ADJ MANHOLES		EA	1.000	✓			1.000
	520- 1- 10	CONC CURB & GUTTER	(TYPE F)	LF	130.000	✓			130.000
	522- 1-	CONC SIDEWALK,	4" THICK	SY	82.000	✓			82.000
	530- 1- 1	RIPRAP (SAND-CEMENT)	(ROADWAY)	CY	7.000	✓			7.000
	536- 1- 1	GUARDRAIL	(RDWY)	LF	237.500	✓			237.500
	536- 6-	END ANCHORAGE ASSEM TYPE II		EA	4.000	✓			4.000
	536- 7-	SPECIAL GUARDRAIL POST		EA	8.000	✓			8.000
	536- 73-	REM OF EXIST GUARDRAIL		LF	125.000	✓			125.000
	570- 2-	SEED & MULCH		SY	62.000				62.000

88010-3510

SUMMARY OF SIGNING PAY ITEMS

A T	ITEM NUMBER	ITEM	UNIT	88010-3510 FA NON PART	QUANTITY TOTAL
	706- 2-	REFLECTIVE PAVEMENT MARKER	EA	77.000	77.000
	710- 4- 41	SOLID TRAFFIC STRIPE (4")	LF	505.000	505.000
	710- 4-181	SOLID TRAFFIC STRIPE ()8"	LF	240.000	240.000
	711- 2-	SKIP TRAFFIC STRIPE, THERMOPLASTIC (4")	LF	1186.000	1186.000
	711- 4-	DIRECTIONAL ARROWS,THERMOPLASTIC	EA	5.000	5.000
	711- 6- 41	SOLID TRAFFIC STRIPE, THERMOPLASTIC (4")	LF	1977.000	1977.000

88010-3510

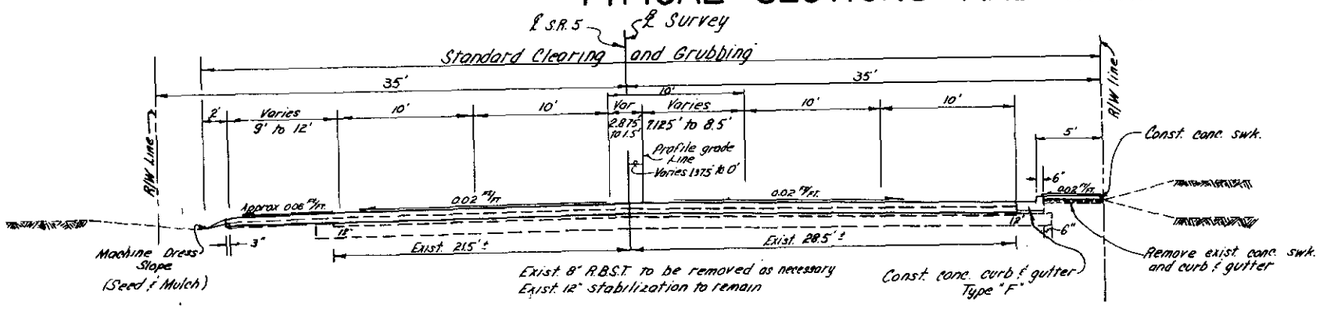
SUMMARY OF BRIDGE PAY ITEMS

ALT	ITEM NUMBER	ITEM		UN	88010-3510 IT	BR # 880003 FA NON PART	QUANTITY TOTAL
	110- 3-	REM OF EXIST STRUCTURES		LS	1.000		1.000
	400- 2- 4	CLASS II CONC	(SUPERSTRUCTURE)	CY	178.000		178.000
	400- 2- 5	CLASS II CONC	(SUBSTRUCTURE)	CY	111.000		111.000
	400- 5- 4	CONC HANDRAIL	(BARRIER)	LF	114.000		114.000
	400- 5- 5	CONC HANDRAIL	(SIDEWALK BARRIER TYPE)	LF	114.000		114.000
	415- 1- 4	REINF STEEL	(SUPERSTRUCT)	LB	45158.000		45158.000
	415- 1- 5	REINF STEEL	(SUBSTRUCT)	LB	17225.000		17225.000
	450- 71-	RESETTING PREST SLAB UNITS		LF	1100.000		1100.000
	455- 3- 2	PREST CONC PILING FURN	(18" SQ)	LF	1624.000		1624.000
	455- 4- 2	PREST CONC PILING DRIV	(18" SQ)	LF	1624.000		1624.000
	455- 9- 12	UNL TEST PILES	(PREST CONC) (18" SQ)	LF	140.000		140.000
	455- 10- 90	TEST LOADS	(90 TN)	EA	1.000		1.000
	455- 10-110	TEST LOADS	(110 TN)	EA	1.000		1.000
	455- 15-	PREFORMED PILE HOLES		EA	22.000		22.000
	455- 17- 2	PILE SPLICES	(18")	EA	1.000		1.000
	460- 91- 2	EXPANSION JOINT SEAL	(COMPRESSION ELAST)	LF	137.000		137.000
	530- 1- 2	RIPRAP (SAND-CEMENT)	(BRIDGE)	CY	100.000		100.000

PLEASE RETAIN THIS SHEET FOR STANDARD MYLAR SHEET YOUR PERMANENT FILES.

TYPICAL SECTIONS AND SUMMARY OF QUANTITIES

STATE PROJ. NO.	SHEET NO.
88010-3510	2



TYPICAL SECTION

Sta. 377+13 to Sta. 377+93
Sta. 379+47 to Sta. 379+97

Construct limerock base course (8" thick, double course) primed, with type S-I aspholtic concrete surface course (200 #/S.Y., double course).

For additional information see Index Nos. BGR-01 & PCG-01

DESIGN SPEED 45 M.P.H.

TRAFFIC DATA

1979 ADT	= 15,000
1987 ADT	= 16,463
1999 ADT	= 18,801
K	= 10%
D	= 55%
24 HR T	8%
Design H.R.T.	1%

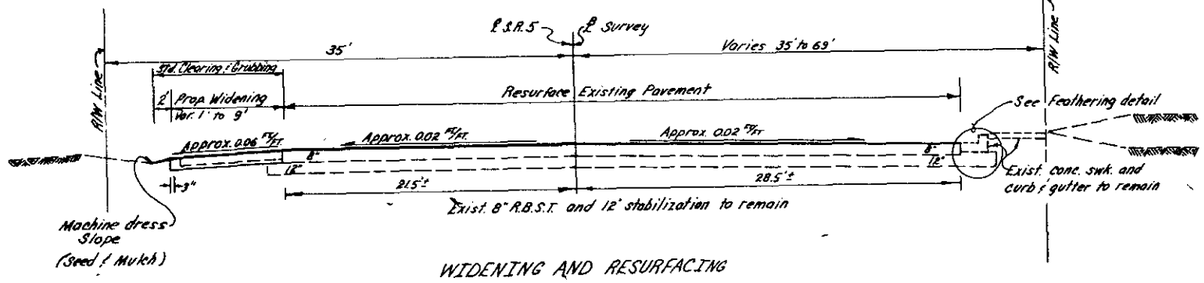
SUMMARY OF GUARDRAIL

STATION TO STATION		SIDE	LENGTH	END ANCHORAGE	REMARKS
Sta. 377+46.5	Sta. 378+09	Lt.	62.5	1	Guardrail - Bridge
Sta. 377+46.5	Sta. 378+09	Rt.	62.5	1	Guardrail - Bridge
Sta. 379+31	Sta. 379+93.5	Lt.	62.5	1	Guardrail - Bridge
Sta. 379+31	Sta. 379+81	Rt.	50	1	Guardrail - Bridge
Sta. 377+55.5	Sta. 378+18	Lt.	62.5		Remove Guardrail
Sta. 379+23	Sta. 379+85.5	Lt.	62.5		Remove Guardrail
GRAND TOTALS			237.5 L.F.	4	Const. Guardrail
			125 L.F.		Remove Guardrail

Stationing shown above is approximate. Exact stations to be determined by the Engineer during construction.
Connection of Guardrail to proposed bridge shall be in accordance with Index No. BGR-01
Existing guardrail that is removed shall be delivered by the Contractor to: 5025 - 41st Street (S. Gifford Rd.) Vero Beach, Florida.

SUMMARY OF EARTHWORK

CHANNEL EXCAVATION	847 C.Y.
REGULAR EXCAVATION	465 C.Y.



WIDENING AND RESURFACING

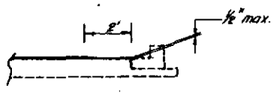
Sta. 375+00 to Sta. 377+13
Sta. 379+97 to Sta. 381+67

LEVELING
Level existing pavement with type III asphaltic concrete (1000.18 STAB)(50 #/sy Avg.)

RESURFACE
Type S-I asphaltic concrete surface course (100 #/s.y.)

WIDENING
Limerock base course (8" thick, double course) primed, with type S-I asphaltic concrete surface course (200 #/s.y, double course)

DESIGN SPEED 45 M.P.H.



FEATHERING DETAIL

NOTES:
1) None of the existing limerock base that is removed is to be used in the construction of new limerock base.
2) For information on Maintenance of Traffic see Bridge Plans.
3) New construction and widening shall be constructed with Type S-I asphaltic concrete surface course (200 #/s.y. - Double Course), 1st layer to be (100 #/s.y.) and the 2nd layer to be constructed along with roadway resurface (100 #/s.y.)

PAY ITEM FOOTNOTES:

ITEM NO. 104-11 Included for prevention, control, and abatement of erosion and water pollution and are to be used at locations as directed by the Engineer. Limits shown on plans are approximate only.

ITEM NO. 110-1 Includes the removal of approx. 175 L.F. of conc. curb and gutter and approx. 90 S.Y. of conc. swk.

ITEM NO. 120-1 The pay quantity for this item shall be the plan quantity.

ITEM NO. 331-2 Includes estimated 6 tons for sidestreets.

ITEM NO. 339-1 Included for pavement under guardrail.

ITEM NO. 425-5 Included for the adjustment of the storm sewer manhole at Sta. 380+02

ITEM NO. 530-1-1 Included for the spillway as shown on plans. This is an estimated quantity and is to be increased or decreased as directed by the Engineer.

ITEM NO. 536-7 Included for post placement on approach slabs.

ITEM NO. 570-2 Included in the cost for this item will be approximately 1.3 lbs. grass seed, .05 tons mulch material, .006 tons fertilizer, and 0.13 MG water. Also includes any final dressing that may be needed.

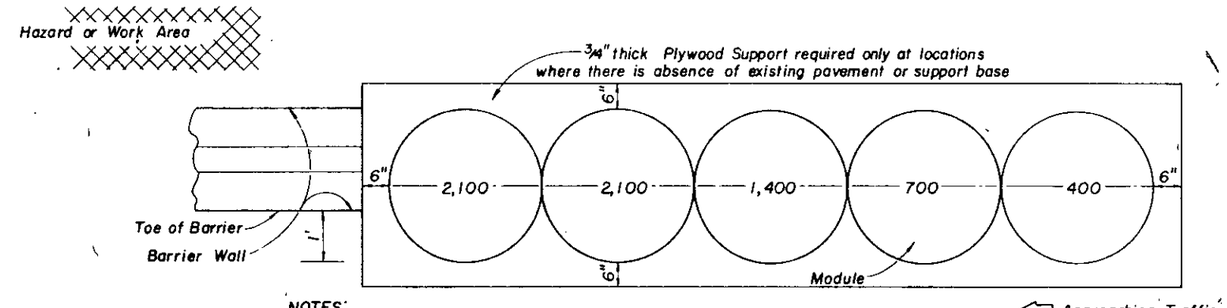
ITEM NO. 706-2 Includes 47 ea. red and colorless and 30 ea. amber & amber (reflective pavement markers).

ITEM NO. 711-6-91 Includes 917 L.F. white and 1080 L.F. yellow.

TRAFFIC CONTROL AND SAFE PRACTICES
FOR STREET AND HIGHWAY CONSTRUCTION, MAINTENANCE AND UTILITY OPERATIONS
FLORIDA DEPARTMENT OF TRANSPORTATION

WARNING DEVICES

PROJ. NO.	SHEET NO.
88010-3510	3



NOTES:
1) Inertial Attenuator to be installed where taper offset from lane line is not obtainable.
2) Number shown inside module indicates the weight in pounds of sand. All modules are approximately 36" inches in height and in diameter.
3) Inertial Attenuator to be installed in accordance with manufacturers specifications and recommendations
4) Module color and marking shall be in accordance with Index No. 17353.
5) Cost of inertial attenuator to be included in the unit cost for Maintenance of Traffic.

TEMPORARY INERTIAL ATTENUATOR

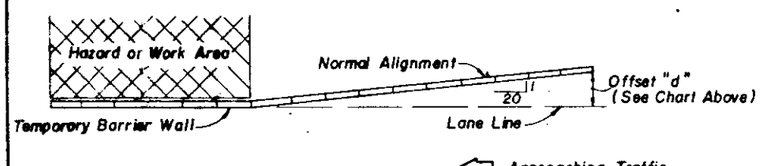
SUMMARY OF MODULES	
WEIGHT	QUANTITY
400 lbs.	1
700 lbs.	1
1,400 lbs.	1
2,100 lbs.	2

Design Vehicle Wt. 4,500 lbs.
Design Speed 45 m.p.h.
Max. Deceleration 5.96 g's
Avg. Deceleration 4.15 g's

Design Vehicle Wt. 2,000 lbs.
Design Speed 45 m.p.h.
Max. Deceleration 7.06 g's
Avg. Deceleration 4.47 g's

OFFSET

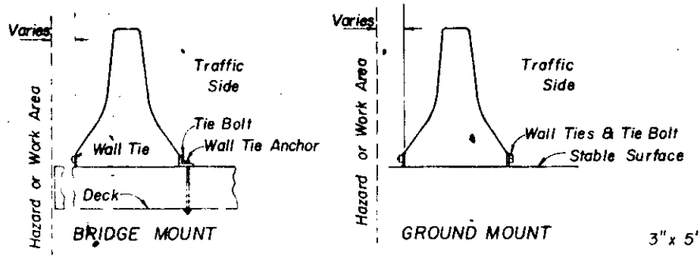
"d"	Conditions
6'	Municipal Construction - Low Speed - ADT > 1600
6'	Undivided Highway - Low Speed - ADT < 1600
6'	Undivided Highway - High Speed - ADT < 1600
10'	Undivided Highway - High Speed - ADT > 1600
10'	Divided Highway of Four or More Lanes
10'	Interstate and Other Limited Access Facilities



PLAN
WALL ALIGNMENT

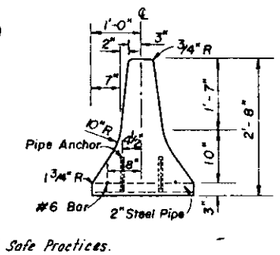
NOTES.
1) For optional wall alignment see detail of temporary inertial attenuator.
2) Temporary barrier to be placed as shown in the plans or as directed by the Engineer.
3) For additional information refer to charts I, II and III in the manual of Traffic Control and Safe Practices.
4) Sections of temporary barrier wall shall be set end-to-end as close together as feasible to form a continuous barrier.
5) Temporary barrier wall shall be delineated by steady burn type "C" lights on 50' centers.
6) For additional information on barrier wall placement see construction sequence on Bridge Plans.

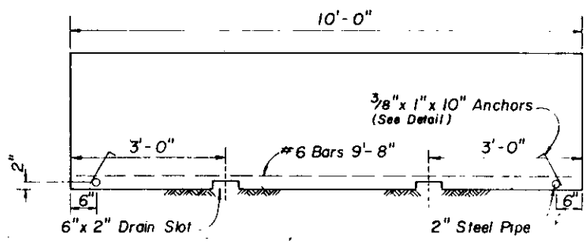
FIGURE 7.3



WALL CONNECTION & ANCHORAGE

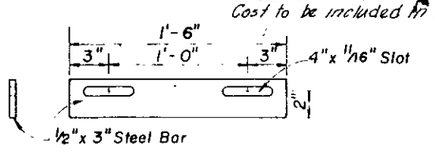
Anchor shall have a pullout and shear capacity of 14,000 lbs. After construction is complete anchor shall be removed to 1" min. below slab surface and hole filled with grout.



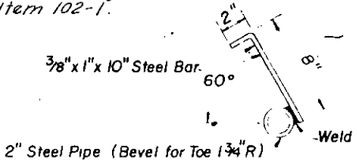


PRECAST WALL UNIT

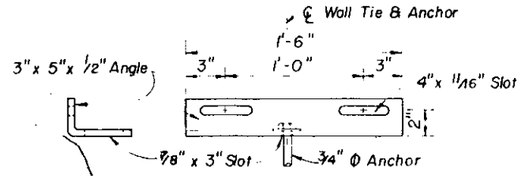
The contractor shall pick up wall units (furnished by D.O.T.) at the D.O.T. Fort Pierce maintenance yard, 3601 Oleander Ave., Fort Pierce. The contractor shall also return the wall units to the Fort Pierce maintenance yard. (Approx. 45 units will be available.) Cost to be included in Pay Item 102-1.



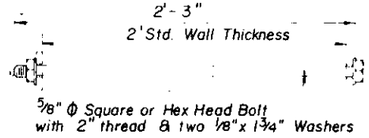
WALL TIE



WALL LIFT PIPE & ANCHOR

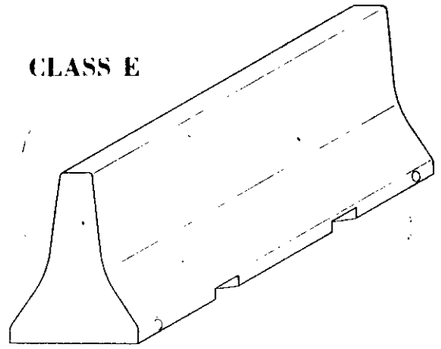


WALL TIE & ANCHOR



WALL TIE BOLT

CLASS E



TEMPORARY BARRIER WALL

Wall ties, wall tie, anchors and wall tie bolts, are to be furnished by the Contractor and shall become the property of D.O.T. at the completion of the project, and shall be stockpiled as directed by the Engineer.

Approved

Revised Date 10-1-77

PLEASE RETAIN THIS SHEET FOR STANDARD PILAR SHEET YOUR PERMANENT FILES.

FED. ROAD DIV. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	FLA.	88000-3510	78	4	

Sec. 35, T32S, R39E

℄ Sta. 389+63.37

N.f.T.

℄ Survey

166.807

49°07'20"

460.00'

N.f.B.C.

53°05'55"

N.f.B.C.

References

℄ Sta. 386+31.44

80°

40.55'

60°

Set 80d nails in back of sidewalk

Begin Approach Slab ℄ Sta. 377+33

Begin Bridge ℄ Sta. 378+13

PROPOSED 114'-0" BRIDGE

MAIN CANAL

End Bridge ℄ Sta. 379+27

End Approach Slab ℄ Sta. 379+47

F.E.C. R.R. (East Track)

R.R. TRUSS

℄ Channel Sta. 4+40 Begin Channel exc.

Begin Widening Construction and Resurfacing ℄ Sta. 375+00

End Widening & Resurface Begin Project ℄ Sta. 377+13

TO BE RELOCATED

Const. end anchorage

Const. Floating Silt Barrier

Construct Approach Slabs Index No. 12522

TO BE RELOCATED

TO BE RELOCATED

End Project Begin Widening & Resurface ℄ Sta. 379+97

R/W

Const. Guardrail 50'

B.T. 600 P.R.

Widening Strip

Remove exist. Guardrail

Remove exist Bridge

Resurface

℄ S.R. 5

℄ of Survey

Limits of Resurfacing

18" R.C.P.

15" R.C.P.

24" R.C.P.

Meet exist. swk. and C-G

Const. Conc. C&G Type F

Const. Conc. Swk.

Remove exist. swk. and curb & gutter

Prop. Swk.

P.G.L.

8" W.M.

MH to be adjusted

1 Sty. Bar

Rip-Rap Spillway to be constructed as directed by the Engineer

℄ Sta. 378+70 = ℄ Channel Sta. 5+00

℄ Channel Sta. 5+65 End channel exc.

Construct Floating Silt Barrier

Canal R/W

Limits of Resurface (37' R)

Scale: 1"=20'

B.M. #1 Set boat spk. in 24" T 100' Rt. & 4' South of Sta. 375+00 El. 13.81

B.M. #2 V-notch in concrete bridge rail at NW corner of bridge over Main Canal El. 13.96

B.M. #3 V-notch in concrete bridge rail at SW corner of bridge over Main Canal El. 13.87

B.M. #4 V-notch in concrete bridge rail at SE corner of bridge over Main Canal El. 13.87

B.M. #5 V-notch in concrete bridge rail at NE corner of bridge over Main Canal El. 13.96

B.M. #6 Flo. SRD disk in NW Corner of bridge over Main Canal ℄ 6+65 Quad 27080A El. 13.967

Widening & Resurface

Begin Widening Construction and Resurfacing ℄ Sta. 375+00

Connect to exist.

Begin Project ℄ Sta. 377+13

Begin Approach Slab ℄ Sta. 377+33

Begin Bridge ℄ Sta. 378+13

End Bridge (Ahead) ℄ Sta. 379+27

End Approach Slab ℄ Sta. 379+47

End Project ℄ Sta. 379+97

Prop. profile

Existing Inlet Rt.

18" R.C.P.

B.T. 600 P.R.

24" R.C.P.

Low Member El. 12.33

D.H.W. 8.2

N.H.W. 1.68

100' R.C.

Prop. Profile

GENERAL NOTES

1. B.M. Datum is National Geodetic Vertical Datum of 1929 (NGVD-'29)
2. Grades shown are finished grades.
3. Any NGVD-'29 monument within the limits of construction is to be preserved. If in danger of damage the Project Engineer should notify:

Mr. Dennis Hagerup
Geodetic Information Center
Attn: C 185
Rockville, Maryland 20852
Telephone (301) 443-8631

4. Utilities to be adjusted by others as directed by the Engineer.
5. The locations of the utilities shown in the plans are approximate only; the exact locations shall be determined by the Utility Owners and Contractor where necessary during construction.
6. For Utility Adjustment Symbols see Index No. 20501.
7. Existing drainage structures within construction limits shall remain unless otherwise noted.
8. The Contractor is to exercise extreme caution when working in or around areas of overhead electric facilities during construction.
9. The Contractor shall notify the appropriate Utility Company in advance of any construction involving their utilities so that it can make replacements with a minimum of delay.
10. Utility Owners:
    a) City of Vero Beach Water & Sewer
    b) City of Vero Beach Electric
    c) Southern Bell Telephone
10. The City of Vero Beach will remove or reroute their overhead electric facilities during construction so that they will not be in conflict with the Contractor's work, and upon completion of the project the electric facilities will be relocated to the property line.
12. See Bridge Plans for relocation of existing 8" Water Main.
13. Prior to beginning construction the Telephone Company will temporarily relocate its existing B.T. 600 PR Cables to operate at Grade East of the Bridge and upon completion of construction the B.T. 600 PR Cables will be relocated to the West Side of the Bridge. Consult with the Engineer. For attachments to Bridge See Bridge Plans.

375 376 377 378 379 380 381

FT. ROAD CLASS NO.	STATE	PROJ. No.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	FLA.	88010-3510		5	

See 35, T32S, R39E

F.E.C. R.R. (East Track)

End Widening Construction and Resurfacing
℄ Sta. 381+67

BT. 600 PR.
BT. 600 PR.

Widening Strip 167 / 22.5 Lt.

35'
21.5'
13.5'
35'

381 382 383 384 ℄ of Survey 385 386 387

R/W

18" R.C.P.

15" R.C.P.

Swk.

Conc.

Swk.

18" R.C.P.

R/W

Scale: 1" = 20'

BM #2
Set boat spk in asph drive
to Motel
40' Rt. Sta. 384+55
El. 13.81

℄ Sta. 369+63.37

N.I.T.

℄ Survey

1668.07'

49°07'20"

N.I.BC

33°05'55"

N.I.BC

References

℄ Sta. 386+31.44

60°

60°

Set 60d nails in back of sidewalk

End Widening Construction and Resurfacing
℄ Sta. 381+67

Connect to exist.

Exist. Profile

Existing Inlet Rt.

Existing Inlet Lt.

Existing 15" R.C.P.

18" R.C.P.

16
12
8
4
0
-4

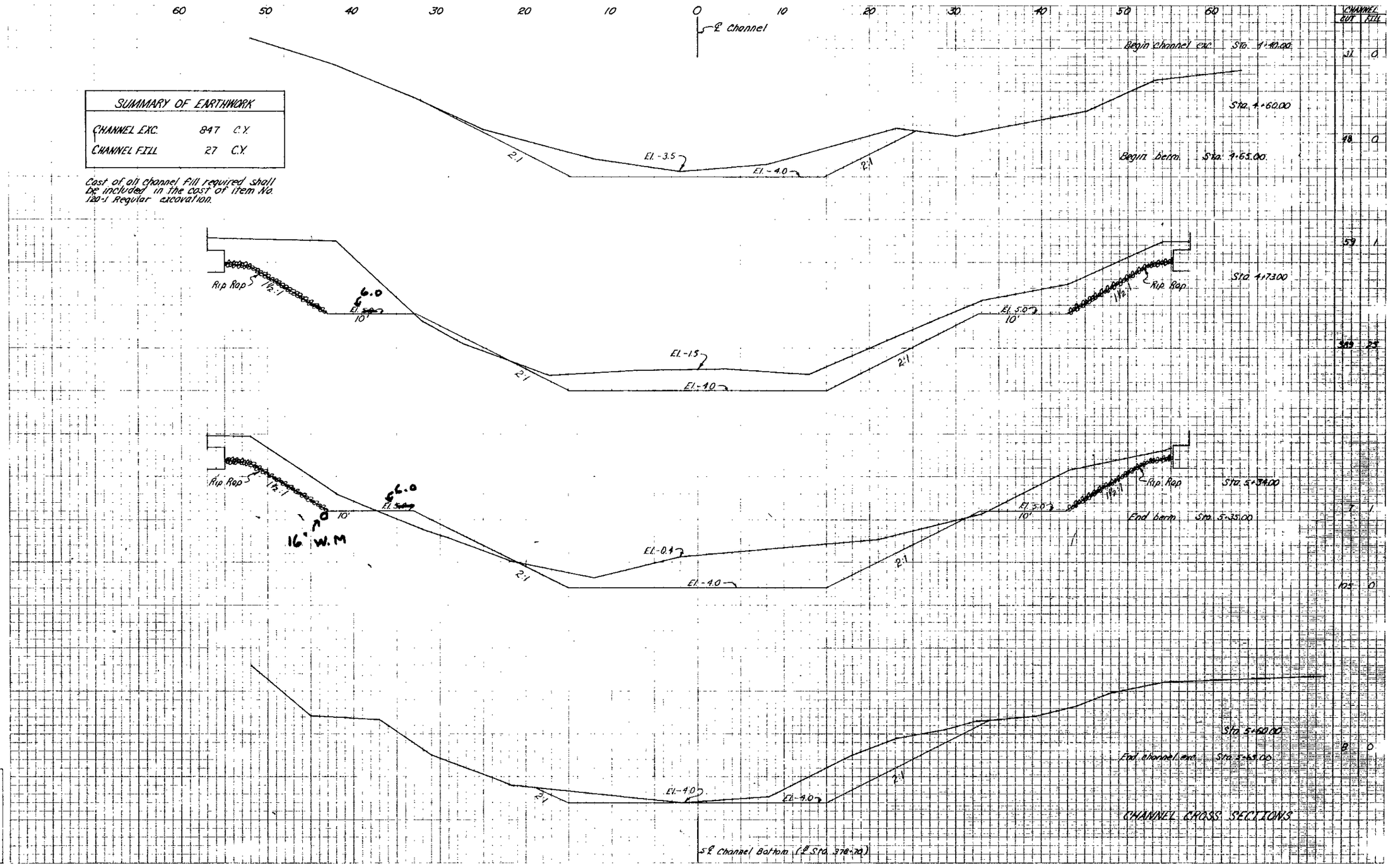
381 382 383 384 385 386 387

Fed. Road Dist. No.	State	County	Route	Proj. No	Sheet No
3	Fla.	Indian River	5	88010-3510	6

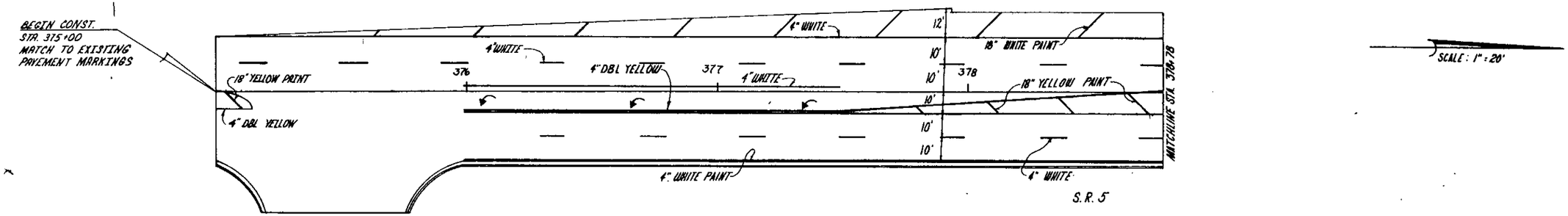
CROSS SECTIONS

SUMMARY OF EARTHWORK		
CHANNEL EXC.	847	C.Y.
CHANNEL FILL	27	C.Y.

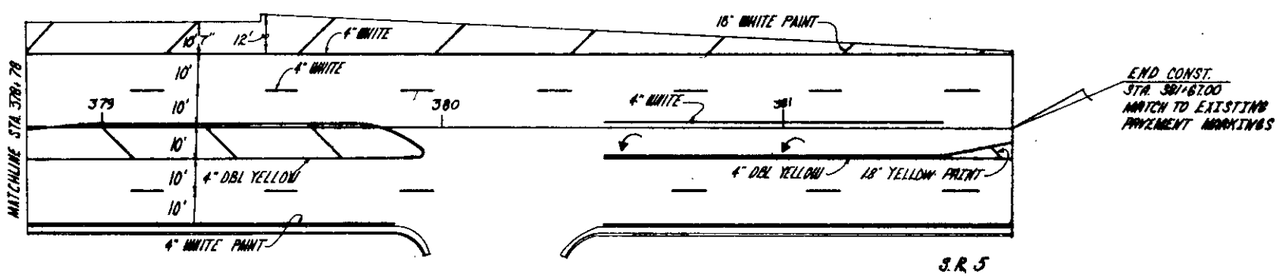
Cost of all channel fill required shall be included in the cost of item No. 120-1 Regular excavation.



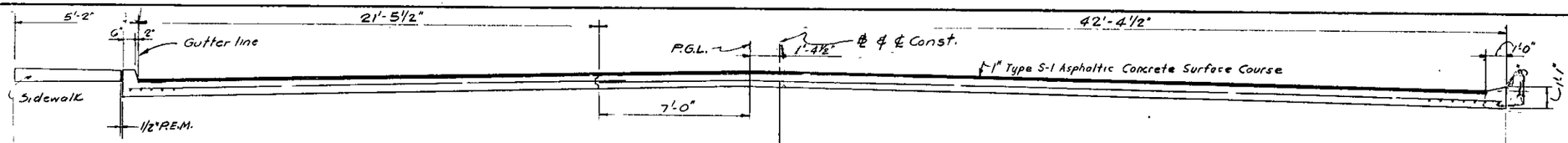
FED. ROAD DIST. NO.	STATE	PROJECT No.	FISCAL YEARS	SHEET No.
9	FLA.	86010-3570		7



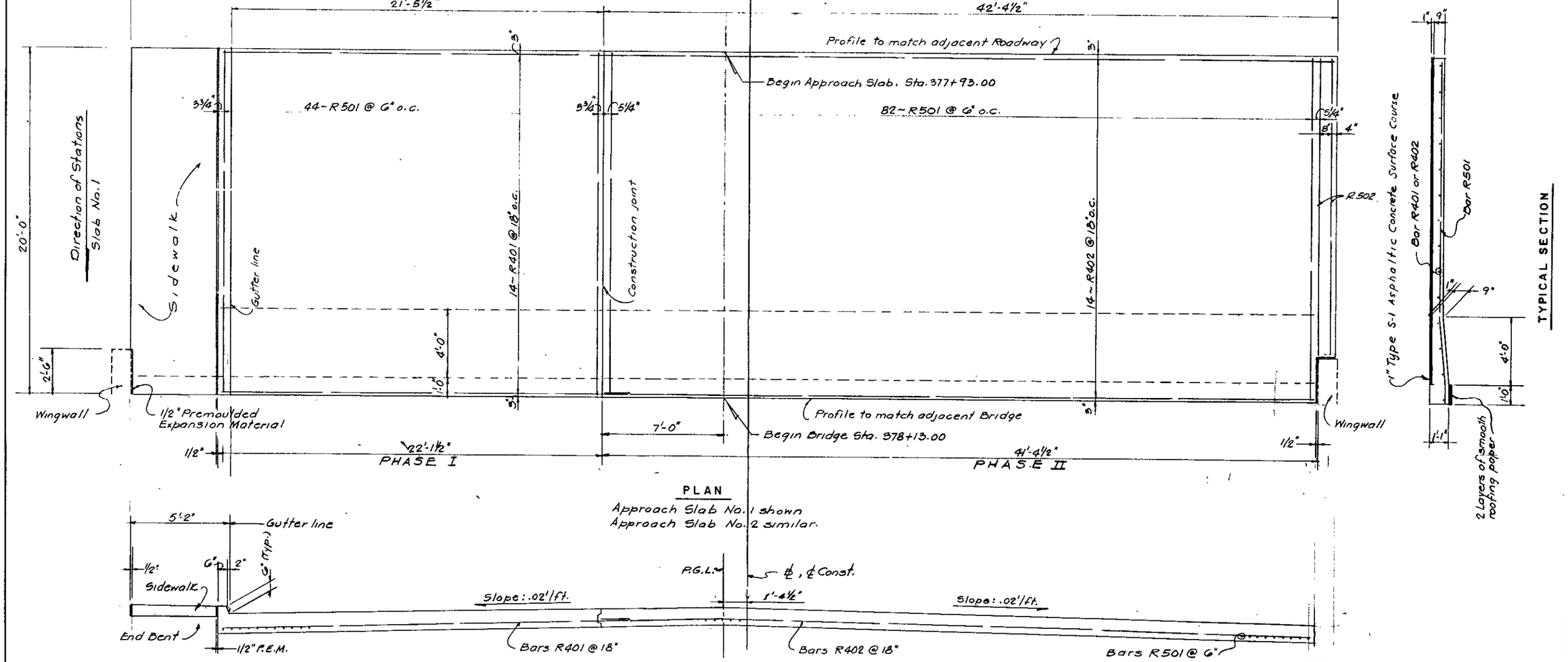
NOTE: ALL PAVEMENT MARKINGS TO BE THERMOPLASTIC UNLESS OTHERWISE SPECIFIED



FED. ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		8



REFLECTED VIEW AT END ADJOINING ROADWAY



PLAN

Approach Slab No. 1 shown
Approach Slab No. 2 similar.

VIEW AT END ADJOINING BRIDGE

TYPICAL SECTION

BILL OF REINFORCING STEEL *				
MARK	SIZE	LENGTH	NO. REQD.	TYPE
R401	4	23'-5"	14	Str.
R402	4	41'-9"	14	"
R501	5	19'-6"	126	"
R502	5	17'-0"	2	"

ESTIMATED QUANTITIES *		
ITEM	UNIT	QUANTITY
Class II Concrete	C.Y.	38.41
Reinforcing Steel	Lbs.	3208

* Bill of Reinforcing Steel and Estimated Quantities are for one Approach Slab only. 2 Required. Sidewalk Quantities are not included.

PREPARED BY
MID-SOUTH ENGINEERING CO.
CONSULTING ENGINEERS
LAUDERDALE BY THE SEA, FLA.

REVISIONS	
Date	Description

APPROVED BY

Deputy Design Engineer, Structures

APPROVAL SLAB

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

ROAD NO.	COUNTY	PROJECT NO
SR-5	INDIAN RIVER	88010-3510

	Names	Dates
Designed by	NCR	11/77
Checked by	RPJr	1/78
Quantities by	NCR	11/77
Checked by	RPJr	1/78
Supervised by	NCR	

Drawing No. 1 of 1

Index No. 12522

FED. ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-1

ESTIMATED BRIDGE QUANTITIES *

ITEM NO.	ITEM	UNITS	QUANTITIES
110-3 ▲	Removal of Existing Structure	L.S.	1
400-2-5	Class II Concrete (Substructure)	C.Y.	111
400-2-4	Class II Concrete (Superstructure)	C.Y.	178
400-5-4	Concrete Handrail (Barrier)	L.F.	114
400-5-5	Concrete Handrail (Sidewalk Barrier Type)	L.F.	114
415-1-4	Reinforcing Steel (Superstructure)	Lb.	45,158
415-1-5	Reinforcing Steel (Substructure)	Lb.	17,225
450-71 ***	Resetting Pre stressed Slab Units	L.F.	1,100
455-3-2	Pre stressed Concrete Piling Furnished (18"ø)	L.F.	1,624
455-4-2	Pre stressed Concrete Piling Driven (18"ø)	L.F.	1,624
455-9-12	Unloaded Test Piles (Pre-stressed Conc)(18"ø)	L.F.	140
455-10-90	Test Load (90 Tons)	Ea.	1 **
455-10-110	Test Load (110 Tons)	Ea.	1 **
455-15	Pre formed Pile Holes	Ea.	22
455-17-2	Pile Splices (18")	Ea.	1
460-91-2	Expansion Joint Seal (Compression Elast.)	L.F.	137
530-1-2	Rip Rap (Sand-Cement)(Bridge)	C.Y.	100

▲ Approx. 7,015 S.F. of Cast in Place Slab Bridge.
* Does not include Quantities for Approach Slab
** The number of test loads may be increased or omitted as directed by the Engineer.

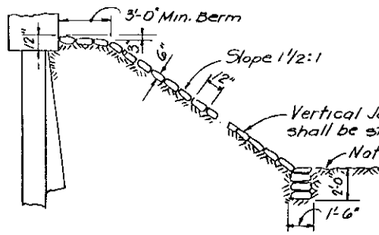
INDEX OF BRIDGE SHEETS

B-1 Summary of Quantities, Index of Drawings, General Notes and Rip-Rap details.
B-2 General Plan and Elevation.
B-3 Bridge Design Data Sheet.
B-4 Soils Data.
B-5 Pile Layout and Finish Grade Elevations.
B-6 End Bents 1 and 5. Plan and Elevation.
B-7 End Bents 1 and 5. Sections and Details.
B-8 Interior Bents 2, 3 and 4.
B-9 Superstructure. Spans 1 thru 4.
B-10 Superstructure Details.
B-11 Concrete Handrail Barrier. (Index 11.407)
B-12 Sidewalk Barrier. (Index 11.460)
B-13 12", 14" and 18" Prestressed Concrete Piles. (Index 3400)
B-14 Construction Sequence.

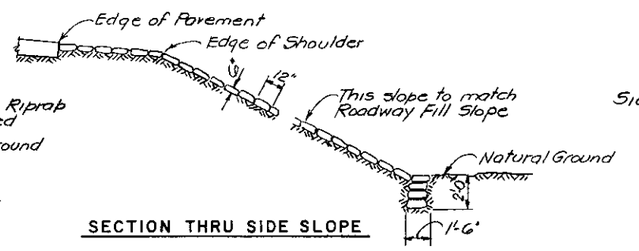
*** The Prestressed Slab Units shall be furnished by the Department of Transportation and shall be picked up by the Contractor at the Ft. Myers Maintenance Yard, 702 Pine Island Road (S.R.78), Ft. Myers, Florida and transported to the job site.
The Contractor shall notify Mr. D.M. Heflin, Post Office Box "M", Ft. Myers, Florida, 33902, Phone No. (813) 995-5403 two (2) weeks in advance of the intended date for picking up the Prestressed Slab Units.
The cost of picking up the Prestressed Slab Units, transporting them to the job site, and the cost of any necessary cleaning and repairs so that the Units may be used in the proposed structure shall be included in the Contract Unit Price for "Resetting Pre stressed Slab Units."

GENERAL NOTES

GENERAL SPECIFICATIONS: Florida Department of Transportation Standard Specifications for Road and Bridge Construction (1977) & 1978 Supplement.
DESIGN SPECIFICATIONS : Designed in accordance with the 1973 edition of A.A.S.H.O. Standard Specifications for Highway Bridges and approved revisions.
DESIGN LOADING : HS 20-44 Roadway.
60 P.S.F. Sidewalk.
MATERIAL STRESSES: All allowable stresses are in accordance with the 1973 edition of the A.A.S.H.O. Standard Specifications for all the materials shown on plans.
Maximum working stresses for Concrete: Class II 1360 p.s.i. Class III 2000 p.s.i. Class IV 2200 p.s.i.
REINFORCING STEEL: Grade 60, except pre-stressed concrete piles may be Grade 40.
CONCRETE STRENGTH: (28 days): Class II 3400 p.s.i., Class III 5000 p.s.i. and Class IV 5500 p.s.i.
SURFACE FINISH: All surfaces shown in detail below, including top and inside face of End Bent wingwalls, shall receive a Class 5 applied finish coating.
ENVIRONMENT : Non-Coastal.

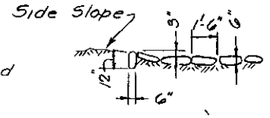


SECTION THRU FORWARD SLOPE

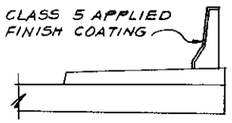


SECTION THRU SIDE SLOPE

RIP - RAP DETAILS



SECTION THRU ENDS



DETAIL SHOWING LOCATION OF APPLIED FINISH COATING

BUDGET ITEM 415356
BRIDGE NO. 88000-3

SUMMARY OF QUANTITIES, INDEX OF DRAWINGS, GEN. NOTES & RIP-RAP DETAILS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

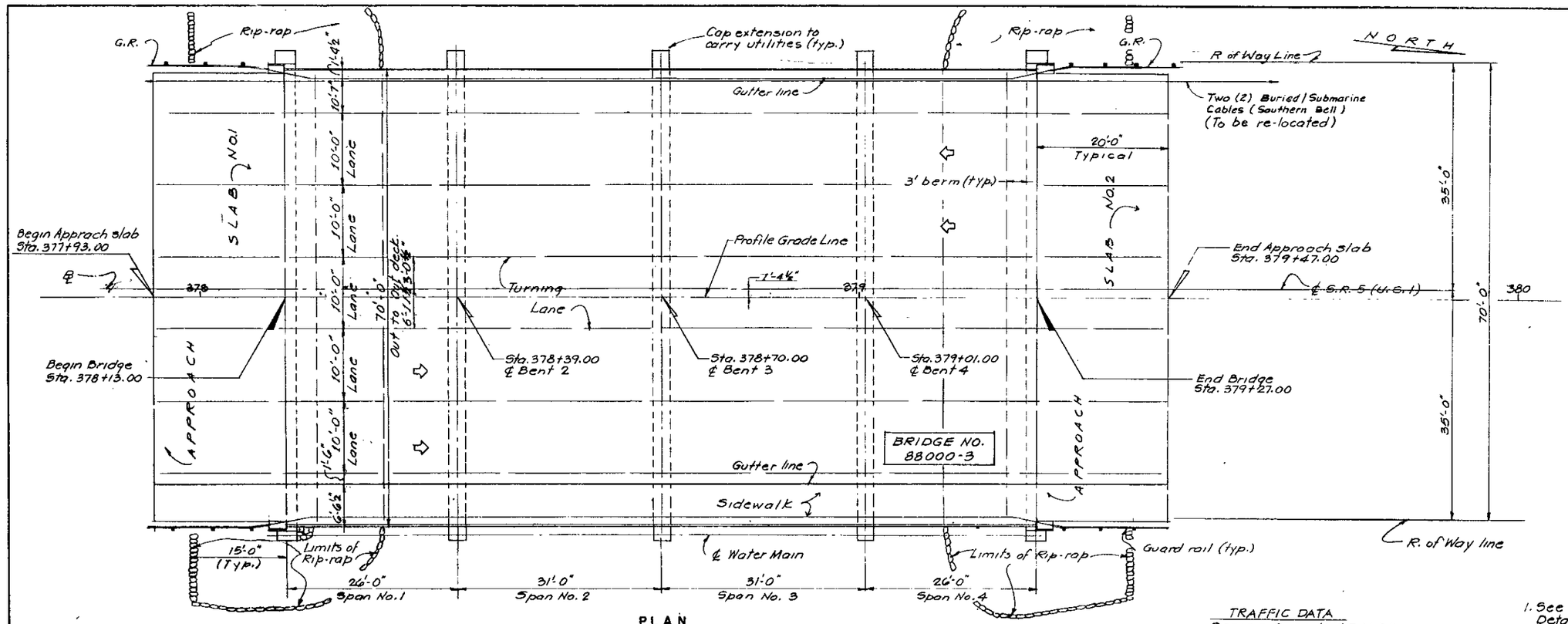
STATE ROAD 5 (U.S.1) OVER MAIN CANAL

REVISIONS		ROAD NO.	COUNTY	PROJECT NO
Date	Description	SR-5	INDIAN RIVER	88010-3510

	Names	Dates	APPROVED BY
Designed by	N.C.R.	Nov. 77	
Checked by	R.P.Te	JAN-78	T. Adkins Jr.
Quantities by	N.C.R.	NOV-77	County Design Engineer, Structures
Checked by	R.P.Te	JAN-	Drawing No. 1 of 11
Supervised by	N.C.R.		Index No. 12521

PREPARED BY
MID-SOUTH ENGINEERING CO.
CONSULTING ENGINEERS
LAUDERDALE BY THE SEA - FLORIDA

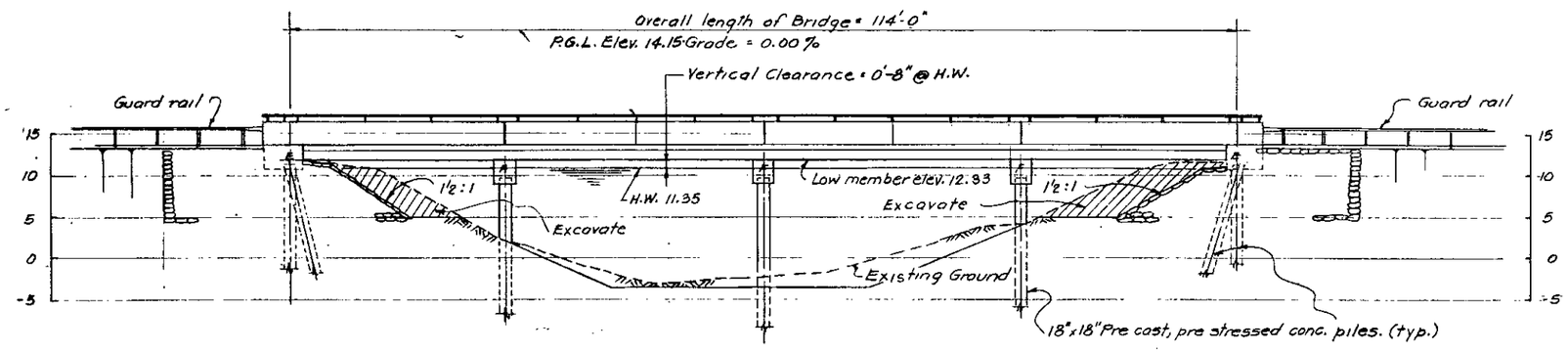
FED. ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEAR	SHEET NO
3	FLA.	88010-3510		B-2



PLAN

TRAFFIC DATA
Design Speed: 45 M.P.H.

1. See Sh. B-1 for General Notes, Details of Rip-rap and Summary of Quantities.
2. See Sh. B-4 for Soils Data.
3. Existing cast in place concrete bridge to be removed. (2 Phases)
4. See Sh. B-14 for Construction Sequence.
5. Exact location uncertain - Contact Cable Location Bureau toll free: 1-800-432-4770



ELEVATION

NOTE: Drive one unloaded test pile 45 ft. long (18"ø) in each Bent 1 and 5, and one unloaded test pile 50 ft. long (18"ø) in Bent No. 3, in the position of a permanent plumb pile located as directed by the Engineer.

BUDGET ITEM 415356
BRIDGE NO. 88000 3
GENERAL PLAN AND ELEVATION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

ROAD NO.	COUNTY	PROJECT NO
SR-5	INDIAN RIVER	88010-3510

	Names	Dates
Designed by	N.C.R.	NOV. 77
Checked by	R.P.	JAN-78
Quantities by	A.	NOV. 77
Checked by	A.	JAN. 78
		R.

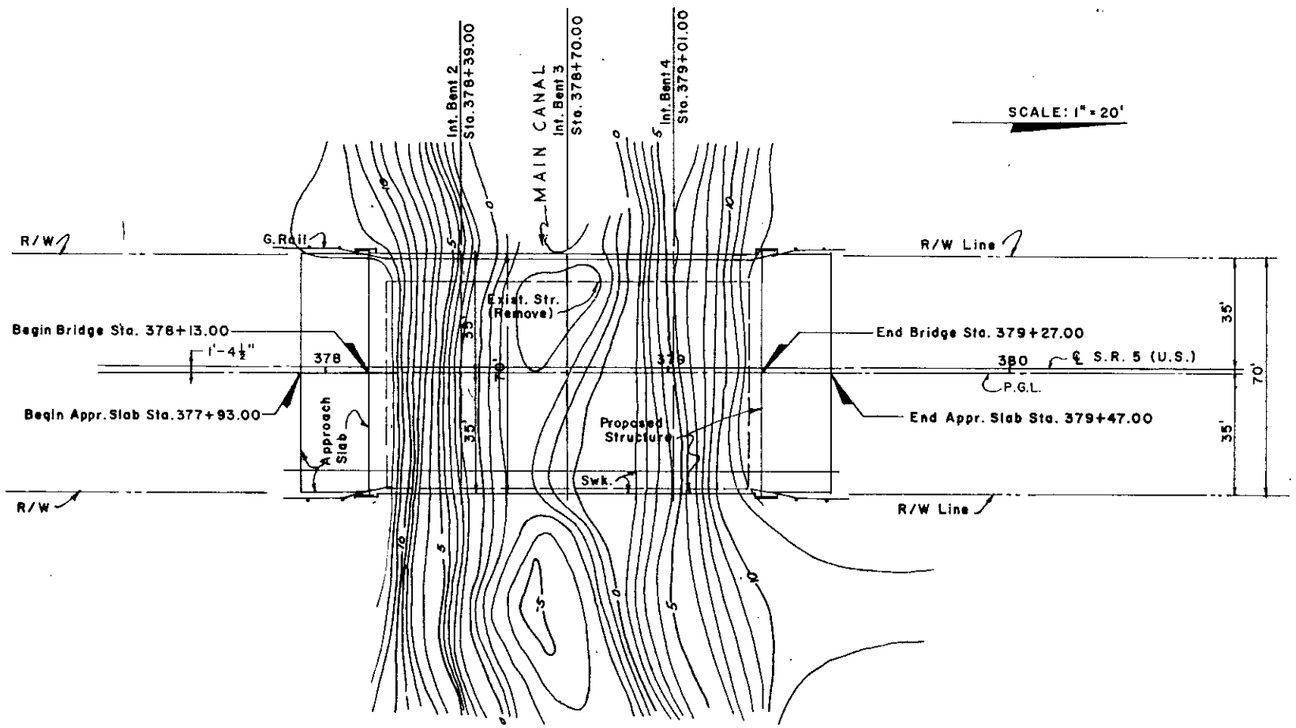
APPROVED BY
Deputy Design Engineer, Structures

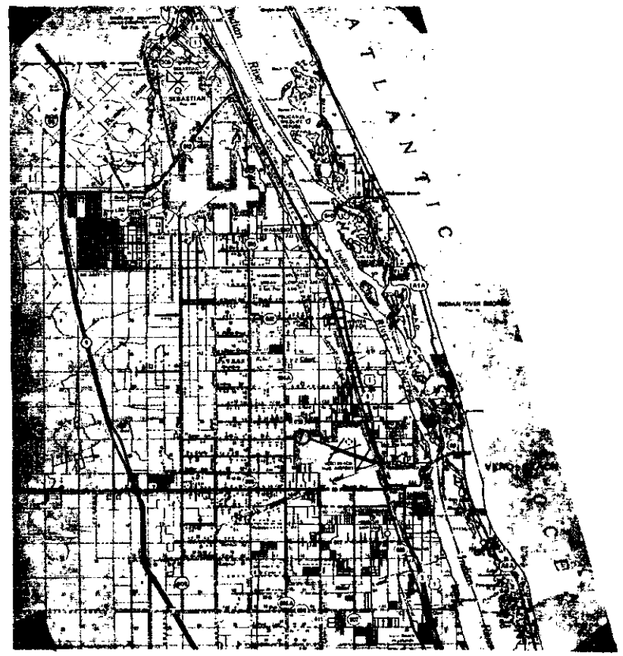
Drawing No. 2 of 11
Index No. 12,521

REVISIONS	
Dates	Descriptions

PREPARED BY
MID-SOUTH ENGINEERING CO.
CONSULTING ENGINEERS
LAUDERDALE BY THE SEA, FLORIDA

FED. ROAD DIV. No.	STATE	PROJECT No.	FISCAL YEAR	SHEET No.
3	FLA.	88010- 3510		B-3

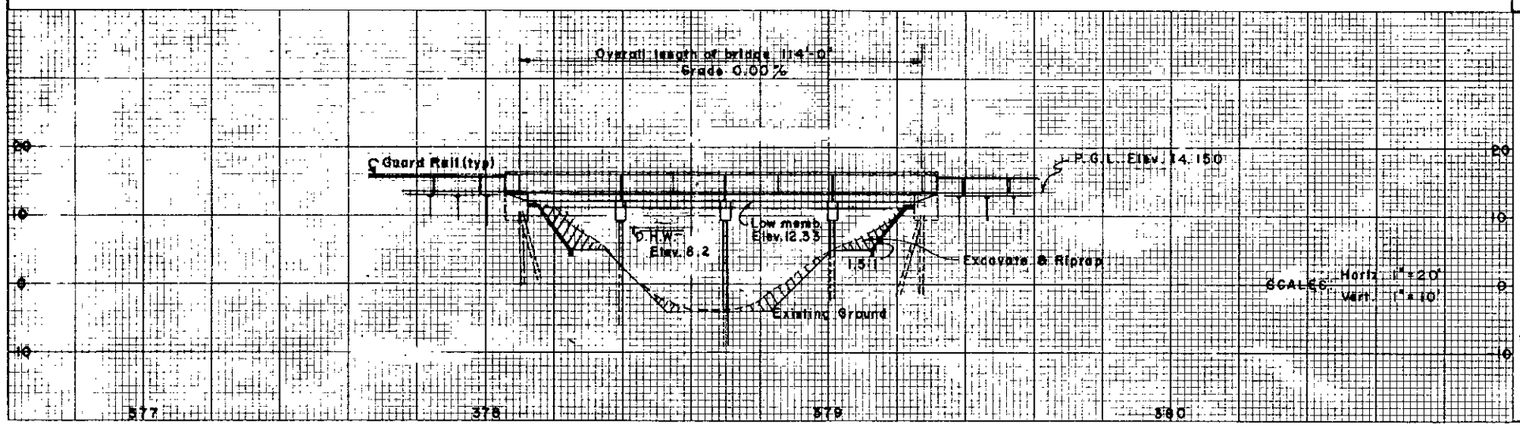




DRAINAGE AREA & LOCATION

EXISTING STRUCTURES

(REFERENCE)	(1)	(2)	(3)	(4)	(5)
FOUNDATION	Conc. Piles				
OVERALL LENGTH	105' 6"				
SPAN LENGTH	5@15' 2@15'3"				
TYPE CONSTRUCTION	Conc.				
SIDEWALKS					
ROADWAY WIDTH	54'				
ELEV LOW MEMBER	12.33				



DESIGN DATA

STRUCTURE RECOMMENDATIONS
1. LOADING HS-20-44
2. BRIDGE ROADWAY WIDTH 62 FT. 1"
3. SIDEWALKS 5'-0" Rt.

DRAINAGE RECOMMENDATIONS
1. BEGIN BRIDGE STATION 378+13.00 END BRIDGE STATION 379+27.00
2. CENTERLINE GRADE ELEVATION 14.15
3. BRIDGE SKEW ANGLE NONE
4. CHANNEL BOTTOM, WIDTH 30'± ELEVATION -4.0 SIDE SLOPES 2:1 approx.
CENTERLINE CHANNEL BOTTOM, STATION 378+70
LIMITS OF CHANNEL EXCAVATION RT. R/W LT. R/W
5. CLEARANCE: NAVIGATION: HORIZ. N.A. DRIFT: HORIZ. 15' Min.
VERT. N.A. ABOVE EL. N.A. VERT. 3.0 ABOVE EL. 8.2
6. DRAINAGE AREA 25 Sq. Miles *
7. WATER STAGE DATA: MAX. STAGE OF RECORD DESIGN H.W. NORMAL FLOW ELEV.
ELEVATION 7.5-8 8.2 1.58
DATE OF OCCURRENCE unknown
RECURRENCE INTERVAL " 50 Years
8. DESIGN DISCHARGE 2264 CFS SOURCE Indian River Farms Drainage District & Corps of Engineers
RECURRENCE INTERVAL 50 YEARS Ft. Drum Study.
9. DESIGN VELOCITY 3.8 FPS

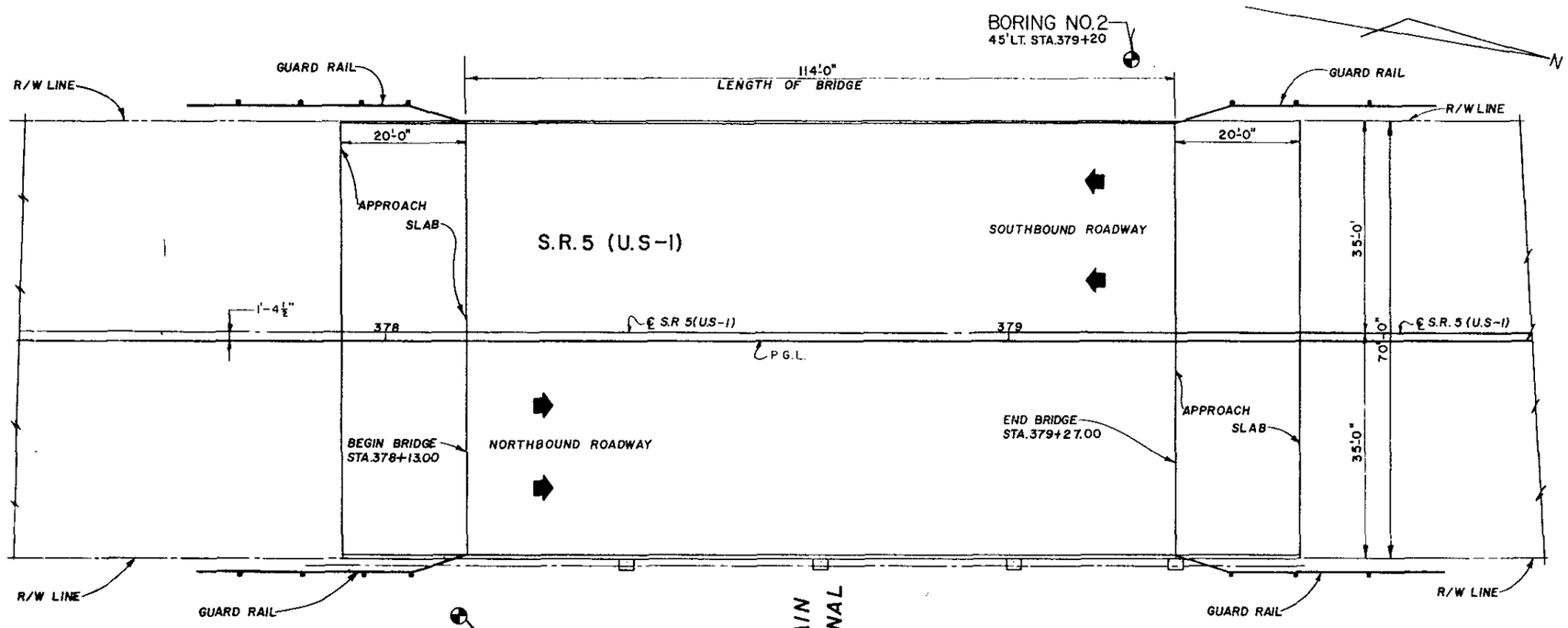
REMARKS: Construct Berm at El. 5.0
* U.S.G.S. report indicates drainage area is indeterminate. D.A. determined by I.R.F.D.D. (Approx.)
There is a saltwater intrusion barrier 4650 ft. east of bridge Elev. 1.2 ± m.s.l.

BASIC FLOOD (100YR) DATA:
Q100 = 2504 cfs
EHW = +8.6' MSL

RECOMMENDED DISTRICT DR. ENGR. [signature]
APPROVED ENGINEER OF DRAINAGE [signature] 3/10/78

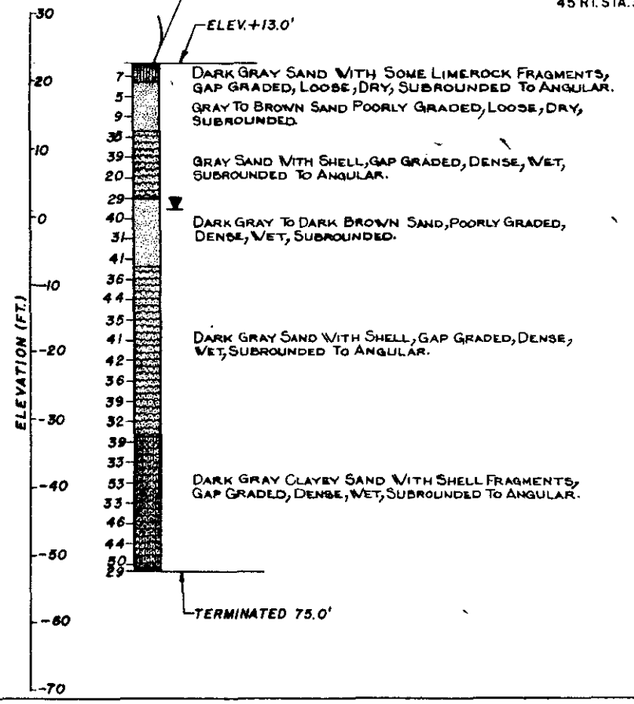
BRIDGE DESIGN DATA SHEET DRAWING NO. 3-C-11 DATE 12-77 DD IB

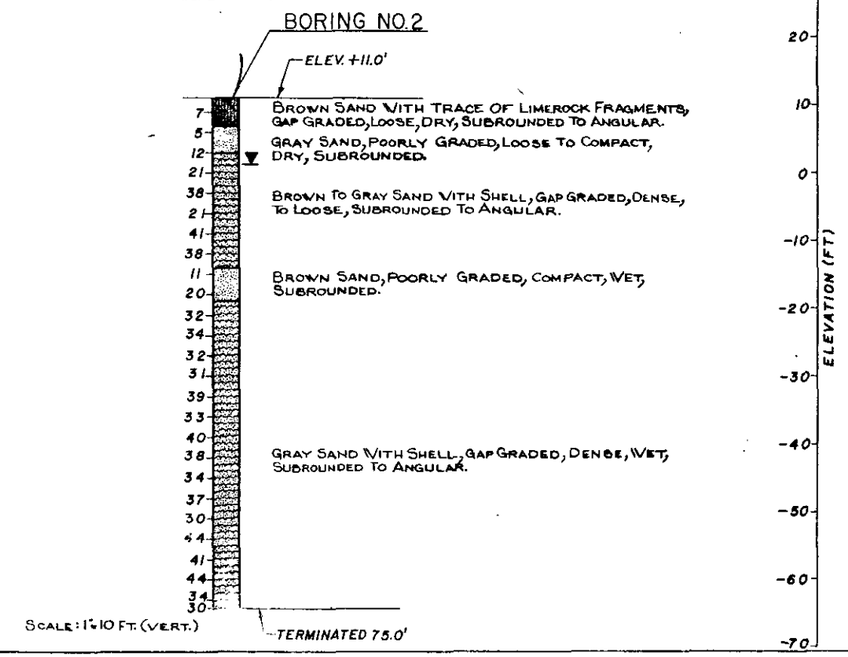
STATE	PROJECT No.	FISCAL YEAR	SHEET No.
FLA.	88010-3510		84



BORING LOCATION PLAN

SCALE 1"=10 FT.





NOTES

DUE TO CORE BORING LOCATIONS AND PROCEDURES, STRATA MAY DIFFER WITH SOIL PROFILE.

DEPTHS GIVEN IN DISTANCE BELOW EXISTING GROUND.

NUMBERS TO LEFT OF BORING INDICATE BLOWS ON SPOON FOR 12" PENETRATION.

SPOON: INSIDE DIAMETER $1\frac{3}{8}$"
OUTSIDE DIAMETER 2"

HAMMER: WEIGHT 140#
DROP 30"

LEGEND

- WATER LEVEL
- FINE SILICA SAND WITH LIMEROCK FRAGMENTS
- FINE SILICA SAND
- FINE SILICA SAND WITH SHELL
- CLAYEY SAND WITH SHELL FRAGMENTS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
REPORT OF CORE BORINGS FOR STRUCTURE

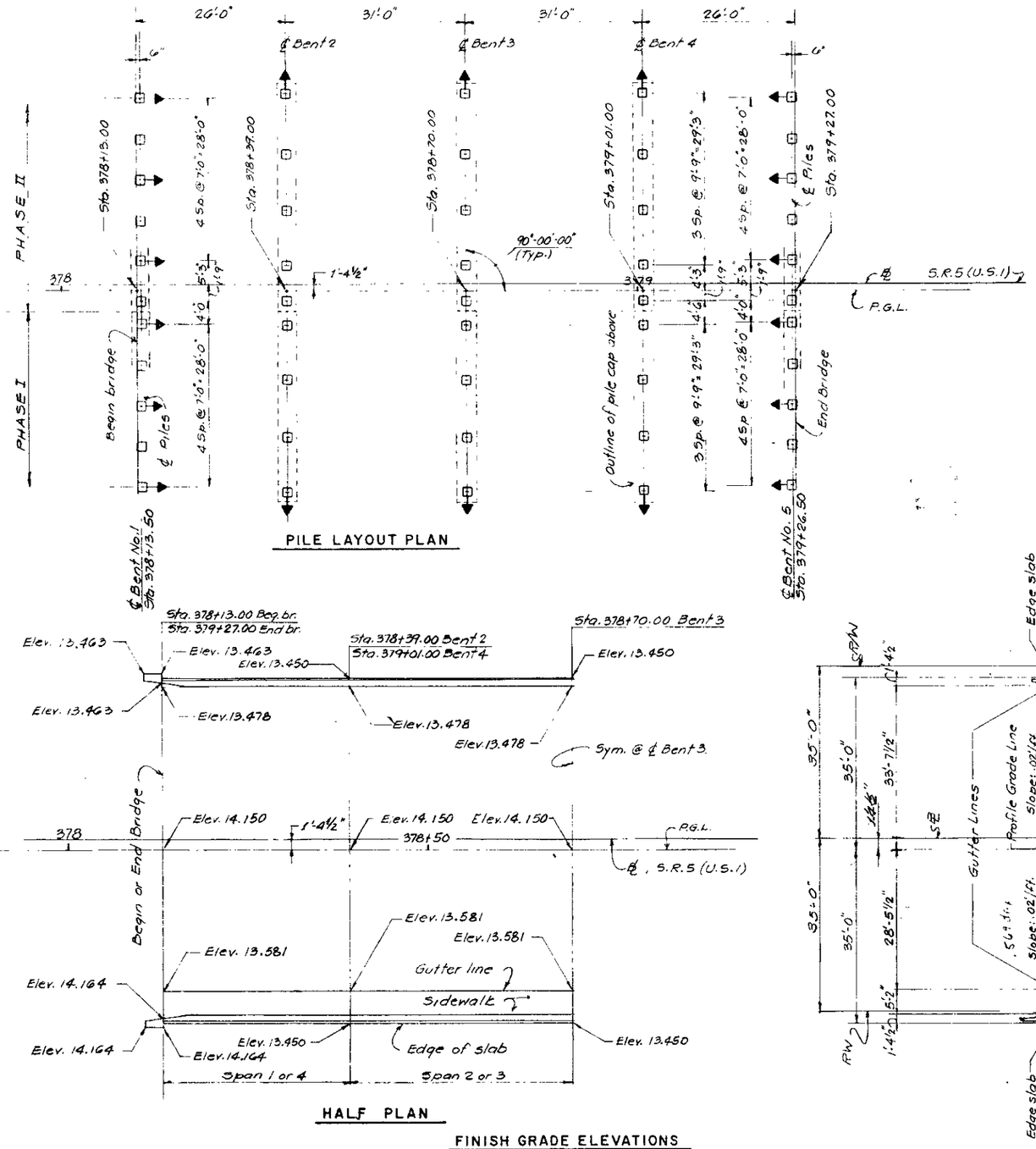
SR5 (U.S.1) OVER MAIN CANAL (BRIDGE NO.3)

PROJ. NO. 99004-3511
BRIDGE NO. 88000 3
COUNTY: INDIAN RIVER

BORING DATE: 1/9 - 1/11/78
BORINGS BY: HAIRE & CONWAY
SUBMITTED BY: FLORIDA TESTING & ENGINEERING

APPROVED	DRAWING NO.	INDEX NO.
	4 of 11	12521

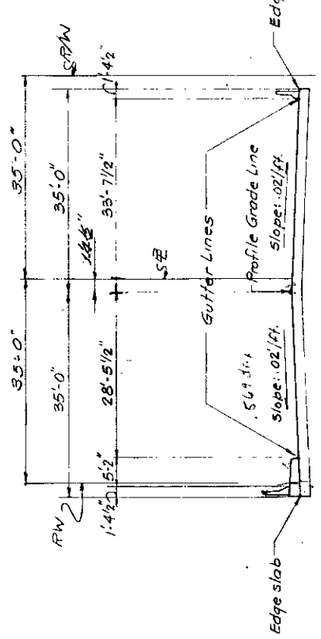
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-5



PILE LAYOUT PLAN

HALF PLAN

FINISH GRADE ELEVATIONS



SECTION THRU ROADWAY SHOWING LOCATION OF ELEVATIONS

NOTES:

← Indicates battered piles.
End Bent batter : 2" per foot.
Int Bent batter : 1½" per foot.
All piles to be 18"x18" Pre-stressed pre-cast concrete.
Pile Loads: End Bents 45 TONS
Int. Bents 55 TONS
Pile Cut-Off Elev.: End Bents 1 & 5 = 10.825
Int. Bents 2, 3 & 4 = 10.825

PILE LAYOUT & FINISH GRADE ELEVATIONS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Date	Description	SR-5	INDIAN RIVER	88010-3510

	Name	Date	APPROVED BY
Designed by	NCR	11/77	
Checked by	R.P.Jr.	1/78	
Quantities by	NCR	11/77	
Checked by	R.P.Jr.	1/78	
Supervised by	NCR		

Deputy Design Engineer, Structures

Drawing No. 5 of 11 | Index No. 12521

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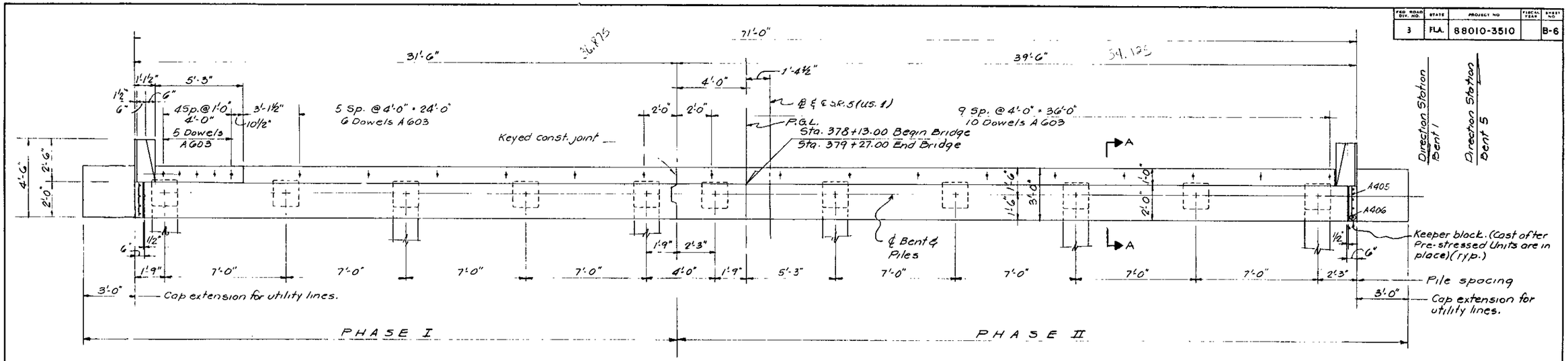
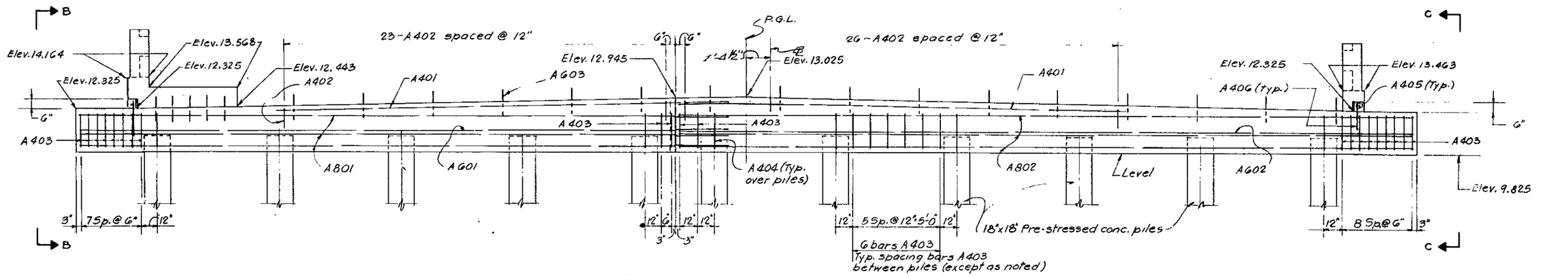
CONSULTING ENGINEERS
LAUDERDALE BY THE SEA, FLORIDA

FED. ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-6



PLAN



ELEVATION

NOTES.
Design Load for Piles = 45 Ton
For Barrier details see Sh. B-11
For General Notes see Sh. B-1

END BENTS 1 & 5. PLAN & ELEVATION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Dates	Descriptions	SR-5	INDIAN RIVER	88010-3510

	Names	Dates	APPROVED BY
Designed by	N.C.R.	Nov. 77	
Checked by	R.P.J.r.	JAN 78	
Quantities by	N.C.R.	Nov. 77	
Checked by	R.P.J.r.	JAN 78	Deputy Design Engineer, Structures
Supervised by	N.C.R.		Drawing No. 6 of 11 — Index No. 12521

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CONSULTING ENGINEERS
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FED. ROAD DIV. NO.	STATE	PROJECT NO	FISCAL YEAR	SHEET NO
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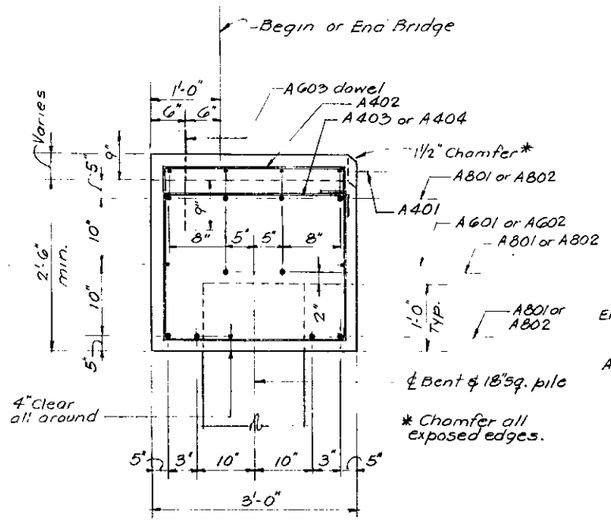
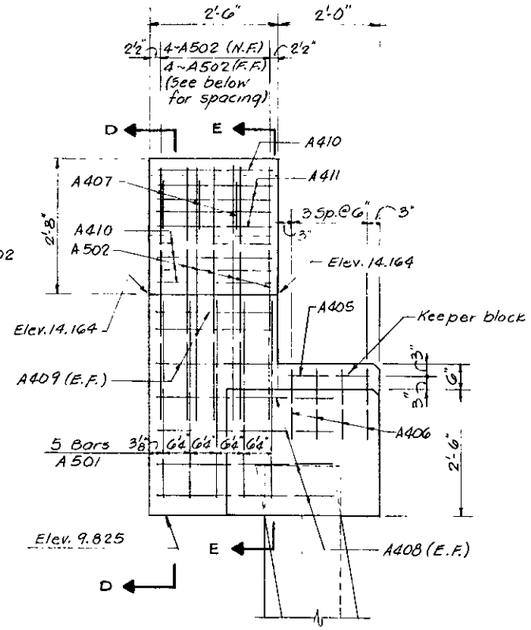
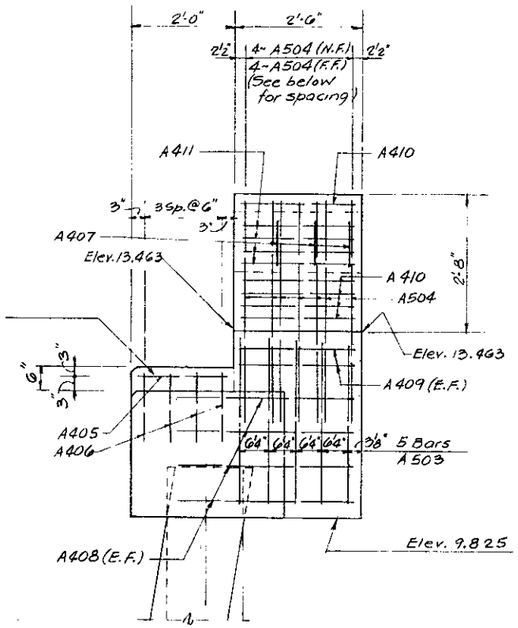


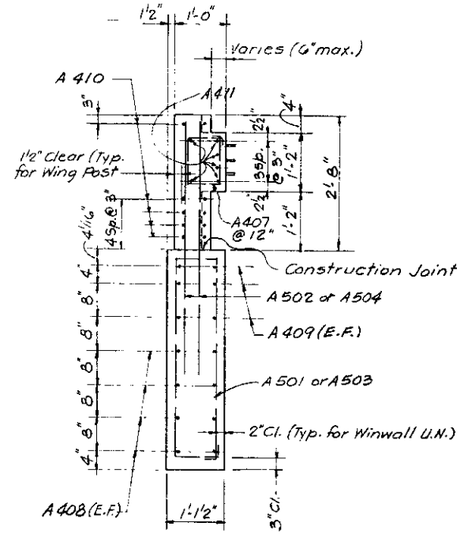
SECTION A-A



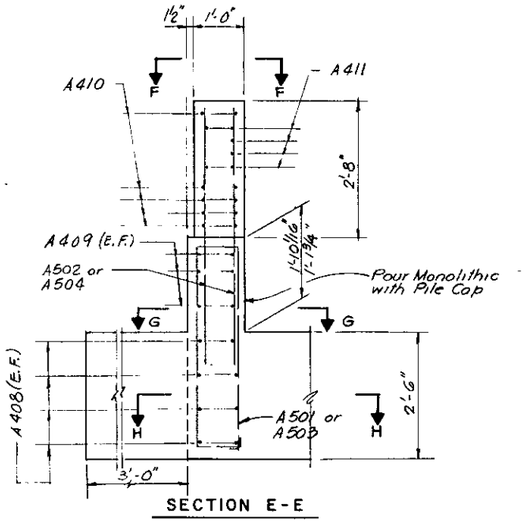
ELEVATION B-B



ELEVATION C-C



SECTION D-D



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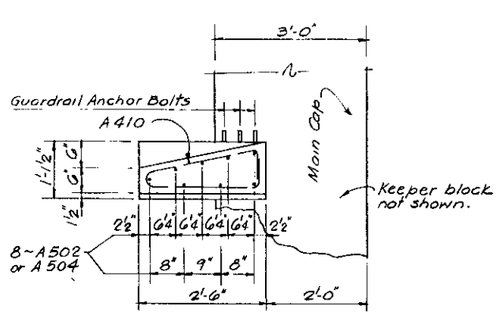

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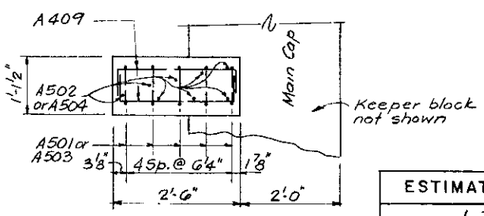
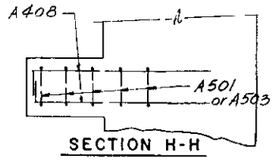


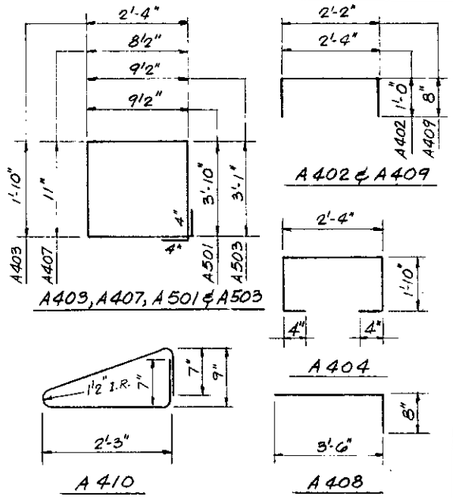
SECTION G-G



SECTION H-H

N.F. Near Face
F.F. For Face
E.F. Each Face

BAR BENDING DIAGRAM



NOTE: All bar dimensions are out-to-out

BILL OF REINFORCING STEEL *

MARK	SIZE	NO. REQ'D.	LENGTH	BENDING
A 401	4	8	26'-0"	Straight
A 402	4	49	4'-4"	See diag.
A 403	4	75	9'-0"	" "
A 404	4	11	6'-8"	" "
A 405	4	2	1'-8"	Straight
A 406	4	8	2'-4"	"
A 407	4	6	5'-11"	See diag.
A 408	4	16	4'-2"	" "
A 409	4	10	3'-6"	" "
A 410	4	10	5'-9"	" "
A 411	4	12	2'-3"	Straight
A 501	5	5	9'-11"	See diag.
A 502	5	8	5'-0"	Straight
A 503	5	5	8'-5"	See diag.
A 504	5	8	4'-6"	Straight
A 601	6	2	37'-3"	Straight
A 602	6	2	42'-3"	"
A 603	6	21	1'-6"	"
A 801	8	10	37'-3"	Straight
A 802	8	10	42'-3"	"

ESTIMATED QUANTITIES *

ITEM	UNIT	QUANTITY
Class II Concrete (Substructure)	C.Y.	24.51
Reinforcing Steel (Substructure)	Lbs.	3520
Pre-stressed Conc. Piling (18"Sq.)	Lin. Ft.	**

Conc. Breakdown.
Cap : 23.23 c.y.
Wingwall : .85 c.y.
End Post : .43 c.y.

* Bill of Rein. Steel & Est. Quant. for one End Bent only.
** See Summary of Estimated Quantities.

PREPARED BY
MID-SOUTH ENGINEERING CO.
CONSULTING ENGINEERS
LAUDERDALE BY THE SEA, FLORIDA

REVISIONS	
Date	Description

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

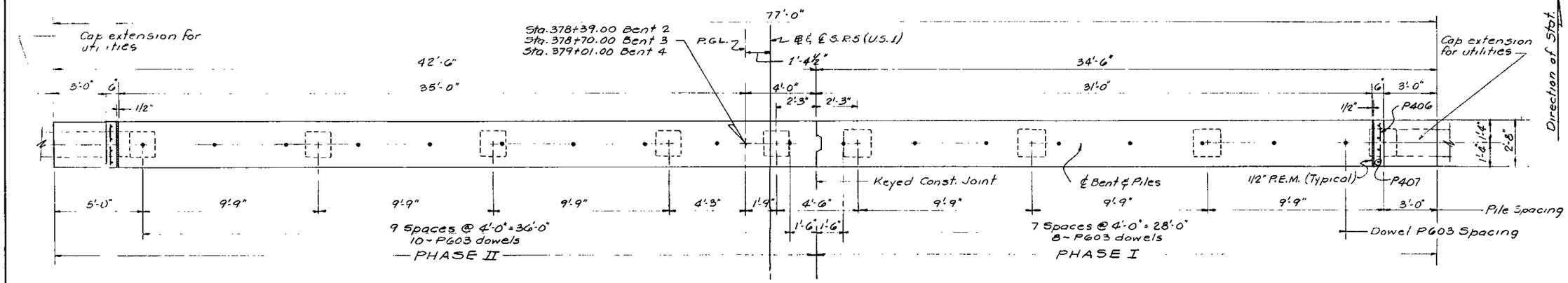
END BENTS 1 & 5, SECTIONS & DETAILS

ROAD NO.	COUNTY	PROJECT NO
SR-5	INDIAN RIVER	88010-3510

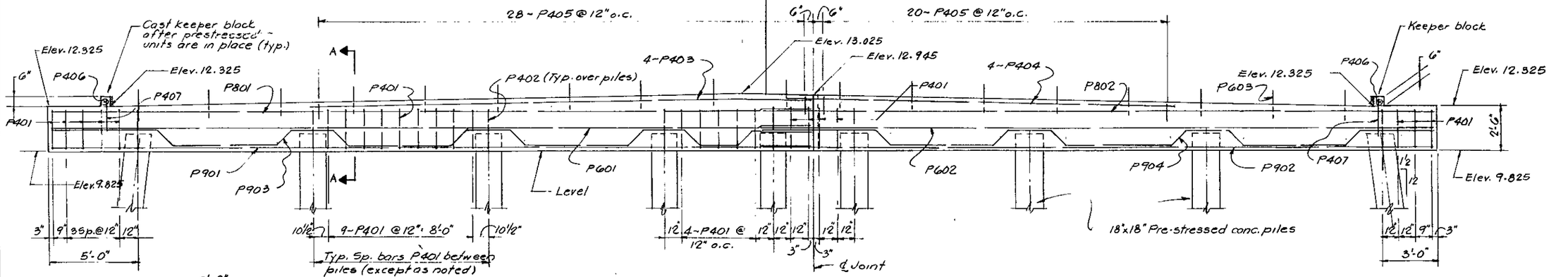
	Name	Date
Designed by	NCR	Nov. 77
Checked by	RPJr	JAN-78
Quantities by	NCR	Nov. 77
Checked by	RPJr	JAN 78
Supervised by	NCR	

APPROVED BY
Deputy Design Engineer, Structures
Drawing No. 7 of 11
Index No. 12521

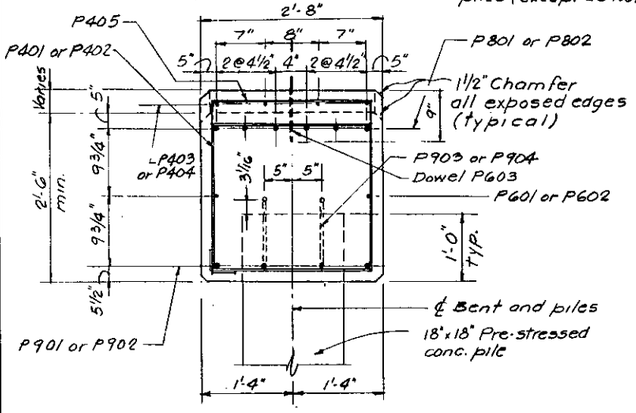
FED. ROAD DIV. NO	STATE	PROJECT NO	FISCAL YEAR	SHEET NO
3	FLA.	88010-3510		B-8



PLAN



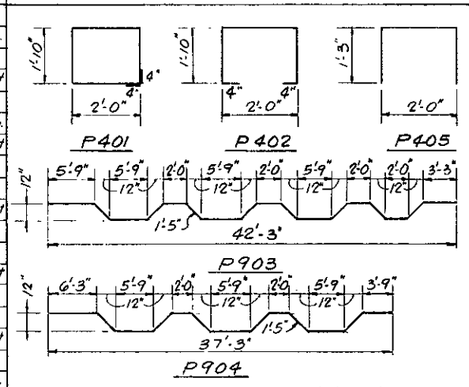
ELEVATION



SECTION A-A

BILL OF REINFORCING STEEL *				
MARK	SIZE	NO. REQ'D	LENGTH	BENDING
P401	4	71	8'-4"	See dia.
P402	4	9	6'-4"	" "
P403	4	4	28'-0"	Straight
P404	4	4	21'-6"	"
P405	4	48	4'-6"	See dia.
P406	4	2	2'-4"	Straight
P407	4	8	1'-8"	"
P601	6	2	42'-2"	Straight
P602	6	2	37'-3"	"
P603	6	18	1'-6"	"
P801	8	6	42'-2"	Straight
P802	8	6	37'-3"	"
P901	9	2	42'-2"	Straight
P902	9	2	37'-3"	"
P903	9	2	45'-7"	See dia.
P904	9	2	39'-9"	" "

BAR BENDING DIAGRAMS



NOTE: All bar dimensions are out-to-out.

ESTIMATED QUANTITIES *		
ITEM	UNIT	QUANT.
Class II Concrete (Substructure)	C.Y.	20.73
Reinforcing Steel (Substructure)	Lbs.	3395
Prestressed Conc. Piling (18" Sq.)	Lin. Ft.	**

* Bill of Reinforcing Steel and Estimated Quantities are for one Interior Bent only.
** See Summary of Estimated Quantities.

GENERAL NOTES
Design Load for Piles: 55 TONS.
For General Notes see Sh. B-1

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REVISIONS	
Date	Descriptions

INTERIOR BENTS 2, 3 & 4

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

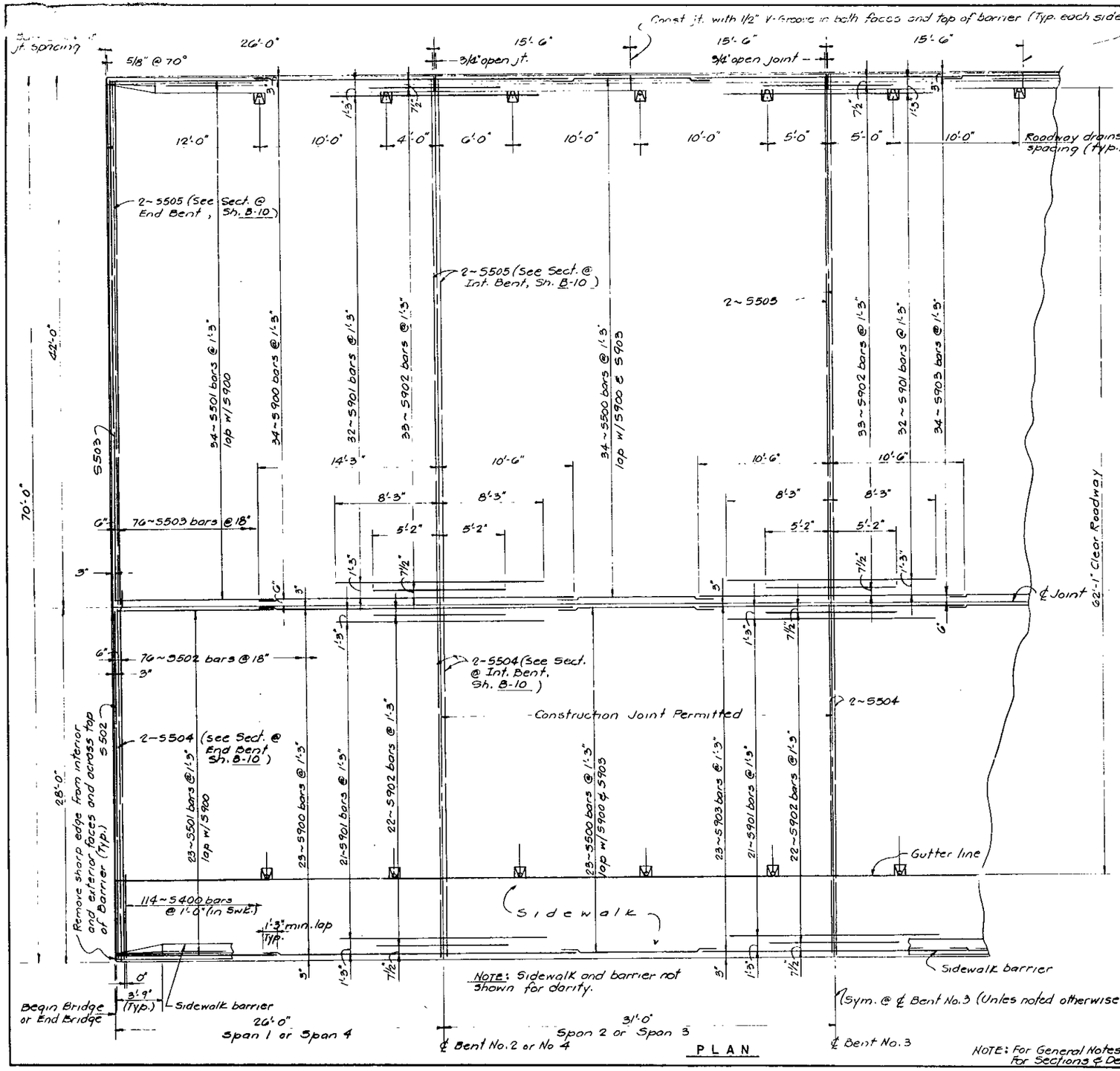
ROAD NO.	COUNTY	PROJECT NO
SR-5	INDIAN RIVER	88010-3510

	Names	Dates
Designed by	N.C.R.	11/77
Checked by	R.P.J.R.	1/78
Quantities by	N.C.R.	11/77
Checked by	R.P.J.R.	1/78
Supervised by	N.C.R.	

APPROVED BY
Deputy Design Engineer, Structures

Drawing No. 8 of 11
Index No. 12521

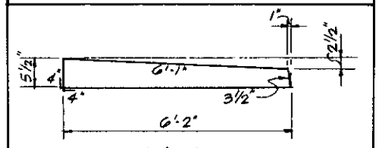
FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-9



BILL OF REINFORCING STEEL *

MARK	SIZE	NO. REQ.	LENGTH	BENDING
S400	4	114	13'-8"	See diag.
S401	4	1026	2'-0"	Straight
S402	4	15	38'-10"	"
S500	5	114	12'-6"	"
S501	5	114	12'-9"	"
S502	5	78	29'-0"	"
S503	5	78	41'-9"	"
S504	5	16	27'-6"	"
S505	5	16	41'-6"	"
S900	9	114	24'-9"	"
S901	9	159	16'-6"	"
S902	9	165	10'-4"	"
S903	9	114	21'-0"	"

BENDING DIAGRAMS



S400

NOTE: All bar dimensions are out to out.

ESTIMATED QUANTITIES *

ITEM	UNIT	QUANTITY
Class II Concrete (Superstruct.)	C.Y.	177.52
Reinforcing Steel (Superstruct.)	Lb.	45,158

* Quantities are for all four spans, and do not include reinforcing steel and conc. in Handrail Barrier. See Sheet B-11 for Handrail Barrier Reinf. including dowels set in Sidewalk and Deck secondary pour.

Concrete Breakdown
Deck Secondary pour: 162.71 c.y.
Sidewalk : 14.81 c.y.

SUPERSTRUCTURE. SPANS 1 THRU 4

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

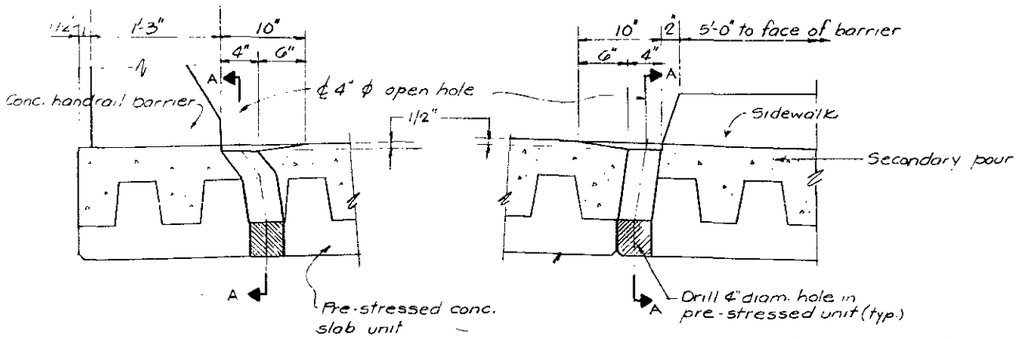
STATE ROAD 5 (U.S.1) OVER MAIN CANAL

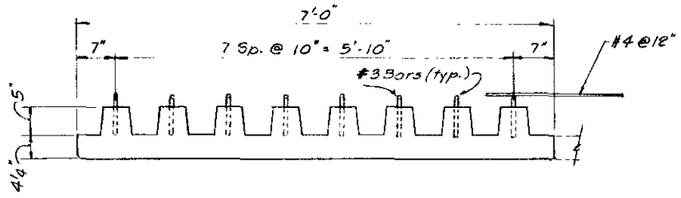
REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Date	Descriptions	SR-5	INDIAN RIVER	88010-3510

	Names	Dates
Designed by	NCR	11/77
Checked by	RPJr	1/78
Quantities by	NCR	11/77
Checked by	RPJr	1/78
Supervised by	NCR	

APPROVED BY
Deputy Design Engineer, Structures
Drawing No. 9 of 11
Index No. 12521

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-10





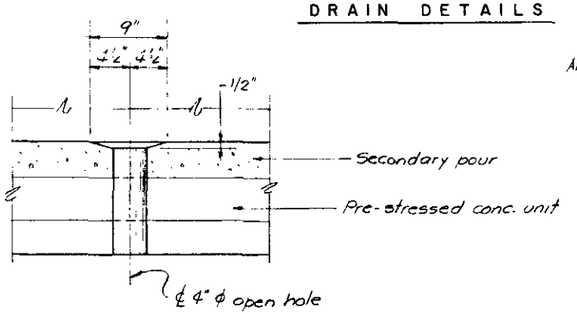
TYPICAL SECTION THRU PRESTRESSED SLAB UNIT

(Furnished by the Department of Transportation)

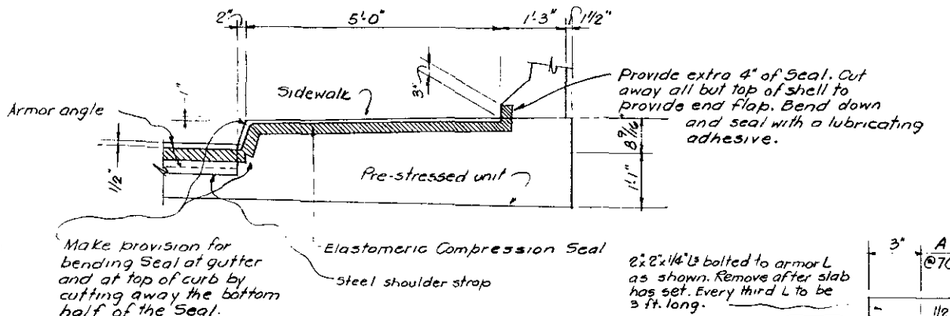
PRESTRESS SLAB UNITS SCHED.		
SIZE	LENGTH	NO. REQ'D.
7'-0" x 9 1/4"	25'-0"	20
7'-0" x 9 1/4"	30'-0"	20

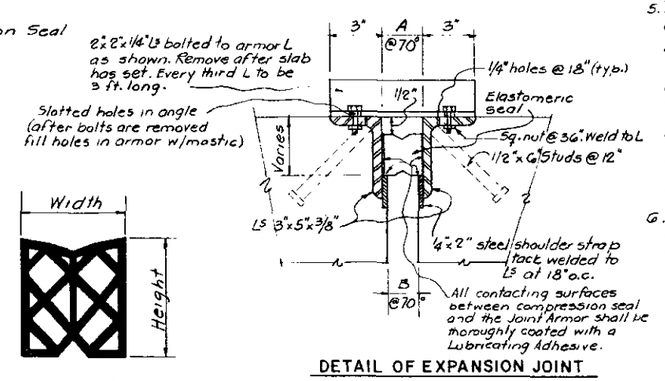
1. Joints between adjacent Precast, Prestressed, Composite Bridge Deck Units may be sealed with a sand-cement grout or a material approved by the Engineer.
2. Camber will be checked and compensated for in the field.
3. Drilling of holes for 4" ϕ P.V.C. pipe to be done in the field after erection of deck units. Do not use impact drills.
4. Form Placement: When differences in camber occur between the individual panel units the height of the bearing material on the caps shall be adjusted so that the underneath side of the panel units form plane surfaces at the center of the span without deviation of more than 1/4 inch between the panel units. When adjustments for camber differences require the thickness of the bearing material on the cap to be greater than 1 1/2 inches the height adjustment shall be made including alternate layers of neoprene bearing mat'l. not less than 1/2 inch thick and the total aggregate thickness of felt and fiberboard material shall be limited to 1 1/2 inches.
   The panel units shall be placed with the joints between the panel units situated parallel to the centerline of the structure with a tolerance of ± 1/2 inch with respect to ℄.
5. Longitudinal Joints: Longitudinal joints shall be spaced at intervals not exceeding 21 feet on each span where precast pre-stressed panels are used. The joints shall be formed or when approved, they may be sawed. The joint in the cast-in-place concrete shall be located directly above and aligned with a mating joint between the panel units. Formed joints shall extend for the full depth of the cast-in-place concrete and sawed joints shall be a minimum of 1/4 inches deep. When more than one longitudinal joint is required, the joints shall be spaced symmetrically about the ℄ of the structure. Longitudinal joints shall be sealed with an approved neoprene compression seal not exceeding 3/4 inch in width.
6. Placing Concrete: To insure the necessary full bond between the precast pre-stressed panels and the cast-in-place concrete, at time of concrete placement this interface must be free of any foreign material. Immediately prior to placing the slab concrete, the precast pre-stressed panels shall be saturated with water. The original design thickness of the deck slab shall be maintained as at the point of maximum camber in the slab units.

DRAIN DETAILS



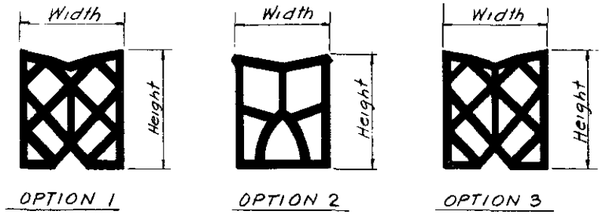
SECTION A-A





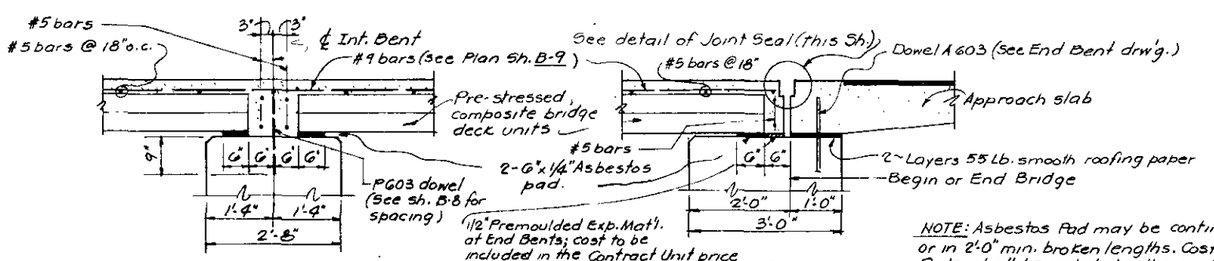
DETAIL OF EXPANSION JOINT

ELASTOMERIC COMPRESSION SEAL DATA					
LOCATION	OPTION	HEIGHT	WIDTH	A	B
End Bents	1	1 5/16"	1 1/2"	1 1/8"	5/8"
	2	1 1/16"	1 1/2"	1 1/8"	5/8"
	3	1 5/8"	1 7/8"	1 1/8"	5/8"



OPTION 1 OPTION 2 OPTION 3

ELASTOMERIC COMPRESSION SEALS



SECTION AT INTERIOR BENT SECTION AT END BENT

NOTE: Asbestos Pad may be continuous or in 2'-0" min. broken lengths. Cost of Pads shall be included in the contract unit price for Class II Concrete (Superstructure)

ELASTOMERIC COMPRESSION SEAL NOTES

For temperatures other than 70° F. adjust opening .0052 in. per degree difference between 70° F. and the temperature at the time the joint is constructed. For temperatures above 70° F. diminish opening and for temperatures below 70° F. increase opening.
The Expansion Joint Seal shall be installed in accordance with the recommendations of the manufacturer.
The cost of labor and materials required for construction of the joints in the bridge deck shall be included in the Contract Unit Price for Expansion Joint Seals.

PREPARED BY
MID-SOUTH ENGINEERING CO.
CONSULTING ENGINEERING
LAUDERDALE BY THE SEA - FLORIDA

REVISIONS	
Date	Description

SUPERSTRUCTURE DETAILS.

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

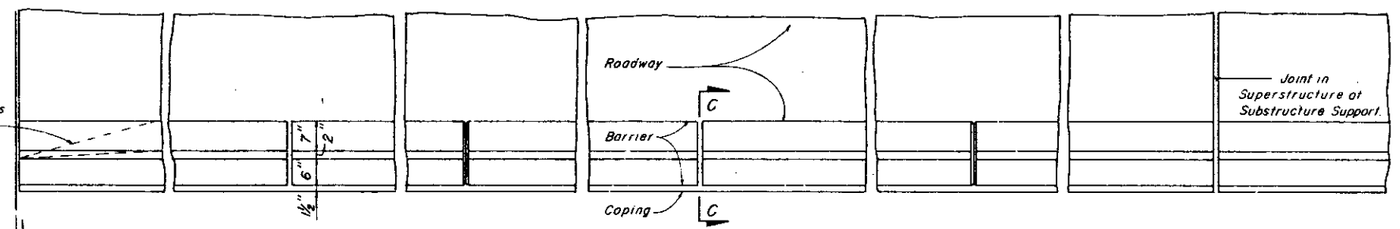
ROAD NO.	COUNTY	PROJECT NO
S.R.-5	INDIAN RIVER	88010-3510

	Name	Date
Designed by	N.C.R.	Nov. 77
Checked by	R.P.Jr.	JAN. 78
Quantities by	N.C.R.	NOV 77
Checked by	R.P.Jr.	JAN 78
Supervised by	N.C.R.	

APPROVED BY
Deputy Design Engineer, Structures
Drawing No. 10 of 11
Index No. 12521

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-11

NOTE: For Barrier Transition at End Bents see Details below, this Sheet.

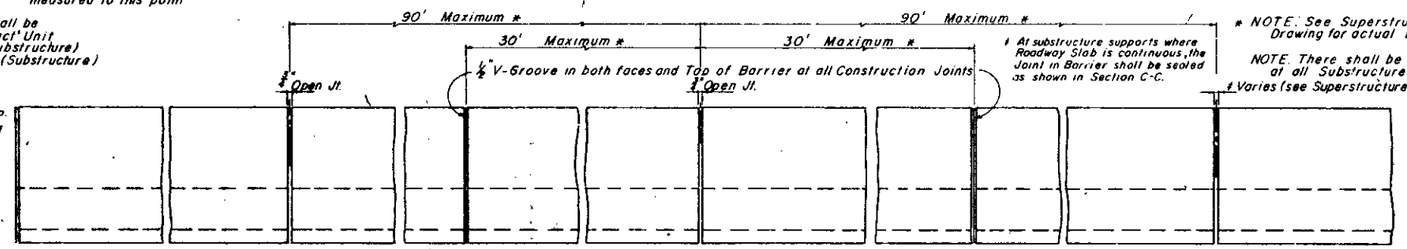


PLAN

End Bent Wing Post — Begin Bridge

For payment Barrier shall be measured to this point

NOTE: Concrete Wing Post shall be paid for at the Contract Unit Price for Concrete (Substructure) and Reinforcing Steel (Substructure)

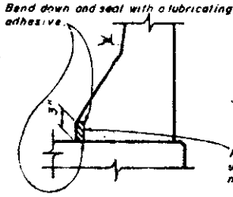


ELEVATION

* NOTE: See Superstructure Drawing for actual Dimensions.

NOTE: There shall be a ¾" Min. Open Joint at all Substructure Supports.

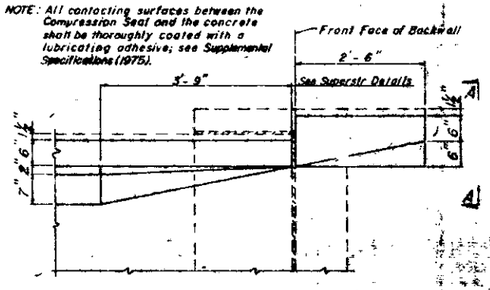
Provide extra 4" of Seal. Cut away all but top of Shell to provide end flop. Bend down and seal with a lubricating adhesive.



Polychloroprene Compression Seals used in ¾" Open Joints shall be 1" wide minimum.

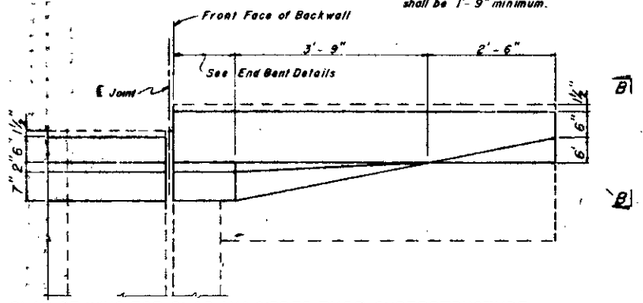
SECTION C-C

NOTE: All contacting surfaces between the Compression Seal and the concrete shall be thoroughly coated with a lubricating adhesive; see Supplemental Specifications (1975).



PLAN OF WING FOR SLAB TYPE SUPERSTRUCTURE

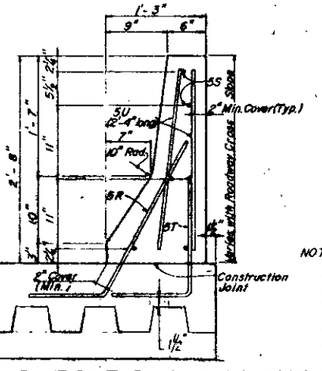
NOTE: For Reinforcing Steel in Transition Area on Slab Type Superstructure adjust and field bend as required for minimum cover



PLAN OF WING FOR SLAB AND GIRDER TYPE SUPERSTRUCTURE

REINFORCING STEEL NOTES

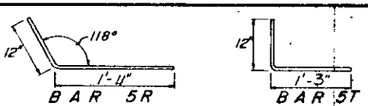
All Reinforcing Steel in Barrier shall be No. 5's. Bars 5R, 5T & 5U to be spaced at 9" c.c. At all open joints bars 5R, 5T, 5U and the ends of bars 5S shall have 2" min. cover. At all construction joints bars 5S may be either continuous or spliced. All splices in bars 5S shall be 1'-9" minimum.



TYPICAL SECTION THRU HANDRAIL BARRIER

BENDING DIAGRAMS

* For Slab Type Superstructure. Adjust length of Bars 5R & 5T to compensate for thicker slab. See Superstr. drawing.

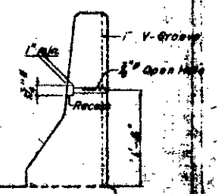


NOTE: All bar dimensions are out-to-out.

QUANTITIES: Class II Concrete = 0.07594 Cu. Yds. per linear ft. of Barrier. (Based on Roadway Cross Slope of .02"/ft.). REINFORCING STEEL = 13.948 lbs. per linear ft. of Barrier.

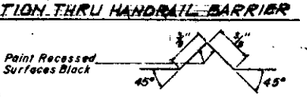
GENERAL NOTES

CONCRETE: Class II Concrete shall be used in Barrier.
REINFORCING STEEL: Reinforcing Steel shall be Grade 60.
PAYMENT: Barrier shall be paid for per linear foot, which shall include all Concrete and Reinforcing Steel. Barrier shall be measured along the center line of the top surface of the Barrier.
CYLINDER STRENGTH: The Cylinder Strength of the Concrete shall be 3,400 p.s.i. minimum at 28 days.
MARKERS: Markers recording the Elevation shall be placed on top of the Barrier at End Bents. On Bridges longer than 100 ft. one marker shall be placed at each end of the Bridge. On Bridges less than 100 ft. long, one marker shall be placed at one end of the Bridge only. Markers are to be furnished by the Department of Transportation and installed by the Contractor. The Cost of installing the Markers shall be included in the Contract Unit Price for Concrete Barrier.
ANCHOR BOLTS: Anchor Bolts, Nuts, and Washers shall be hot dip galvanized in accordance with A.S.T.M. A-123.



HOLES FOR INCIDENTAL SIGNING

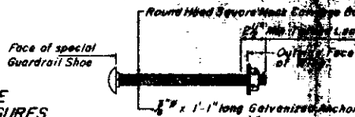
NOTE: Holes and grooves shall be placed on Barrier type approach rail, divided and undivided bridges, as shown in the plans for designated Type 3 signs (warning, informational, guide, regulatory and warning sign locations may change) and at approximately 500' intervals along the right handrails of bridges between designated locations for future signs as directed by the Engineer. The cost of the extra holes and grooves shall be included in the contract unit price for Concrete Handrail (Barrier). If Signing Plans are not available the Project Engineer should secure necessary information from the District Maintenance or Traffic Operations Office.



SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES

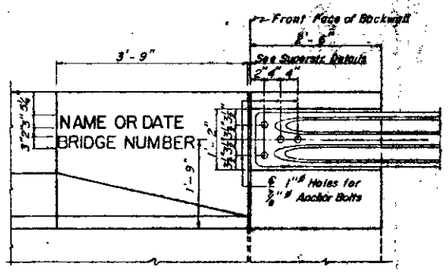
NOTES

This Name and Bridge Number to be placed on the Barrier shall be seen on the drivers right when approaching Bridge. The Date to be placed on the drivers left when approaching Bridge. The Date shall be the Year the Bridge is constructed.
Block Plastic Letters and Figures 3" in height as approved by the Engineer may be used in lieu of Letters and Figures formed by ¾" "V" Grooves. "V" Grooves shall be formed by preformed Letters and Figures.

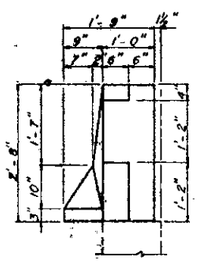


ANCHOR BOLT DETAIL

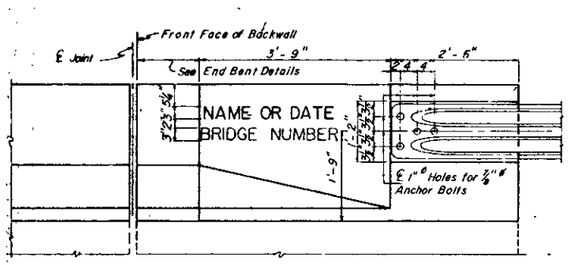
NOTE: Cost of Anchor Bolts to be included in the Contract Unit Price for Guardrail.



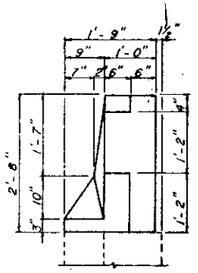
ELEVATION OF WING FOR SLAB TYPE SUPERSTRUCTURE



VIEW A-A



ELEVATION OF WING FOR SLAB AND GIRDER TYPE SUPERSTRUCTURE



VIEW B-B

DETAILS OF GUARDRAIL ATTACHMENT AT WING POSTS

NOTE: For Guardrail Shoe See Standard Drawing in Roadway Plans

REVISIONS				
Date	Description			
10-30-74	Revised Bars 5R & 5T			
6-25-75	Bridge number added to Wingwalls.			
10-3-75	Added Detail of Holes for Incidental Signing.			
12-8-75	Added V-Groove & Revised Bolts on Notes for Incidental Signing.			
5-1-76	Added Supplemental Specifications Section C-C			

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

CONCRETE HANDRAIL BARRIER

ROAD NO.	COUNTY	PROJECT NO.
SR-5	INDIAN RIVER	88010-3510

	Name	Date
Designed by	L.A.L.	3-74
Checked by	J.R.A.	3-74
Quantities by		
Checked by		
Supervised by	S.P.J.	

APPROVED BY: T. [illegible]
State Highway Engineer, Structures

Drawing No. 1 of 1 — Index No. 11407

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-12

NOTE: For Barrier Transition at End Bents see Details below, this sheet

* NOTE: See Superstructe Drawing for actual Dimensions

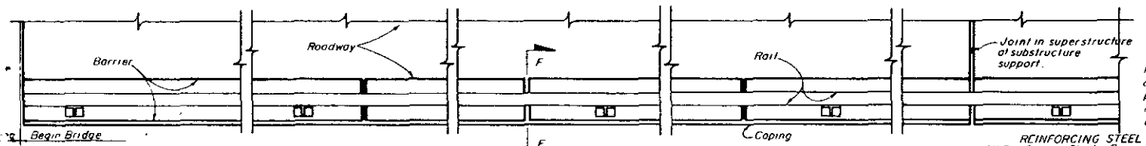
End Bent W. Post — Begin Bridge

For payment Barrier & Rail shall be measured to this point

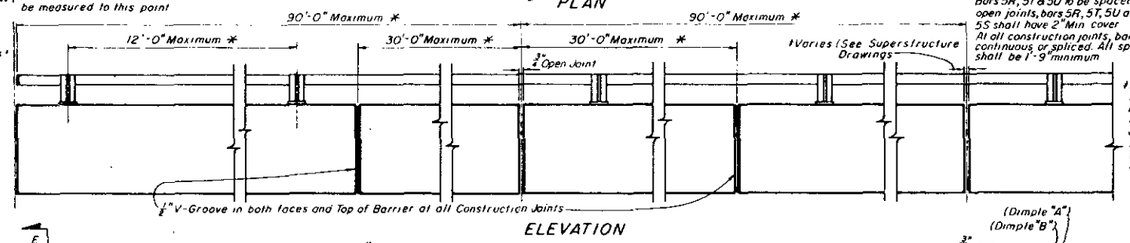
NOTE: There shall be a 1" Min Open Joint at all Substructure Supports

NOTE: Concrete Wing Pos shall be paid for at the Contract Unit Price for Concrete (Substructure) and Reinforcing Steel (Substructure).

NOTE: Rail shall be continuous over a minimum of 3 Posts before splicing



PLAN



ELEVATION

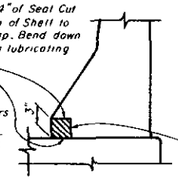
REINFORCING STEEL NOTES

All Reinforcing Steel in Barrier shall be No 5's. Bars 5R, 5T & 5U to be spaced at 9" c.c. At all open joints, bars 5R, 5T, 5U and the ends of bars 5S shall have 2" Min cover. At all construction joints, bars 5S may be either continuous or spliced. All splices in bars 5S shall be 1'-9" minimum

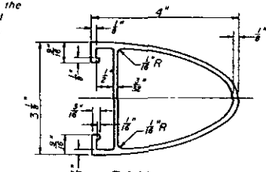
At substructure supports where Roadway Slab is continuous, the Joint in Barrier shall be sealed as shown in Section F-F.

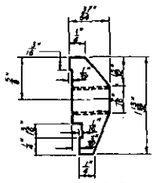
NOTE: All contacting surfaces between the Compression Seal and the concrete shall be thoroughly coated with a lubricating adhesive; see 1975 Supplement.

Provide extra 4" of Seal Cut away all but top of Shell to provide end flap. Bend down and seat with a lubricating adhesive



SECTION F-F

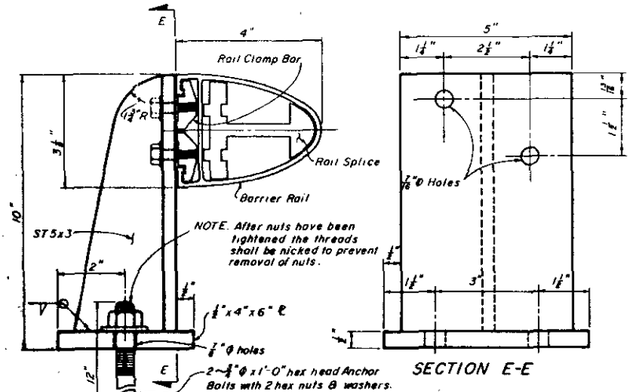




BENDING DIAGRAM

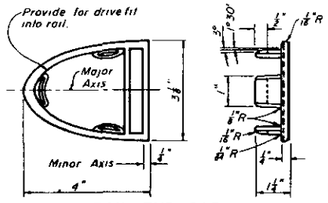
NOTE: All bar dimensions are out-to-out

QUANTITIES: Class II Concrete = 0.07594 Cu Yds. per lineal ft. of Barrier (Based on Roadway Cross Slope of .02 ft/ft.).
REINFORCING STEEL = 20.744 lbs. per linear ft. of Barrier.



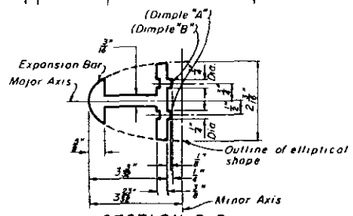
SECTION THRU RAIL

SECTION E-E

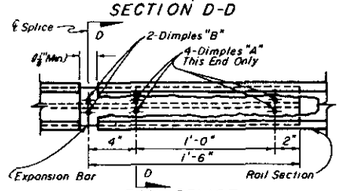


RAIL END CAP

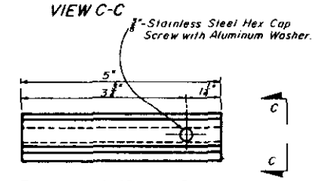
NOTE: At the option of the contractor, the bottom nut shown in "Section Thru Rail" may be used in conjunction with top nut to secure Anchor Bolt to form work during pour



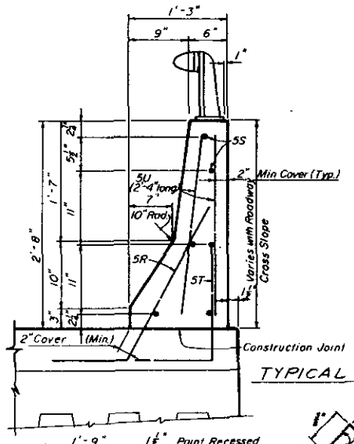
SECTION D-D



RAIL SPLICE



RAIL CLAMP BAR



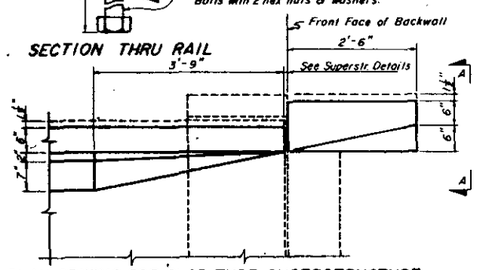
TYPICAL SECTION THRU SIDEWALK BARRIER

GENERAL NOTES

CONCRETE: Class II Concrete shall be used in Barrier.
REINFORCING STEEL: Reinforcing Steel shall be Grade 60.
PAYMENT: Barrier shall be paid for per linear foot, which shall include all Rail, Concrete and Reinforcing Steel. Barrier shall be measured along the centerline of the top surface of the Barrier.
CYLINDER STRENGTH: The Cylinder Strength of the Concrete shall be 3,400 p.s.i. minimum at 28 days.
MARKERS: Markers recording the Elevation shall be placed on top of the Barrier at End Bents. On Bridges longer than 100 ft. one marker shall be placed at each end of the Bridge. On Bridges less than 100 ft. long, one marker shall be placed at one end of the Bridge only. Markers are to be furnished by the Department of Transportation and installed by the Contractor. The Cost of installing the Markers shall be included in the Contract Unit Price for Concrete Barrier.
ANCHOR BOLTS: Anchor Bolts, Nuts and Washers shall be hot dip galvanized in accordance with A.S.T.M. A-123.

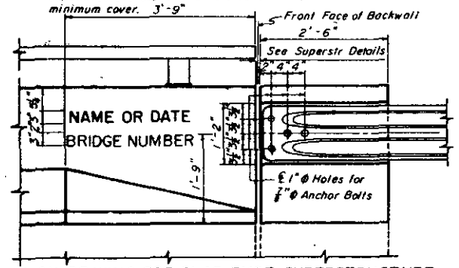
SPECIFICATIONS FOR BRIDGE RAIL

POST: Fabricated wrought aluminum A.S.T.M. B221, alloy 6061-T6 or alloy 6351-T5 with welding using filler wire 4043.
RAIL & RAIL SPLICE: Aluminum; A.S.T.M. B221, alloy 6061-T6 or alloy 6351-T5.
RAIL CLAMP BAR: Aluminum; A.S.T.M. B221, alloy 6061-T6 or alloy 6351-T5.
ANCHOR BOLTS: Anchor Bolts shall be in accordance with A.S.T.M. A-36 or A-307. Anchor Bolts, nuts and washers shall be hot-dip galvanized in accordance with A.S.T.M. Designation A-153.
RAIL END CAP: A.S.T.M. B 26 sand cast aluminum alloy, S G 70A-F (Aluminum Assoc. alloy designation A-356-F).
RAIL INSTALLATION: Rail Post shall be normal to Profile Grade. Posts shall be seated on ¼" thick resilient pads in accordance with Article 932-2.1. The dimension shall be the same as the post base. Rail expansion joints shall occur in the panel between posts on either side of Bridge expansion joints. Rail expansion joints shall be similar to rail splices with provision for movement equal to 1.5 times the bridge joint opening
SHOP DRAWINGS: Complete details and description of materials of the proposed bridge rail shall be submitted by the contractor for the Engineers approval prior to fabrication.

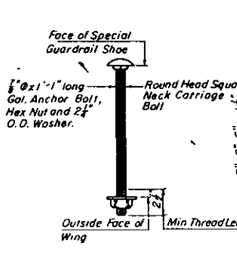


PLAN OF WING FOR SLAB TYPE SUPERSTRUCTURE

NOTE. For Reinforcing Steel in Transition Area on Slab Type Superstructure adjust and field bend as required for minimum cover. 3'-9"

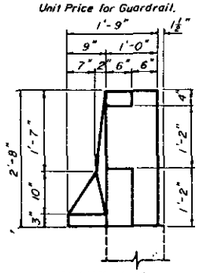


ELEVATION OF WING FOR SLAB TYPE SUPERSTRUCTURE

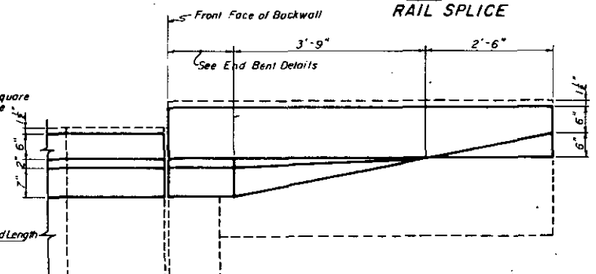


ANCHOR BOLT DETAIL

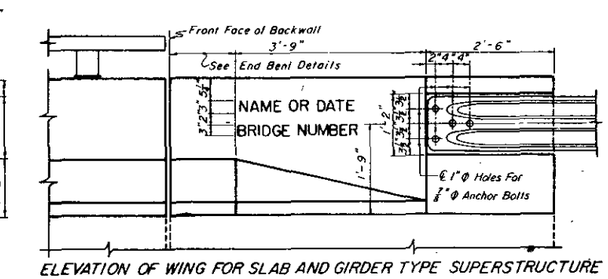
NOTE: Cost of Anchor Bolts to be included in the Contract Unit Price for Guardrail.



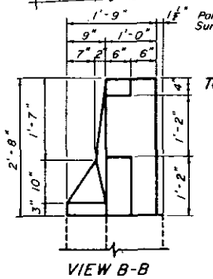
VIEW A-A



PLAN OF WING FOR SLAB AND GIRDER TYPE SUPERSTRUCTURE



ELEVATION OF WING FOR SLAB AND GIRDER TYPE SUPERSTRUCTURE



VIEW B-B

SECTION THRU RECESSED "V" GROOVE TO FORM INSCRIBED LETTERS AND FIGURES

Black Plastic Letters and Figures 3" in height as approved by the Engineer may be used in lieu of Letters and Figures formed by ¼" "V" Grooves. "V" Grooves shall be formed by preformed Letters and Figures.

The Name and Bridge Number to be placed on the Barrier shall be seen on the drivers right when approaching Bridge. The date to be placed on the drivers left when approaching Bridge. The date shall be the Year the Bridge is constructed.

DETAILS OF GUARDRAIL ATTACHMENT AT WING POSTS

NOTE: For Guardrail Shoe See Standard Drawing in Roadway Plans

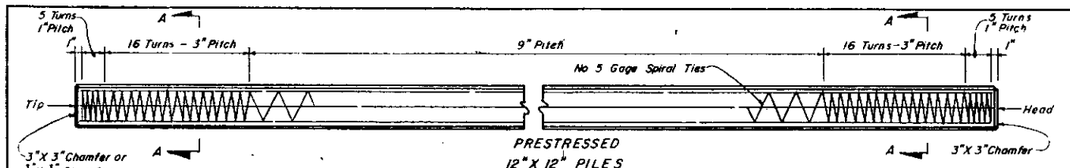
REVISIONS			
Date	Description		
5/30/75	In reference to 1975 Supplement.		
6-29-76	Bridge Number added to Wingwall		

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

SIDEWALK BARRIER

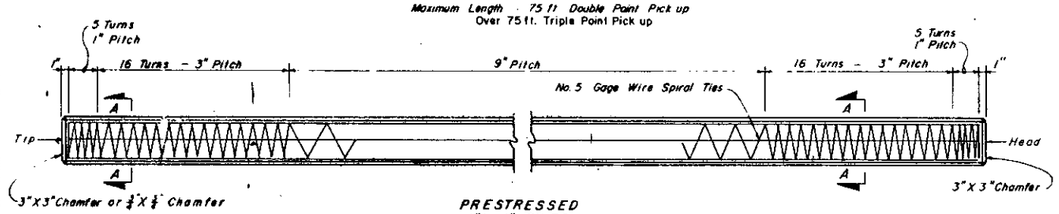
ROAD NO.	COUNTY	PROJECT NO.
SR-5	INDIAN RIVER	88010-3510

	Names	Dates	APPROVED BY
Designed by	WHD	5-74	T. Ball Jr.
Checked by	JLM	5-74	Deputy District Engineer, Structures
Quantities by			
Checked by			
Supervised by	PB		Drawing No. 1 of 1 — Index No. 11,460

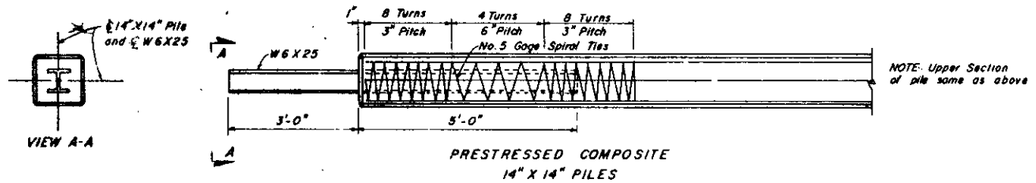


PRESTRESSED
12"X 12" PILES

Maximum Length --- 50 ft. Single Point Pick up
Maximum Length --- 75 ft Double Point Pick up
Over 75ft. Triple Point Pick up

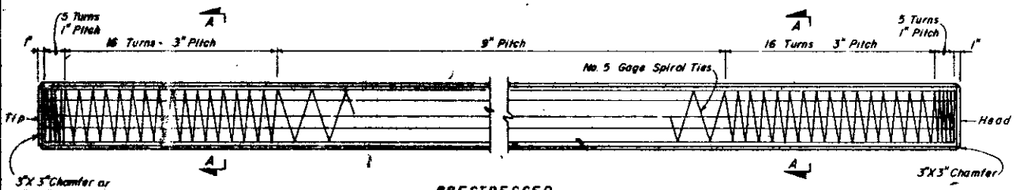


PRESTRESSED
14"X 14" PILES

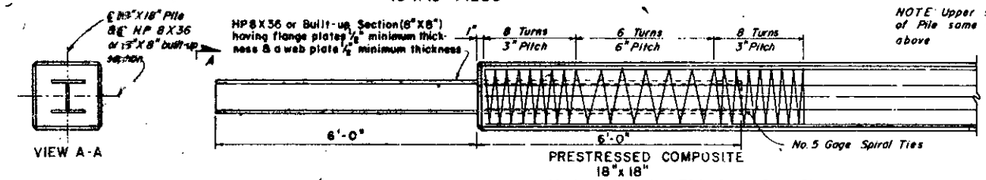


PRESTRESSED COMPOSITE
14" X 14" PILES

Maximum Length --- 60 ft. Single Point Pick up
Maximum Length --- 85 ft. Double Point Pick up
Over 85ft. Triple Point Pick up

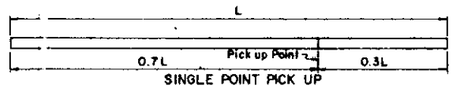


PRESTRESSED
18"X 18" PILES

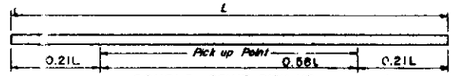


PRESTRESSED COMPOSITE
18"x 18"

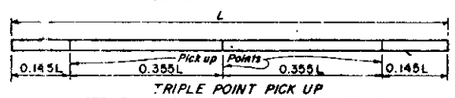
Maximum Length---- 70ft. Single Point Pick up
Maximum Length--- 95 ft. Double Point Pick up
Over 95 ft. Triple Point Pick up



SINGLE POINT PICK UP

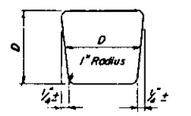


DOUBLE POINT PICK UP

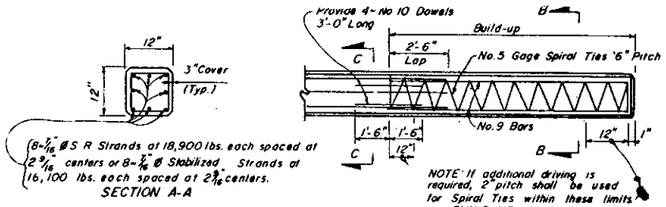


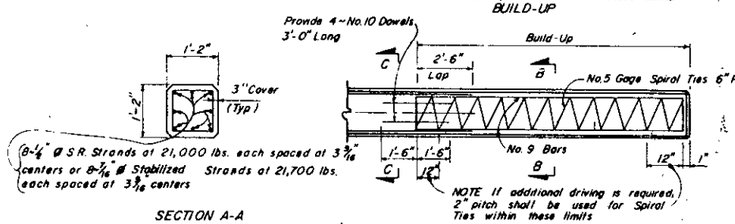
TRIPLE POINT PICK UP

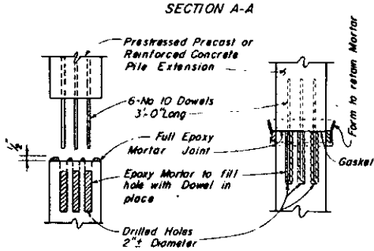
NOTE: Piles shall be marked at pick up points to indicate proper points for attaching handling lines.



TYPICAL PILE SHAPE
FOR MOLD FORMS

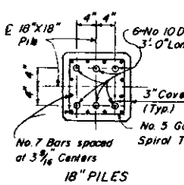






BEFORE BONDING AFTER BONDING

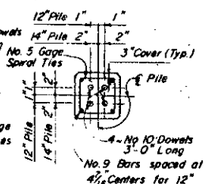
TYPICAL BONDING DETAILS FOR 18" PILE



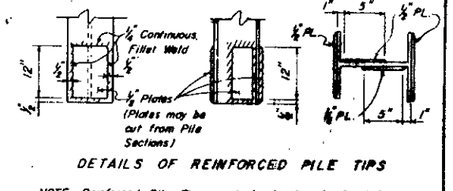
18" PILES

NOTE Spliced Piles may be driven after Splice is two days old.

EPOXY BONDED SPLICE

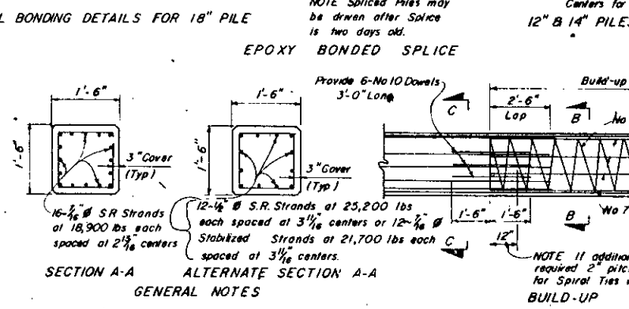


12" & 14" PILES



DETAILS OF REINFORCED PILE TIPS

NOTE Reinforced Pile Tips required only where ordered by the Engineer. At the option of the Contractor and with the approval of the Engineer Commercial Tips may be used in lieu of the Reinforced Pile Tips shown.



OCTAGONAL PILES Prestressed Octagonal Piles of equivalent strength may be substituted for square piles Details of Pile shall be submitted to the Engineer for approval.

SPIRAL TIES Each wrap of spiral shall be tied to at least two corner strands.

MATERIAL FOR SPIRAL TIES. Spirals may be manufactured from stock meeting requirements of any grade of reinforcing steel or hard drawn steel.

PILE CUTOFFS In cutting off Concrete Piles an abrasive saw shall be used to score the Concrete at cut off elevation to the approximate depth of Reinforcing Steel.

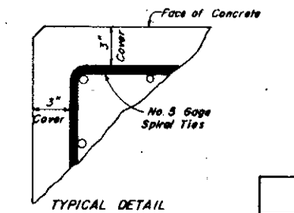
CONCRETE STRENGTH. For Class III Concrete the Cylinder Strength shall be 5,000 p.s.i. minimum at 28 days and 4,000 p.s.i. minimum at transfer of the Prestressing Force.

WEBS: Webs of Wide Flange sections shall be in a vertical position when Composite Pile is cast.

NOTE All Reinforcing Steel shall be Grade 40 or 60.

APPROVAL: Prior Approval in Writing By the Engineer is Required for Reinforced Concrete Build-Up in Excess of 2'-0". This will not be approved for piles in a coastal environment.

DUNNAGE: Place Dunnage under pick up points shown for double pick up. Where Pile Length exceeds that requiring double point pick up, place dunnage at pickup points called for in Triple Point Pick up.



TYPICAL DETAIL
SHOWING COVER DIMENSION

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		8/3

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

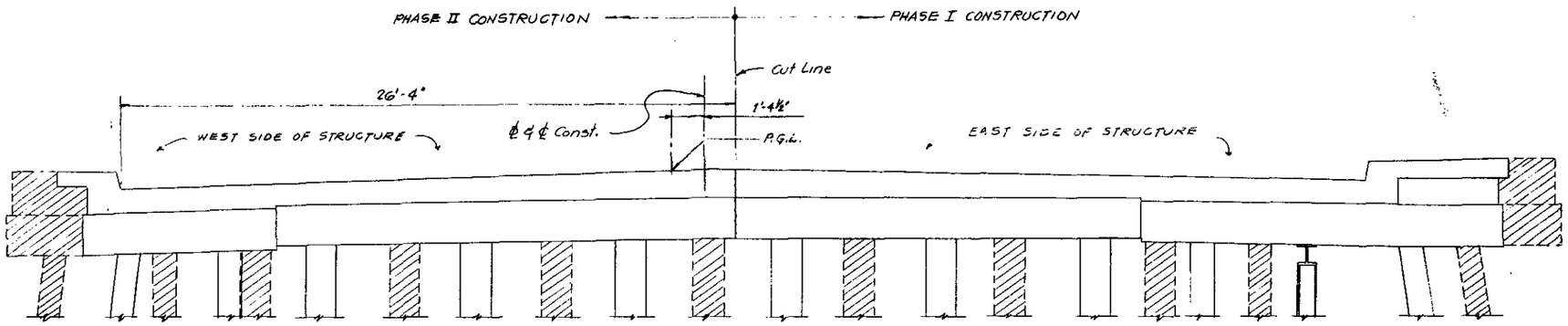
12", 14" AND 18"
PRESTRESSED CONCRETE PILES

REVISIONS				ROAD NO.	COUNTY	PROJECT NO.
Dates	Descriptions			SR-5	INDIAN RIVER	88010-3510
5-5-75 Revised 7-22-75 Change Chamfer 7-28-75 Change Approval Note 10-8-75 ADD TRIPLE POINT PICK UP 9-21-76 Change Lat.-Stress Strands to Stabilized Strands					Names	Dates
				Designed by	S.A.B.	5-75
				Checked by	L.A.L.	5-75
				Quantities by		
				Checked by		
				Supervised by		

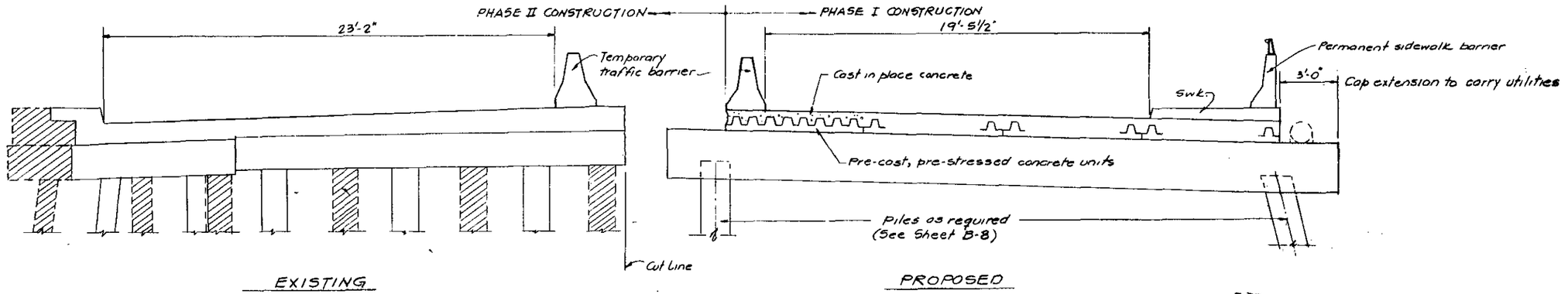
APPROVED:
Deputy Design Engineer Structures

Drawing No.	Index No.
1 of 1	3400

FED. ROAD DIV. NO.	STATE	PROJECT NO.	FISCAL YEAR	SHEET NO.
3	FLA.	88010-3510		B-14



BRIDGE TYPICAL SECTION
(EXISTING)



LOOKING AHEAD WITH STATION

LEGEND

END BENTS

INTERMEDIATE BENTS

CONSTRUCTION SEQUENCE

1. Install temporary traffic barrier to the West of Center Line of Bridge as shown.
2. Remove Eastern section of existing Bridge while maintaining two lanes of traffic in Western portion of Structure.
3. Build Eastern section of proposed structure.
4. Relocate two lanes of traffic to Eastern portion of proposed Structure; remove Western portion of existing Bridge and complete proposed Structure.

CONSTRUCTION SEQUENCE

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION
STRUCTURES

STATE ROAD 5 (U.S.1) OVER MAIN CANAL

REVISIONS		ROAD NO.	COUNTY	PROJECT NO.
Date	Description	S.R-5	INDIAN RIVER	88010-3510

	Name	Date
Designed by	NCR	10/77
Checked by	R.P.T.	1/78
Quantities by		
Checked by		
Supervised by	NCR	

APPROVED BY

Deputy Bridge Engineer, Structures

Drawing No. 11 of 11 | Index No. 12521

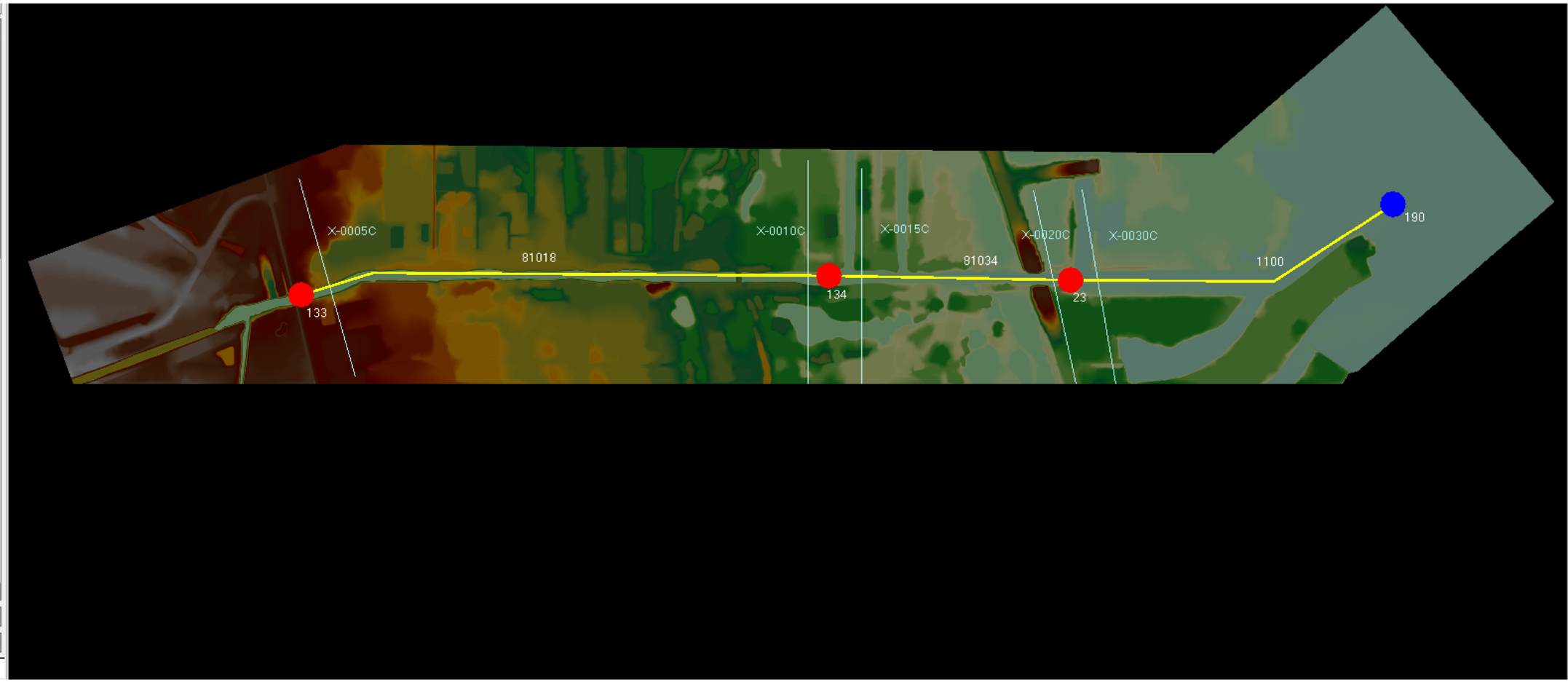
PREPARED BY:
MID-SOUTH ENGINEERING CO.
CONSULTING ENGINEERS
LAUDERDALE BY THE SEA, FLA.

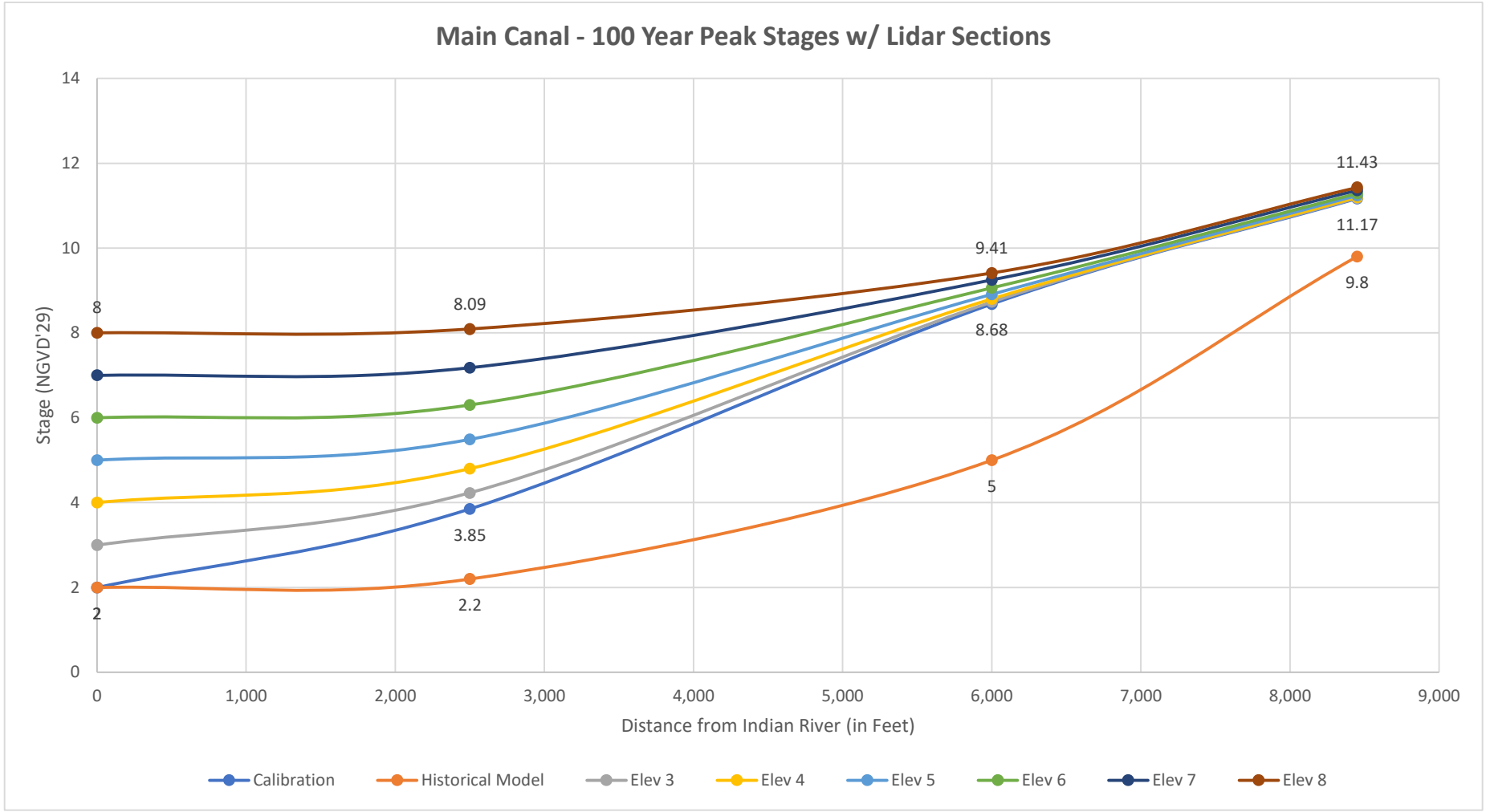
Raster Legend			
	1.50 - 1.63		11.71 - 11.83
	1.64 - 1.76		11.84 - 11.97
	1.77 - 1.90		11.98 - 12.10
	1.91 - 2.03		12.11 - 12.24
	2.04 - 2.17		12.25 - 12.38
	2.18 - 2.31		12.39 - 12.51
	2.32 - 2.44		12.52 - 12.65
	2.45 - 2.58		12.66 - 12.78
	2.59 - 2.71		12.79 - 12.92
	2.72 - 2.85		12.93 - 13.06
	2.86 - 2.99		13.07 - 13.19
	3.00 - 3.12		13.20 - 13.33
	3.13 - 3.26		13.34 - 13.46
	3.27 - 3.39		13.47 - 13.60
	3.40 - 3.53		13.61 - 13.74
	3.54 - 3.67		13.75 - 13.87
	3.68 - 3.80		13.88 - 14.01
	3.81 - 3.94		14.02 - 14.14
	3.95 - 4.08		14.15 - 14.28
	4.09 - 4.21		14.29 - 14.42
	4.22 - 4.35		14.43 - 14.55
	4.36 - 4.48		14.56 - 14.69
	4.49 - 4.62		14.70 - 14.82
	4.63 - 4.76		14.83 - 14.96
	4.77 - 4.89		14.97 - 15.10
	4.90 - 5.03		15.11 - 15.23
	5.04 - 5.16		15.24 - 15.37
	5.17 - 5.30		15.38 - 15.51
	5.31 - 5.44		15.52 - 15.64
	5.45 - 5.57		15.65 - 15.78
	5.58 - 5.71		15.79 - 15.91

Opacity 50

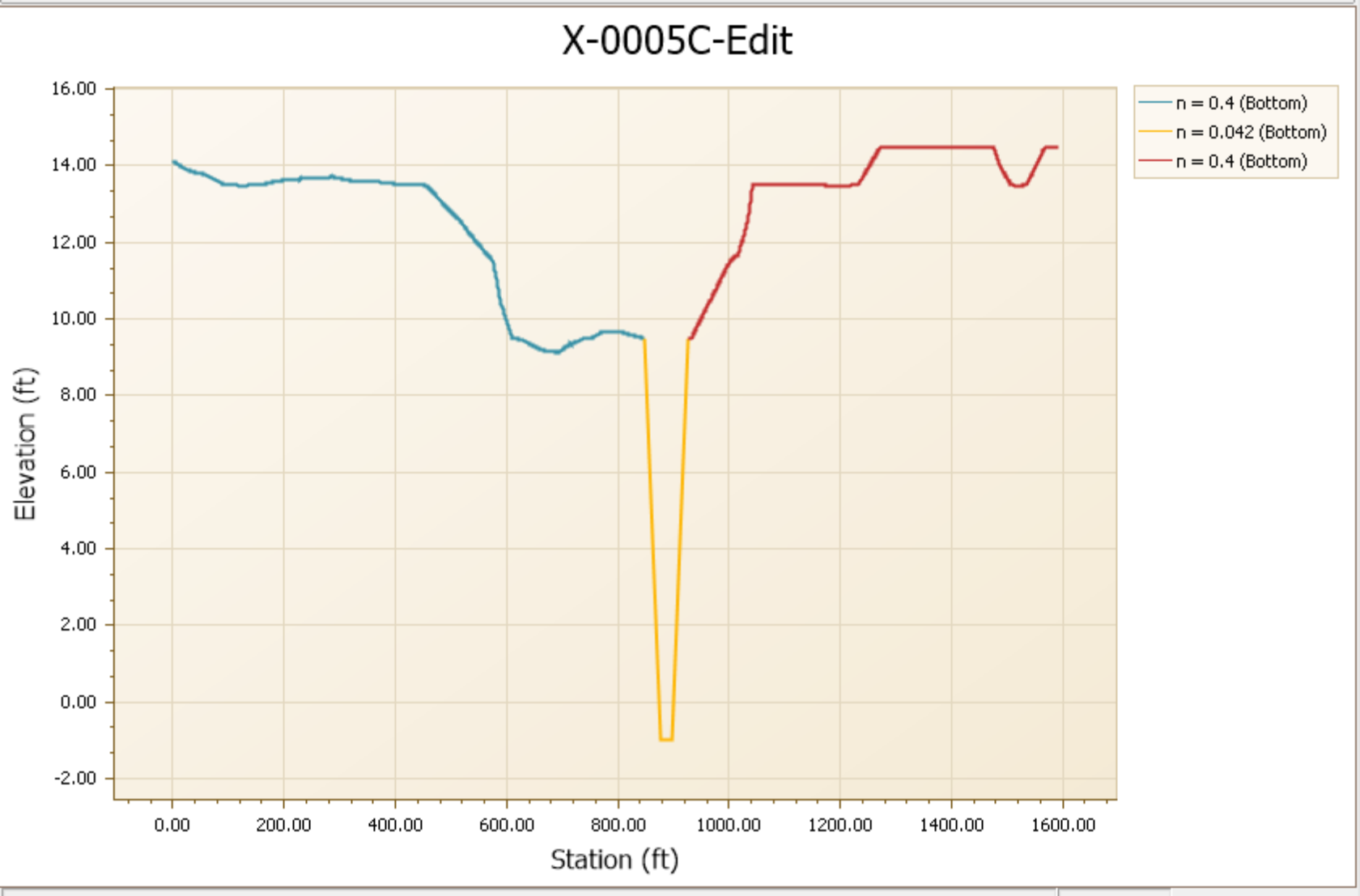
Surface Dynamic Zoom Viewable Legend

General | Raster | Report | Animation | Search |




Main Canal - 100 Year Peak Stages w/ Lidar Sections
Stage (NGVD'29)
Distance from Indian River (in Feet)
0
2
4
6
8
10
12
14
0
1,000
2,000
3,000
4,000
5,000
6,000
7,000
8,000
9,000
8
8.09
9.41
11.43
11.17
9.8
8.68
5
3.85
2.2
2
Calibration
Historical Model
Elev 3
Elev 4
Elev 5
Elev 6
Elev 7
Elev 8

IRFWCD Main Canal 100 Year Peak Stages				
Simulation	**Tailwater Elevation (Node 190)**	**Node 23**	**Node 134**	**Node 133**
Historical Model	2	2.2	5	9.8
Calibration	2	3.85	8.68	11.17
Elev 3	3	4.23	8.73	11.18
Elev 4	4	4.8	8.8	11.2
Elev 5	5	5.49	8.91	11.24
Elev 6	6	6.3	9.06	11.29
Elev 7	7	7.18	9.25	11.36
Elev 8	8	8.09	9.41	11.43


X-0005C-Edit
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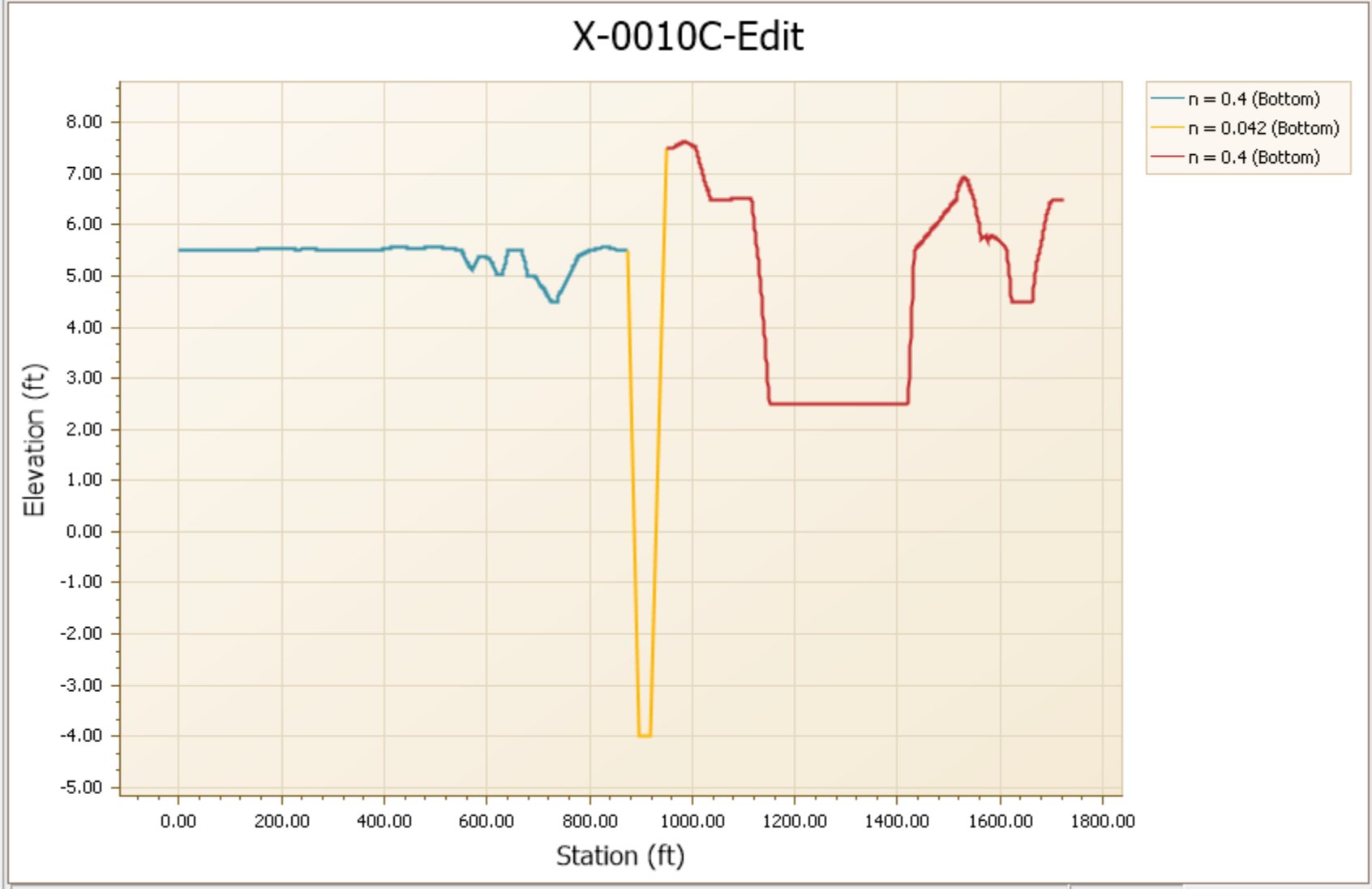
14.00
12.00
10.00
8.00
6.00
4.00
2.00
0.00
-2.00
Elevation (ft)
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
Station (ft)
n = 0.4 (Bottom)
n = 0.042 (Bottom)
n = 0.4 (Bottom)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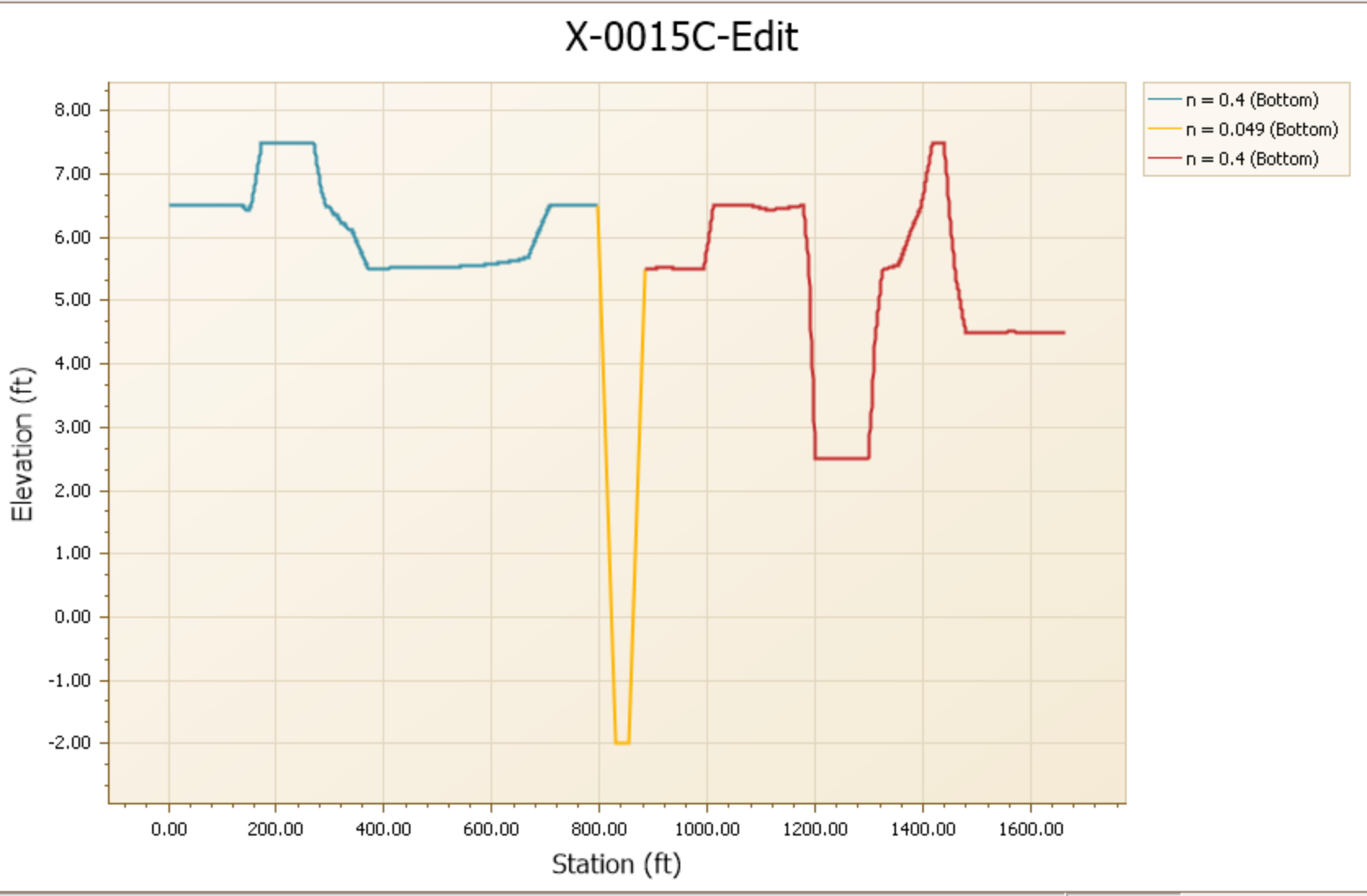
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
1800.00
Station (ft)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n = 0.4 (Bottom)
Elevation (ft)
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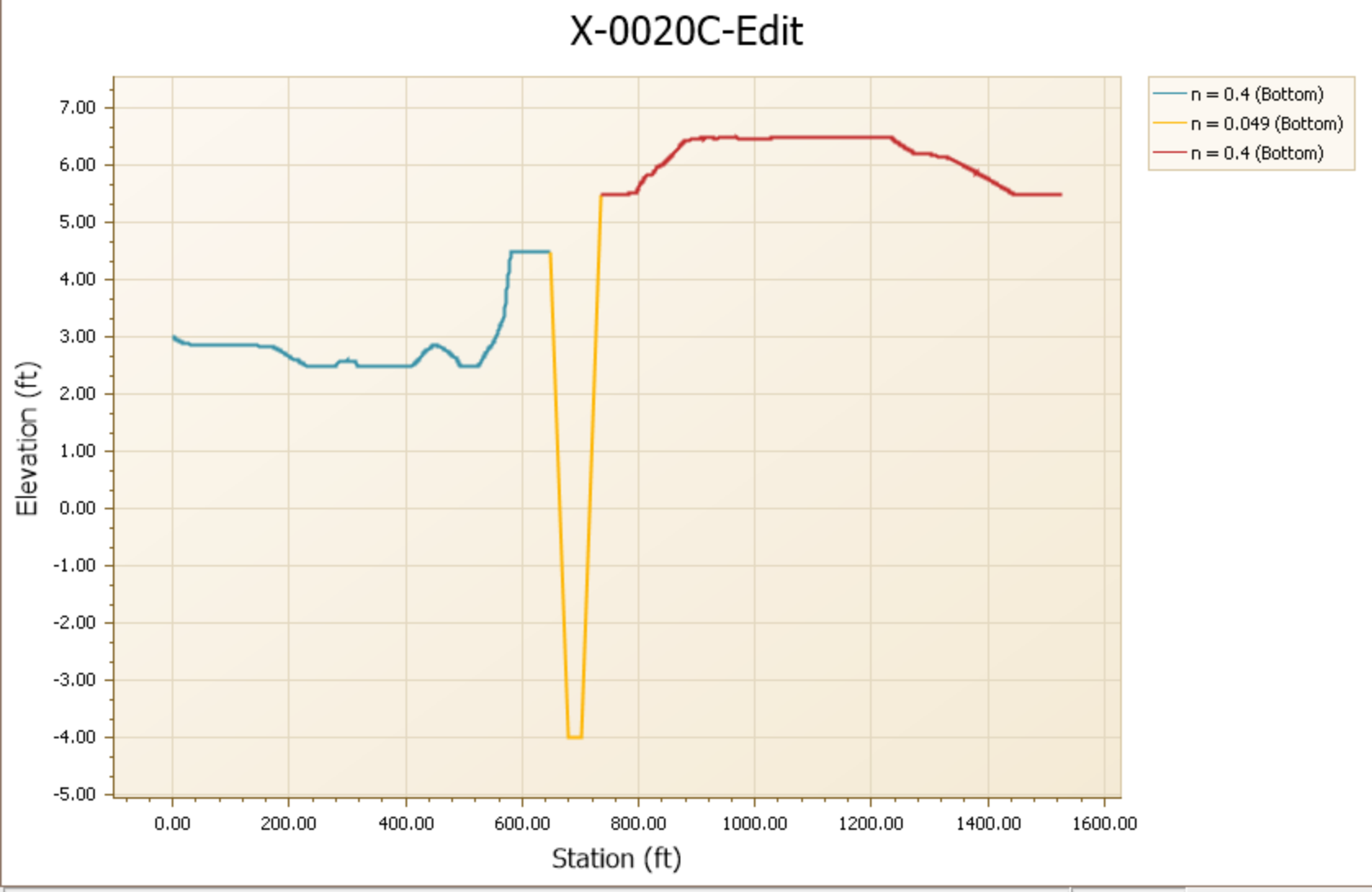
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
Station (ft)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n = 0.4 (Bottom)
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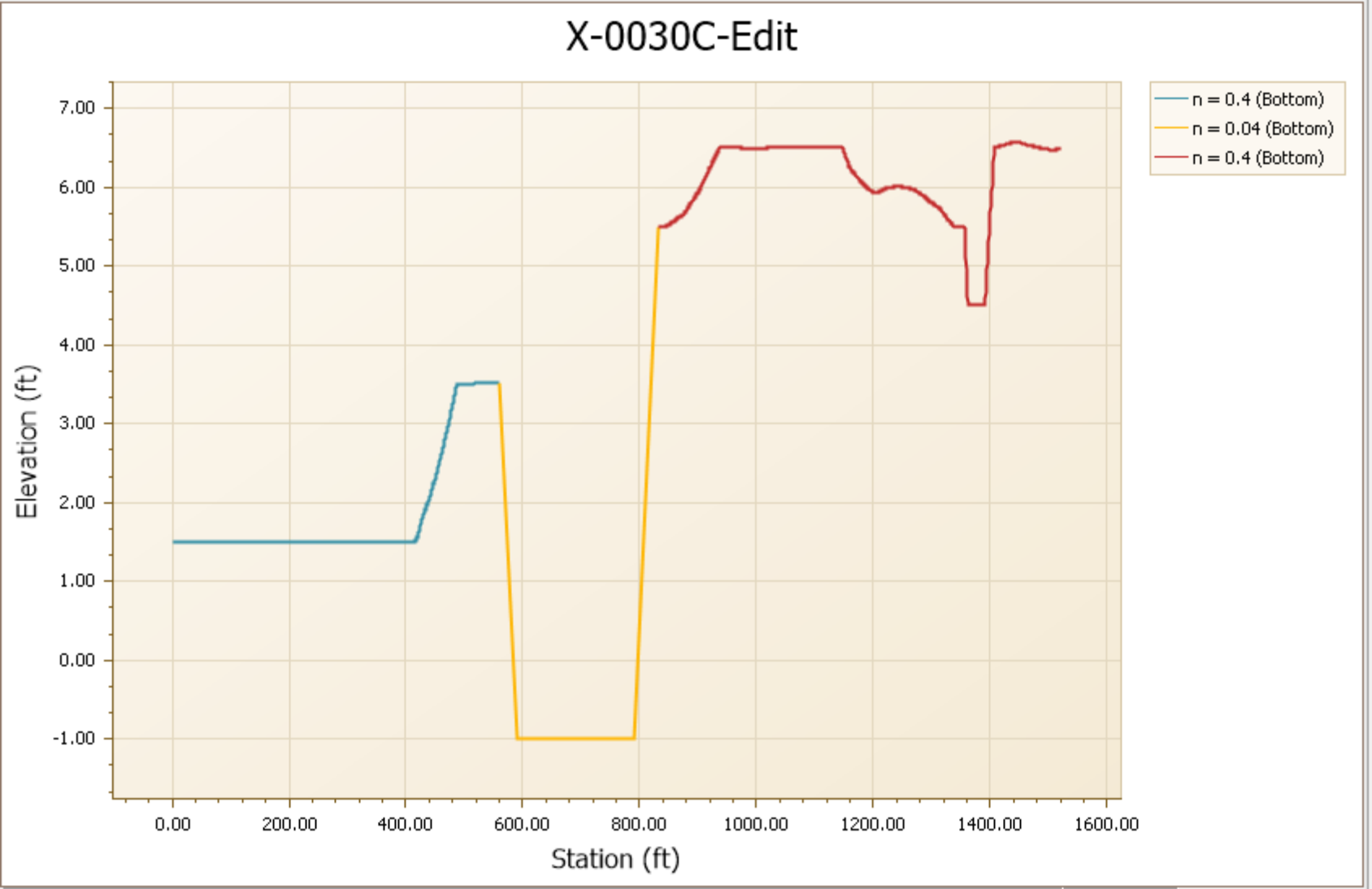
6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
-2.00
-3.00
-4.00
-5.00
Elevation (ft)
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
Station (ft)


X-0030C-Edit
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Elevation (ft)
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6.00
5.00
4.00
3.00
2.00
1.00
0.00
-1.00
0.00
200.00
400.00
600.00
800.00
1000.00
1200.00
1400.00
1600.00
Station (ft)

APPENDIX F-7

INDIAN RIVER FARMS
WATER CONTROL DISTRICT

EVALUATION AND UPDATING OF THE
"PLAN OF RECLAMATION
WORKS OF IMPROVEMENT"

AUGUST 1988
MAY 1990 (REVISED)
JULY 1990 (REVISED)

CARTER ASSOCIATES, INC. /
WILLIAMS, HATFIELD & STONER, INC.

CARTER ASSOCIATES, INC.

CONSULTING ENGINEERS AND LAND SURVEYORS

1708 21st STREET
VERO BEACH, FLORIDA 32960-3472
772-562-4191
772-562-7180 (FAX)

MARVIN E. CARTER, P.S.M.
DEAN F. LUETHJE, P.E. (FL & NC)

JOHN H. BLUM, P.E.
FRANK S. CUCCURESE, P.S.M.
DAVID E. LUETHJE, P.S.M.
GEORGE SIMONS, P.E.
STEVE SNOBERGER, P.E.
PATRICK S. WALTHER, P.E.

MEMO

TO: Marvin E. Carter, Michael O'Haire, and John Amos

FROM: George A. Simons
THROUGH: Dean F. Luethje

RE: IRFWCD – Stormwater Discharge 2″/24 Hr. Limitation Clarifications

DATE: February 29, 2000

CAI requests that the supervisors formally accept the clarifications noted below. The clarifications will assist all stormwater design engineers working within the district as well as the city and county engineers reviewing plans as to the appropriate methodology for meeting the 2″ rule.

1. The design storm event is a 25 yr-24 hour event. The storm event rainfall hydrograph shall be modeled using either the Santa Barbara Urban Hydrograph Method or the S.C.S. Unit Hydrograph Method. The Rational Hydrograph Method shall not be used.

2. The 2-inch limitation applies to any 24-hour period from hour 0 through hour 72. (Provide hourly accumulative discharge volume from hour 0 through hour 72.)

3. The peak stage elevation for the project's receiving water shall be determined using the results of CAI/Williams, Hatfield and Stoner study (IRFWCD Study) titled "Evaluation and Updating of the Plan of Reclamation Works of Improvement dated August 1988 (July 1990 revised) as follows:

   A. Identify the IRFWCD System Junction number(s) which are the closest to the specific project site. (Refer to the District Maps, i.e. Figure 6.4.)

   B. Identify the maximum computed stage (NGVD) for the Junction selected in part 3A from Appendix C, 25yr - design storm. (Refer to the Summary Statistics for Junctions as listed in Appendix C.)

C. The time (hour) of the maximum stage is estimated by relating the time of occurrence from the study (72 hr. event) peak stage to the 24-hour storm model as follows:

District Study	Proposed Project
Hr. 48	Hr. 0
Hr. 60	Hr. 12
Hr. 72	Hr. 24
Hr. 96	Hr. 48
Hr. 120	Hr. 72

D. The time/stage elevation relationship of receiving water can be estimated by correlating the project site location with the IRFWCD study results. Twenty (20) junction locations are listed in the IRFWCD Study Appendix C, under the "Time History of H.G.L.". The time/stage relationship of the junctions are noted from Hr. 36 through Hr. 96. The project's receiving water time/stage relationship can be estimated by interpolating/extrapolating between the adjacent junction nodes.

Note: CAI is currently developing a time stage relationship for each of the (20) nodes to be used in modeling the 25 yr.- 24 hr. storm event.

E. All District outfall canals have gate structures which control the water elevation upstream of them at elevation 15.5± (NGVD). These gates can be opened during a rainfall event which may temporarily result in a water elevation less than 15.5. However, we recommend that all project sites discharging upstream of a gate structure be modeled at a minimum elevation of 15.5.

4. Within the project site, all flood plain storage must be maintained from pre to post development. Predevelopment calculations shall be based on existing site conditions (NGVD) as determined by a Florida Registered Land Surveyor. Post development calculations shall be based on the design grades. The 100 yr. flood elevation shall be based on the results of the IRFWCD study calculated using the same methodology as noted in number 3 above.

CARTER ASSOCIATES, INC.

CONSULTING ENGINEERS AND LAND SURVEYORS

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DAVID E. LUETHJE, P.S.M.
GEORGE SIMONS, P.E.
STEVE SNOBERGER, P.E.
PATRICK S. WALTHER, P.E.

MEMO

TO: Marvin E. Carter, Michael O'Haire and David Gunter

FROM: George A. Simons, P.E.

THROUGH: Dean F. Luethje, P.E.

RE: IRFWCD – Clarifications Regarding:
Flood Plain Cut and Fill Policy for the 100 Year Storm Event and 2″/24 hour Discharge Limitation for the 25 Year Storm Event Within Development Sites and Affidavits of Exemptions (A.O.E.)

DATE: May 31, 2005, Second Revision of August 17, 2005

CAI requests that the supervisors formally accept the clarifications noted below. The clarifications are based on the results of a meeting held on May 20, 2005, in which the methodology of calculating the cut and fill balance within flood plain areas was discussed with county engineers and local consulting engineers. Additional clarifications to the 2″/24 hour policy were also discussed. The clarifications will assist all stormwater design engineers working within the district as well as the city and county engineers reviewing plans as to the appropriate methodology for meeting the flood plain cut and fill and the 2″/24 hour limitation policies.

A. Flood Plain Calculations and Compensation for a Development Site – 100 Year Storm Event

1. Within the project site, all flood plain storage must be maintained from pre to post development. Predevelopment calculations shall be based on existing site conditions (1929 NGVD) as determined by a Florida Registered Land Surveyor. Post development calculations shall be based on the design grades. The design engineer must select the 100 year flood elevation from the FIRM maps or on the results of the IRFWCD study.

2. The flood plain encroachment (fill) is based on the volume of proposed fill between the existing ground, (or the wet season water table if a lake or wetland is present) and the 100 year flood elevation. Fill above the 100 year elevation is not displacing flood waters and therefore not included.

3. The volume of flood plain compensating storage (cut) is based on the volume of cut between the existing ground and the wet season water table. If a wet detention system is used for the flood plain storage compensation, then the control elevation of the bleed down weir shall be used as the lower elevation of the cut volume calculations. The upper elevation of the compensating storage volume calculations is the ground elevation or the 100 year flood elevation if it is below the existing ground elevation.

CAI Serving Florida Since 1911

4. Flood plain compensating storage (cut) calculations, which include volume above the 100 year flood plain elevation, are not allowed, regardless if there is an onsite peak stage above the 100 year flood plain elevation at some point during the computer modeling of the event.

5. The flood waters within the District canals must be allowed to flow into the development's flood storage area when the District's canal system is above the flood storage area water levels within the development. Therefore, the stormwater outfall connection must meet the following criteria:

   a. Flap gates are not allowed.
   b. The pipe connections shall be of a large enough diameter that the head loss is minimal and flows maximized. Small diameter pipes designed to meet the 2'' limitation rule will restrict the flows during a flood event and therefore, are not allowed. Weirs/Orifices shall be utilized. The typical overflow structure which has a restrictive orifice(s) for the 2'' limitation will include a larger weir at the onsite 25 year storm elevation. During storm events larger than the 25 year storm, the larger weir will allow the flood waters from the District canals to move freely into and out of the development storage area. It is understood that below the 25 year storm elevation the inflow from District canals may be restricted to the 2" limitation orifice.

6. An offsite compensating flood storage area may be utilized to balance the cut and fill for a project in which the onsite flood storage is inadequate under the following conditions:

   a. The offsite flood storage area is located within the same sub-lateral drainage basin.
   b. The offsite flood storage area has approximately the same 100 year flood elevation (0.1'+/-).
   c. The offsite flood storage area must be encumbered with development restrictions to preserve the flood storage for the proposed project. The proposed project shall include home owners' association duties to preserve and maintain the offsite area in regards to function and appearance. In cases where the offsite flood storage area is itself a development, then the home owners association which covers the site must be required to preserve and maintain the site through deed restrictions.

7. Previously approved projects can not be utilized to compensate for flood storage for future developments.

B. <u>2''/24 hour Discharge Limitation Clarifications – 25 Year Storm Event</u>

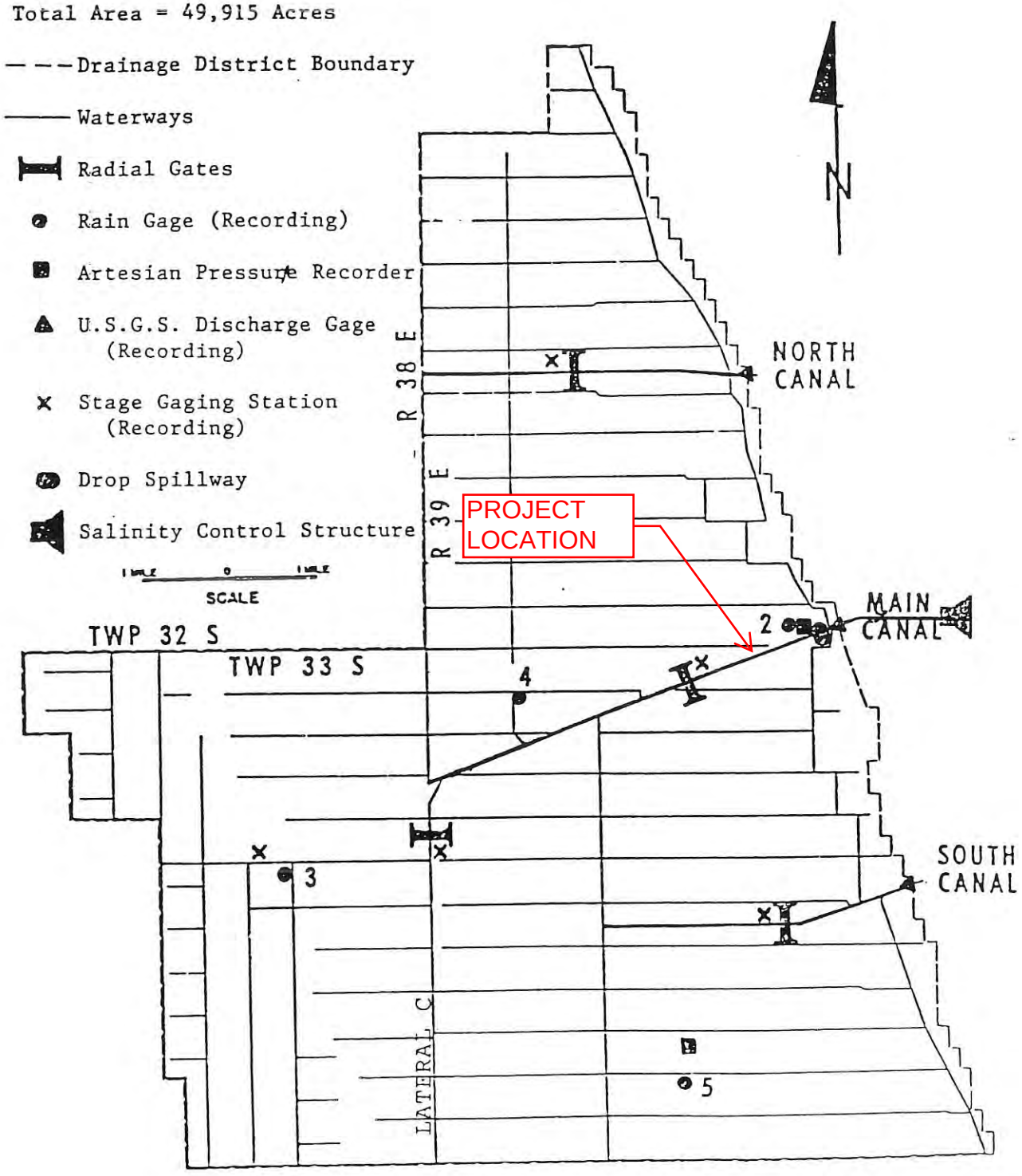
1. The 2''/24 hour Volume Discharge Limitation design storm is the 25 year – 24 hour event with the discharge analyzed for 72 hours.

2. Each site is allowed 2''/24 hour of net positive discharge during a storm event for any given 24 hour period following a storm event. Some projects may experience a backflow of water from the District's canal system (receiving water) onto the site during a storm event. This flow may result in a negative discharge of runoff volume onsite, (i.e. the site's rainfall runoff plus the backflow from off site flood waters results in net negative discharge due to the flood storage). The 2''/24 hour criteria does not apply during the discharge of the (received from District canals) offsite flood waters. However, when the stormwater system has discharged the off site flood waters and the discharge of runoff generated from onsite begins, then the

2″/24 hour limitation is required. Additional flow to "catch up" with the discharge volume allowance lost during the time of negative flows is not allowed. Each 24 hour period must stand alone to meet the 2″/24 hour limitation criteria. If the overflow weir elevation of a lake is set at the 25 year storm elevation for the development, then flows in and out above this elevation could be greater than the 2"/24 hour criteria.

3. Affidavit of Exemptions (A.O.E.) projects must limit the number of discharge points into the I.R.F.W.C.D. sub-lateral canals by incorporating collector ditches/swales into the design. The collector ditches will convey the discharge from the individual lots to a common outfall to the district canals. One (1) outfall is preferred per development, two (2) may be allowed, with requests being reviewed on a case by case basis. Existing conditions or site geometry will be considered.

4. Affidavit of Exemptions (A.O.E.) projects which include a platted road shall include a stormwater system designed to limit the discharge to 2″/24 hour from the platted road drainage basin. Platted lots are not required to meet the 2″ limitation since only minimal increased discharge volume is anticipated. However, if the platted road drains to a stormwater lake which is shared with the platted lot, then the lot must be included in the 2″/24 hour limitations calculations, and the lake must be constructed when the road is constructed.



WATERSHED MAP

INDIAN RIVER FARMS WATER CONTROL DISTRICT

PROJ. NO. 1920.01

FIGURE 3.10

WILLIAMS HATFIELD & STONER
CARTER ASSOC.

From: Jerome Saval
To: George Simons
Cc: William Evans
Subject: Aviation Blvd. - Pond Siting for PD&E
Date: Monday, February 12, 2024 4:52:33 PM
Attachments: image988165.png
image087845.png
image339844.png
image563210.png
image301412.png

Thank you for taking my call today regarding the IRFWCD discharge criteria on the Aviation Blvd PD&E project.
Per our telephone today to confirm the discharge criteria, the discharge into the IRFWCD canal cannot exceed 2 in per 24 hours from the new roadway right-of-way and 4 in per 24 hours from the existing roadway right-of-way for a 25-year/24-hour storm within a 72-hour period.

Jerome Saval, PE, CFM
Chief Engineer
2035 Vista Parkway
West Palm Beach, FL 33411
561.687.2220 | **561.472.8131** (direct) | **561.239.5980** (cell)

APPENDIX F-8

From: William Evans
To: Nagole, Vandana; Vater, Robert; Magar-Chhabra, Rupa; Jerome Saval
Subject: Call Notes: FM 441693-1: SR-5 at Aviation Blvd- PD&E - Proposed Ponds Discussion
Date: Monday, August 14, 2023 2:09:39 PM
Attachments: image765414.png
image714273.png
image629274.png
image832619.png
image608902.png

Good afternoon:
This email is a brief documentation of our call today. Please send any comments or revisions to me.

Meeting: Monday, August 14, 2023 11:30 AM-12:00 PM
Attendees: Nagole, Vandana; Vater, Robert; Magar-Chhabra, Rupa; William Evans, Jerry Saval
Subject: FM 441693-1: SR-5 at Aviation Blvd- PD&E - Proposed Ponds Discussion

The purpose of the call was to obtain input from the District 4 Drainage department related to the alternative pond sites and to share information the team recently obtained from the Indian River Farms Water Control District (IRFWCD). The pond locations for the PD&E Alternatives 1, 2, 7 and 8 were discussed.
A brief discussion of the 12 pond sites occurred and open discussion followed.

- The ponds will be dry ponds to meet the permitting and airport requirements. The outfall will be into the Main Canal. Floating petroleum separators in the pond/outfall location would be desired to reduce opportunity for floating contaminates or debris to enter the canal. There is a salinity structure of sheet pile located ½ mile to the east.
- The team shared input from District Four R/W which noted:
  - The R/W office will submit their comments on the proposed pond sites to assist with the pond siting process.
  - The pond "B" sites should be modified to allow for property access. The team will split pond B to maintain access along 32nd Street for Alternatives 1 and 7.
  - Pond C may have less R/W impacts, however the review is not complete at this time.
- The D4 Drainage members inquired about:
  - Potential outfall and pipe locations for pond sites B and C as they are further from the canal. Piping would run along US-1 or along 13th Avenue to the canal which may require additional R/W or reconstruction of 13th Avenue.
  - They noted the easiest operation and maintenance location is pond site A as it is closest to the canal and the parcels do not have existing buildings to be removed or relocations to occur.
  - Pond A is their preferred location.
- The team shared recent pond input from IRFWCD who noted:
  - The original stream flowed generally northeast from the Main Canal bridge location towards the intracoastal waterway. This route is through the pond site A location.
  - There is a hard pan soil below grade that reduces the percolation in some locations and that ponds located at pond sites B or C may encounter that hard pan and may require exfiltration trenches under the ponds to dry them out in the required timeframe. The drainage district noted the could be a possibility of horizontal flow

through the soils, however the ponds are shallow and will dry out between storms. If soil analysis conducted in Design phase warranted seepage mitigation, sheet pile or another method could be investigated during design.
    - Pond A is located where the prior stream was and the hard pan would not be expected in that location and more suitable soil may be in that location and less chance of unsuitable soil (aka muck) below grade.
- The team shared recent Main Canal Bridge input from IRFWCD:
    - The canal R/W includes the pavement for 30th Street however the IRFWCD recommended a search for the legal documents to identify the canal/roadway easement that may exist.
    - The IRFWCD is running the storm surge model to identify if additional bridge clearance is required for major storm/flood events. The will be requesting sacrificial piles upstream of the bridge piers to assist canal debris clearing operations and protect the bridge.
    - The IRFWCD requested 15 foot maintenance easement along the four corners of the US -1 bridge and a 15 foot access easement from 29th Street to the canal, which requires R/W acquisition.
- The type of permits required were discussed.
    - IRFWCD R/W permit, stormwater permit, dredge and fill permit.
    - St. Johns Water Management has some environmental jurisdiction of the canal east of the bridge related to the manatees. A Natural Resource Evaluation is required due to the Manatee.

The meeting concluded at 12:07 PM.

William Evans, PE, AICP
PD&E Market Leader
2035 Vista Parkway
West Palm Beach, FL 33411
561.687.2220 (office) | **561.209.7774** (direct)

APPENDIX F-9

MEETING NOTES
POND SITING MEETING 3
Identify Preferred Pond Alternatives

August 30, 2023

Project Name: SR 5 / US-1 at Aviation Blvd PD&E Study **WGI Project:** 02217003.00

Client Name: FDOT District 4 **Client Contract:** CAI127 **FDOT FM:** 441693-1-22-02

Attendees: Vandana Nagole, Cesar Martinez, Bill Evans, Robert Winslow, Linda Hess, Fernando Ascanio, James Hughes, Jerome Saval, Jim Pepe, Daniel Marwood, Lynn Kelley, James Poole, Victor Ramos, Ann Broadwell, Christina Brown, Robert Vater

The purpose of the meeting was to discuss the pond sites, evaluation matrix and determine the preferred pond location. The proposed ponds for Alternatives 1, 2, 7 and 8 were reviewed. Each alternative had 3 proposed pond sites (A, B and C) evaluated and only one pond site is needed per alternative. The sites are dry ponds that must dry in the required 72 hours. The following topics were discussed.

General Comments:

- The evaluation matrix did consider getting water from the ponds to the outfall location. The number of property owners per pond site could be challenging when purchasing the right of way for the ponds. Indian River County does own 3 parcels off of US 1. The intent for the public alternatives workshop is to show 1 pond site per alternative.

Pond Site A for Alternatives 1 and 7

- The Indian River Farms Water Control District (IRFWCD) did like Pond A the best since the site is located closest to the outfall site. The outfall canal is maintained by IRFWCD.
- Despite the cultural resource findings within Pond Site A 1, the evaluation matrix rated the site highest.
- The cultural resources related to the Old Vero Site 8IR9 and the historic structures were discussed and preliminary graphics of the cultural resource investigation were reviewed. The Old Vero Site (8IR9) has an area that includes portions of Pond Site A. Cultural resource consultant, Janus Research, explained that the Site 8IR9 boundary is an extrapolation from findings in other areas west and south of Pond Site A. No archeological testing was conducted in the area of pond site A during the Site 8IR9 investigation.
- Pond Site 1A and 7A are recommended and the team advised that interval testing should be conducted to determine the archeological determination. The archeological testing would be conducted at 25 meter intervals along with auger drills.
- It was noted that the pond site would be shallow since they are dry ponds. If archeological resources were found in Pond Site 1A or 7A, they could be deep as previously found on the Vero Site at other locations. Therefore, it is possible that the pond will not impact the cultural resource, if they were located deep enough.
- There has been a lot of interest in the Vero Man Site so it could be a concern of the local community.
- **Pond 1A and 7A are the recommended** pond sites and complete additional testing to clear the site. If testing can't be completed to clear Pond A before the public workshop Pond C will also be shown.

Pond Site B

- Pond Sites 1B and 7B is comprised of two smaller ponds that are split by a local road. Pond B sites that were split will be renamed #B South and #B north.
- **Pond Site 2B was recommended for Alternative 2.**
- Pond site 8B was discussed to be reshaped to utilize the 3 parcels between US 1 and the proposed pond site. After the meeting the size of the parcels along US 1 did not have sufficient acreage to hold the revised Pond B, therefore Pond B was not revised.

Pond Site C

- Pond C has existing old cabin structures that are mostly abandoned. Janus, the cultural resource consultant, noted the structures lack building integrity and likely would not be found significant by the SHPO due to poor structural condition. FDOT noted the SHPO did not allow abandoned homes to be removed on another project.
- Pond 1C and 7C were the second choice, if Pond A did not move forward.
- **Pond 8C was recommended for Alternative 8.**

Public Workshop Exhibit

The pond sites would be shown on a separate exhibit with the four alternatives with ponds shown on one exhibit board.

- Alternative 1 – Pond 1A
- Alternative 2 – Pond 2B
- Alternative 7 - Pond 7A
- Alternative 8 – Pond 8C

If the archeological investigation is not conclusive, the exhibit could show 2 pond sites for Alternatives 1 and 7, with notes on the graphic that only pond site A or C is needed.

APPENDIX F-10

Memo

To: William Evans, PD&E Market Leader, WGI
From: Alison Elgart and Rudy Westerman, Janus Research
Date: August 22, 2023
Re: Pond Siting Desktop Analysis for SR 5/US 1 at Aviation Boulevard, Indian River County, Florida

At the request of the Florida Department of Transportation, District Four (FDOT) Janus Research conducted a desktop analysis of nine proposed pond sites associated with the SR 5/US 1 at Aviation Boulevard, Indian River County project (FM #441693-1-22-02). The project area is east of the intersection of SR 5/US 1 and Aviation Boulevard/32nd Street in Vero Beach (Figure 1). The proposed pond sites are located in Section 35 of Township 32 South, Range 39 East on the Vero Beach (1949 Photorevised [PR] 1983) USGS quadrangle map. The purpose of this pond siting analysis was to identify proposed pond sites that have not been previously surveyed, determine the location of any previously recorded cultural resources within or adjacent to the pond siting alternatives, determine archaeological site probability, and identify any potential historic resources.

The study area for archaeological resources included the footprint of the proposed ponds and directly adjacent to it. The study area for historic resources also included the footprint of each pond site as well as a 150-foot buffer to account for potential visual effects.

Methods

An archaeological and historical literature and background information search pertinent to the proposed pond site locations was conducted to determine the types, chronological placement, and location patterning of cultural resources near the pond site locations. This included a search of the Florida Master Site File (FMSF) data[1], historic maps and aerials, and unpublished CRM reports. Archaeological sites within one mile of the proposed ponds, as well as land use history and environmental variables known to be associated with precontact and historic period archaeological sites were also reviewed to help assess the potential for archaeological sites. The Indian River County property appraiser data was reviewed to identify potential historic resources.

[1] The FMSF serves as an archive and repository of information about Florida's recorded cultural resources. It represents an inventory of resources for which available information exists and describes their condition at a particular point of time. Because the inventory of resources is not all-inclusive on a statewide basis, gaps in data may exist. The FMSF is an important planning tool that assists in identifying potential cultural resources issues and resources that may warrant further investigation and protection. It can be used as a guide but should not be used to determine the official position of the Florida Division of Historical Resources (FDHR) or State Historic Preservation Officer (SHPO) regarding the significance of a resource.

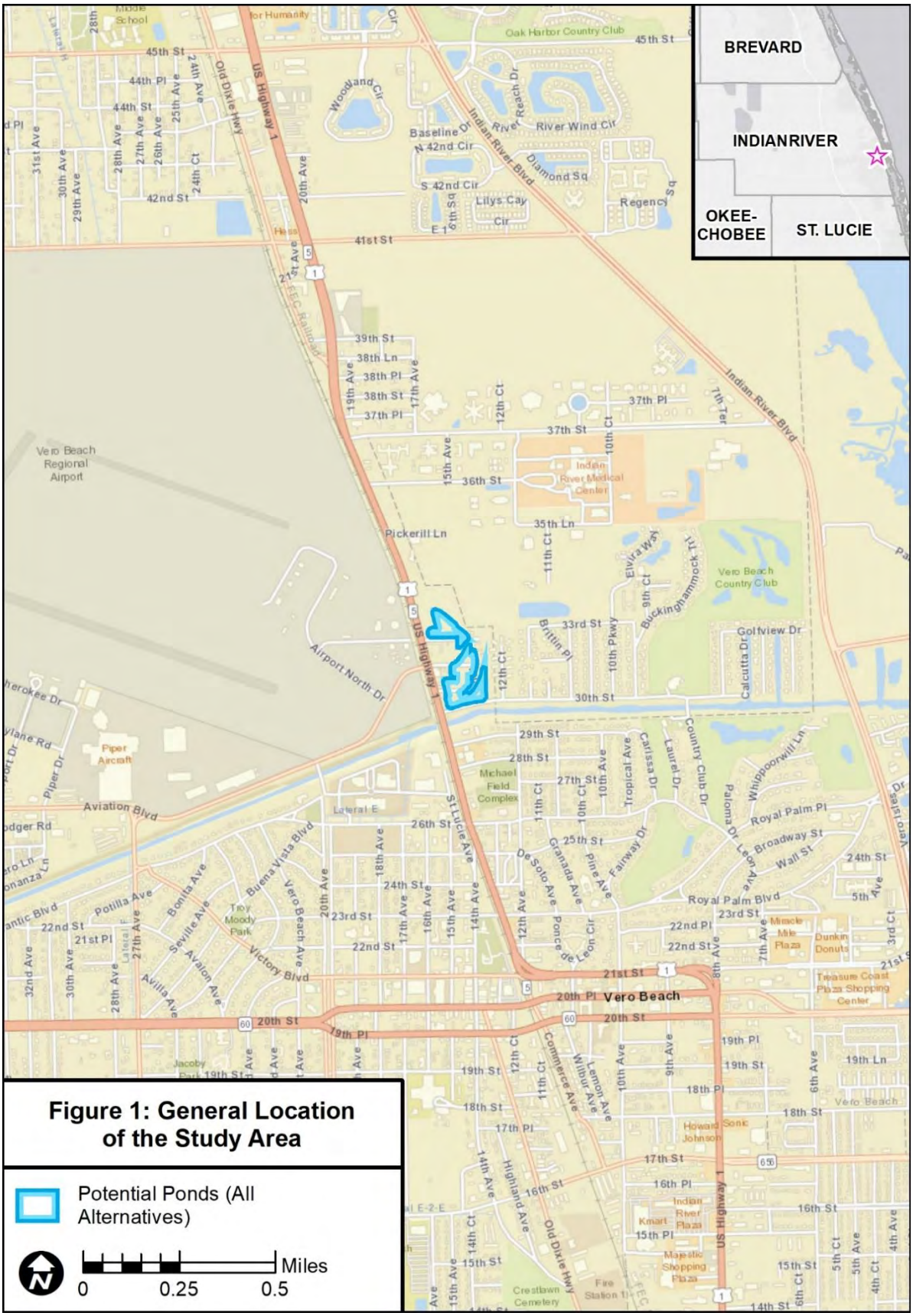


Figure 1: General Location of the Study Area

Background Research

A review of FMSF data identified one previously conducted historic resource survey that partially covered the proposed study area. Historic Property Associates (1990) surveyed the areas of Ponds 1A, 1B, 2A, 2B, 7A, 7B, 8A, and 8B, reviewing the neighborhoods between 30th to 33rd Streets from SR 5/US 1 on the west to 13th Avenue on the east. They recorded 36 resources within or adjacent to the ponds (Sites 8IR732-767; Tables 3 and 4). Some of these structures have since been demolished.

Archaeological Resources

The FMSF and FGDL data review determined that four of the proposed pond sites are located within a known significant archaeological site with confirmed human remains (Table 1; Figures 2-5). A previously recorded archaeological site, The Old Vero Site 8IR9, is located in the southern half of pond sites 1A, 7A, and 8A, and the east half of Pond 2A. The 8IR9 site boundaries were drawn according to the flood plain of Van Valkenburg's Creek before the canal was dug and all of the human remains and artifacts found thus far associated with this site were recovered on the west side of SR 5/US 1. None of the ponds are located within the Vero Local Archaeological Zone (Figures 2-5). However, it should be taken into consideration that there is considerable local interest in the site. The 8IR 9 site has been previously determined to be eligible for listing in the *National Register of Historic Places* (National Register). A summary of this site is included in Table 1.

The FMSF also records 8IR1 on the west side of US 1 where the Vero Local Archaeological Zone is located. Although initially also recorded as the Vero Site, additional research conducted by Andrew Hemmings in 2018 suggested that 8IR1 represents a fossil locality near Fellsmere, approximately 15 northwest of the APE (Hemmings 2018:1).

Table 1. Previously Recorded Archaeological Sites within the Study Area

FMSF Site No.	Site Name	Site Type	National Register Evaluation	Applicable Pond Sites
8IR1[1]	Vero Man	Precolumbian burial	Eligible	1A, 2A, 7A, 8A
8IR9[2]	Vero Locality	Precolumbian burial Precolumbian campsite	Eligible	1A, 2A, 7A, 8A

[1] As recorded in the FMSF, now seen as the same site as 8IR9
[2] Listed in the FMSF as having potential or confirmed human remains

Historic Resources

The review of the FMSF and FGDL data determined that none of the proposed pond sites are located within, or within 150 feet of, known significant or known potentially significant historic resources. There are 30 recorded historic resources located within, or within 150 feet of pond sites, that are still extant (Figures 2-5; Table 2). Many of them have not been evaluated by the SHPO for the National Register; however, all these historic structures have been reviewed by Janus Research for recent Aviation Boulevard projects (Janus Research, in

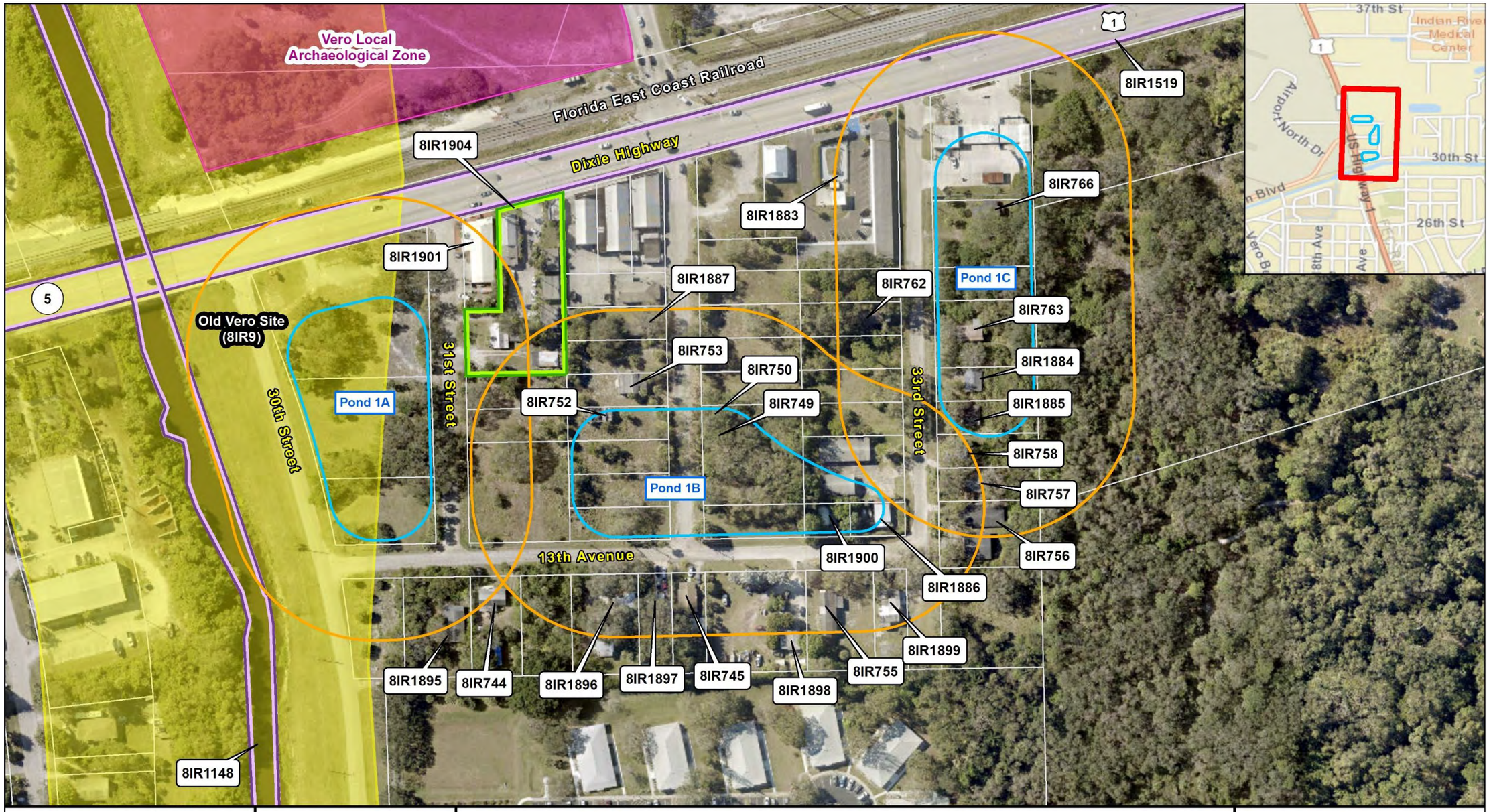


Figure 2: Historic and Archaeological Resources within the Study Area for the Alternative 1 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

Feet
0 100 200

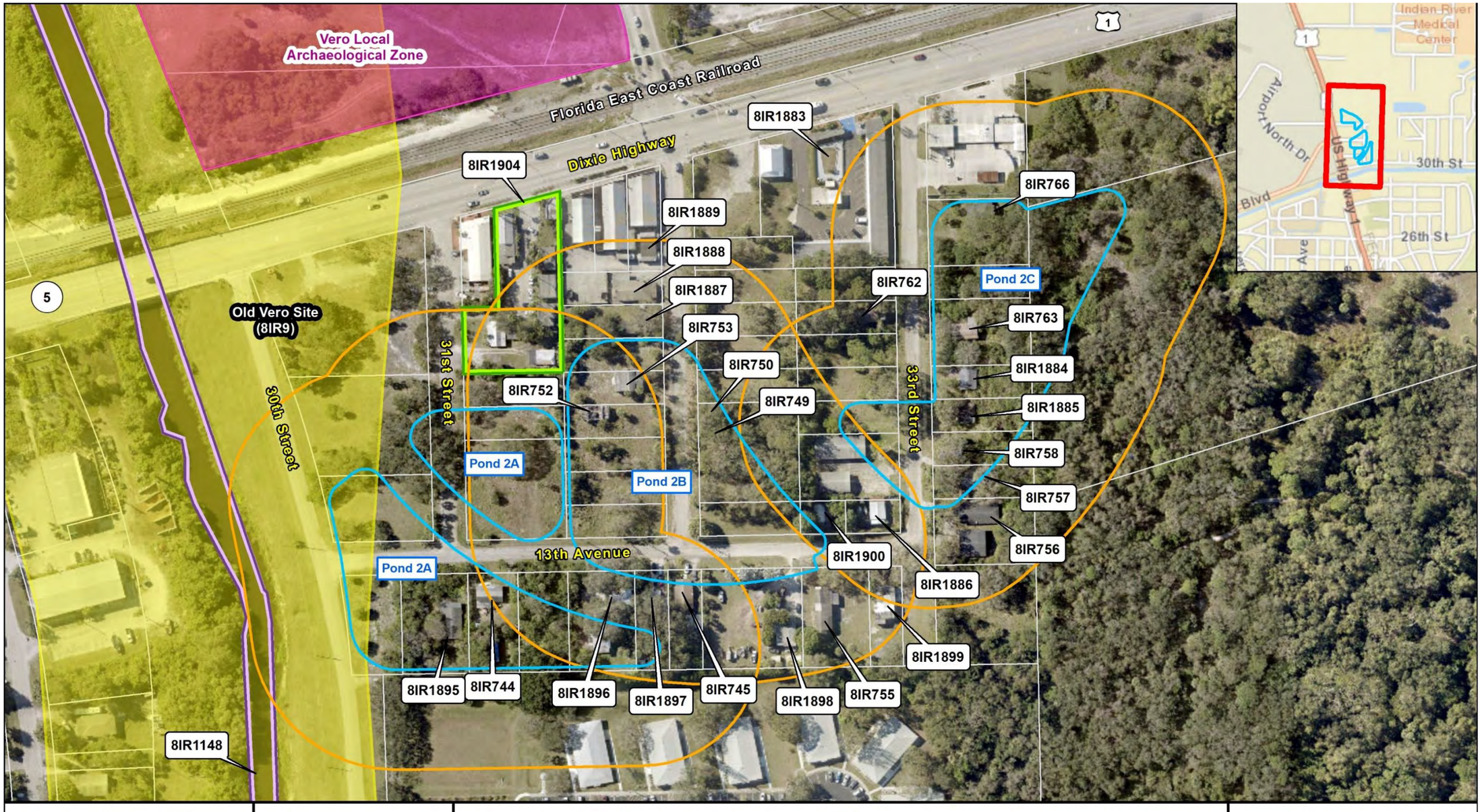


Figure 3: Historic and Archaeological Resources within the Study Area for the Alternative 2 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

0 100 200 Feet

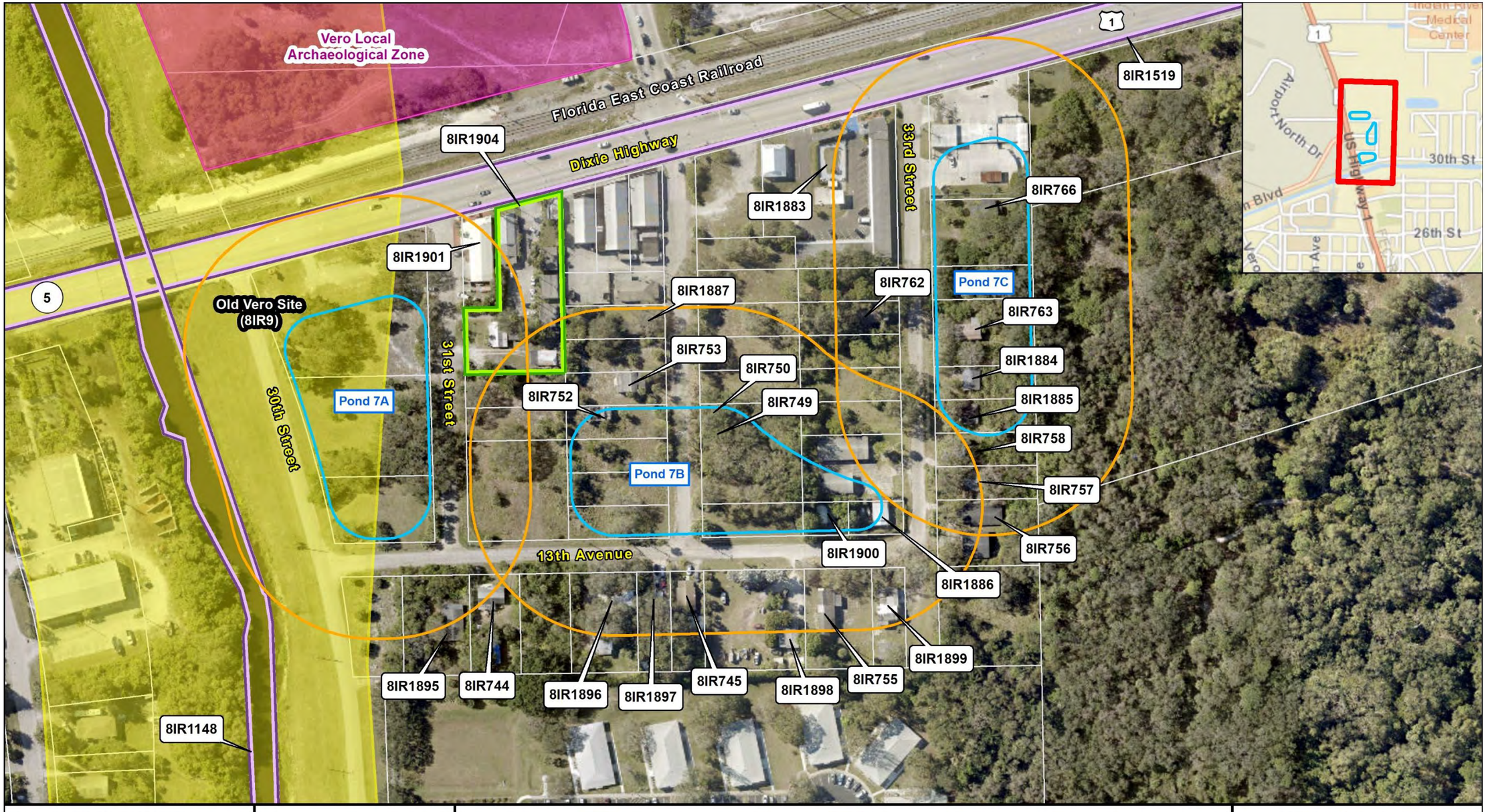


Figure 4: Historic and Archaeological Resources within the Study Area for the Alternative 7 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

0 100 200 Feet

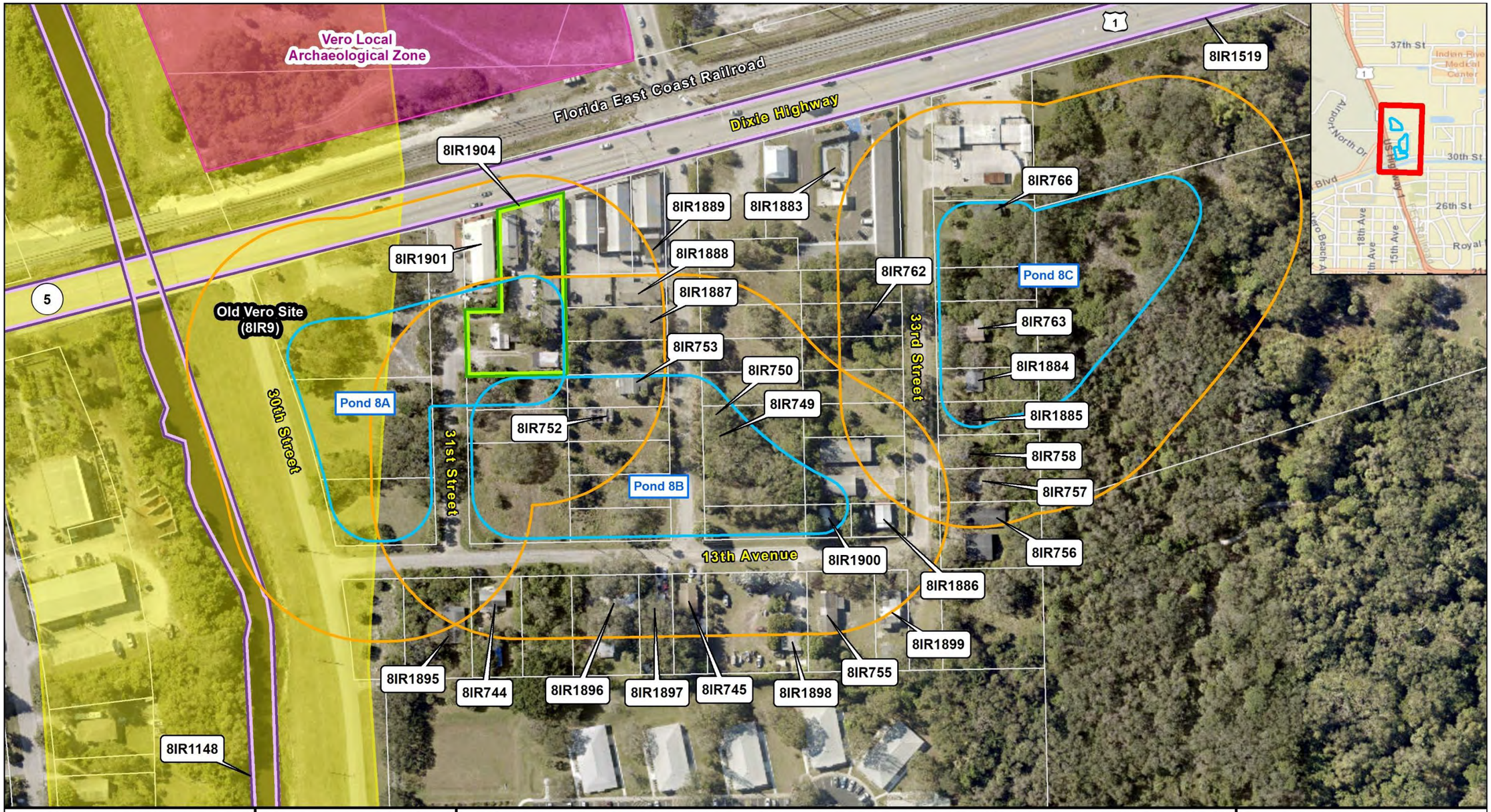


Figure 5: Historic and Archaeological Resources within the Study Area for the Alternative 8 Ponds

SR-5/US-1 at Aviation Boulevard (441693-1-22-02)

Pond
Study Area
Old Vero Site (8IR9)
Vero Local Archaeological Zone
Historic Linear Resource
Historic Motel Complex

Indian River County

Feet
0 100 200

progress) and none were considered eligible for the National Register. Many of these are in ruinous states and others in the area have already been demolished. Details of each previously recorded historic resource extant in the study area and their evaluation status may be found in Attachment 1.

There are two linear resources, 8IR1148 Indian River Farms Main Canal and 8IR1519 Dixie Highway, within 150 feet of Ponds 1A, 2A, 7A, and 8A. The canal is considered ineligible for the National Register. Dixie Highway has been determined eligible outside of the current APE but considered ineligible within the APE as part of the CRAS of Aviation Boulevard Extension (Janus Research, in progress). However, Dixie Highway within the APE has not been formally evaluated by the SHPO for its significance in the study area.

The recorded and potential historic resources within each pond and within 150 feet of each pond are listed by pond in Table 3. Because the footprint of Ponds 1A, 1B, and 1C correspond nearly exactly to Ponds 7A, 7B, and 7C, these ponds were listed together. Any slight difference between them does not change the results.

Table 2. Counts of Pond Sites with Historic Resources Located Within 150-Feet

Historic Resources	Pond Counts	Applicable Ponds Sites
Has Significant Historic Resource(s) Located within Footprint or Within 150 Feet	0	Not Applicable
Recorded or Potential Historic Resources Located Within the Footprint	12	1B, 1C, 2A, 2B, 2C, 7B, 7C, 8B, 8C
Recorded or Potential Historic Resources Located Within 150 Feet (Outside Footprint)	23	1A, 1B, 1C, 2A, 2B, 2C, 7A, 7B, 7C, 8A, 8B, 8C

Table 3. Historic Resources Listed by Pond Site

Pond	Recorded or Potential Historic Resources within Pond Study Area	Historic Resources
1A, 7A	6	8IR744 -3106 13th Ave 8IR1148- Indian River Farms Main Canal 8IR1519 -Dixie Highway 8IR1895- 3036 13th Ave 8IR1901- 3106 US Highway 1 8IR1904- 3116 US Highway 1

Pond	Recorded or Potential Historic Resources within Pond Study Area	Historic Resources
1B, 7B	12	8IR747- 1315 32nd Street 8IR749- 1326 32nd Street 8IR753- 1345 32nd Street 8IR745- 3200 13th Avenue 8IR753- 1345 32nd Street 8IR755- 3236 13th Avenue 8IR756- 1304-06 33rd Street 8IR757- 1316 33rd Street 8IR758- 1326 33rd Street 8IR1887- 1365 32nd Street 8IR1896- 3146 13th Avenue 8IR1899- 3256 13th Avenue
1C, 7C	9	8IR763- 1366 33rd Street 8IR766- 1394 33rd Street 8IR1884- 1346 33rd Street 8IR1885- 1336 33rd Street 8IR756- 1304-06 33rd Street 8IR757- 1316 33rd Street 8IR758- 1326 33rd Street 8IR762- 1365 33rd Street 8IR1883- 3256 US 1
2A	8	8IR744-- 3106 13th Avenue 8IR1895- 3036 13th Avenue 8IR745- 3200 13th Avenue 8IR753- 1345 32nd Street 8IR1896- 3146 13th Avenue 8IR1897- 3156 13th Avenue 8IR1898- 3226 13th Avenue 8IR1148- Indian River Farms Main Canal
2B	12	8IR749 -1326 32nd Street 8IR753- 1345 32nd Street 8IR744- 3106 13th Avenue 8IR745- 3200 13th Avenue 8IR755- 3236 13th Avenue 8IR1887- 1365 32nd Street 8IR1888- 1375 32nd Street 8IR1889- 1385 32nd Street 8IR1896- 3146 13th Avenue 8IR1898- 3226 13th Avenue 8IR1899- 3256 13th Avenue 8IR1900- 3235 13th Avenue

Pond	Recorded or Potential Historic Resources within Pond Study Area	Historic Resources
2C	12	8IR757- 1316 33rd Street 8IR758- 1326 33rd Street 8IR763- 1366 33rd Street 8IR766- 1394 33rd Street 8IR1884- 1346 33rd Street 8IR1885- 1336 33rd Street 8IR756- 1304 33rd Street 8IR762- 1365 33rd Street 8IR1883- 3256 US Highway 1 8IR1886- 3245 13th Avenue 8IR1899- 3256 13th Avenue 8IR1900- 3235 13th Avenue
8A	10	8IR744- 3106 US Highway 1 8IR753- 1345 32nd Street 8IR1148-- Indian River Farms Main Canal 8IR1519- Dixie Highway 8IR1887- 1365 32nd Street 8IR1888- 1375 32nd Street 8IR1889- 1385 32nd Street 8IR1895- 3036 13th Avenue 8IR1901- 3106 US Highway 1 8IR1904- 3116 US Highway 1
8B	14	8IR749- 1326 32nd Street 8IR750- 1336 32nd Street 8IR753- 1345 32nd Street 8IR744- 3106 13th Avenue 8IR745- 3200 13th Avenue 8IR755- 3236 13th Avenue 8IR1886- 3245 13th Avenue 8IR1887- 1365 32nd Street 8IR1888- 1375 32nd Street 8IR1895- 3036 13th Avenue 8IR1896- 3146 13th Avenue 8IR1897- 3156 13th Avenue 8IR1898- 3226 13th Avenue 8IR1899- 3256 13th Avenue
8C	9	8IR763- 1366 33rd Street 8IR766- 1394 33rd Street 8IR1884- 1346 33rd Street 8IR1885- 1336 33rd Street 8IR756- 1304 33rd Street 8IR757- 1316 33rd Street 8IR758- 1326 33rd Street 8IR762- 1365 33rd Street 8IR1883- 3256 US Highway 1

Archaeological Probability

A review of the General Land Office (GLO) historic plat map (Florida Department of Environmental Protection [FDEP] 1846), the Bureau of Land Management (BLM) plat map, and surveyor's field notes (FDEP 1844-1845) was conducted to examine past environmental conditions in and around the study area. Township 32 South Range 39 East was surveyed by Deputy Surveyor George Houstoun in 1844. The plat map of 1845 indicates that to the east of the study area was marshland (BLM 1845). To the west in Section 35 were small ponds. The rest of the environment of the area was described as pine scrub and saw palmetto in the surveyor's notes. Hammock vegetation was depicted along a creek that is flowing east-west adjacent to Ponds 1A, 2A, 7A and 8A. This creek may be Van Valkenburg Creek. The banks of the historic creek have a moderate probability for archaeological sites. The historic plat maps were also reviewed for evidence of other early settlements. No military forts, roads, encampments, battlefields, homesteads, or historic Native American villages located within the vicinity of the project area are identified. The study area has a low probability for historic archaeological sites dated prior to modern development circa 1925.

An examination of aerial photographs from 1943, 1951, 1968, 1970, 1974, 1984, 1994, and 2003 (FDOT, Surveying and Mapping Office 2022; University of Florida, George A. Smathers Libraries 2022) was conducted to examine land use and modifications within the archaeological APE and to identify natural features indicative of increased archaeological site potential, such as hammock vegetation. In the 1943 aerial, US Highway 1, Streets 30th to 33rd, and 13th Avenue are present. However, to the east and north of this development is primarily open woods with scattered vegetation and some agricultural lands.

On the 1951 aerial, the Gordon Motel (8IR1883) located on US 1 adjacent to the study area is visible. There is slightly more development in the neighborhoods between Streets 30th-33rd, which continues into the 1960s.

By 1974, the aerial photograph shows increasingly more structures present on SR 5/US 1. The area where Ponds A are proposed, between 30th and 31st Streets, remains only partially developed. In the 1984 aerial, the vegetation between 33rd and 36th increased and the area is covered with vegetation today. Because the area north of 33rd Street to 36th Street east of SR 5/US 1 has some oak hammock vegetation and has not been developed previously, this area is considered to have moderate archaeological potential.

The *Soil Survey of Indian River County, Florida,* (United States Department of Agriculture [USDA] 1985) was reviewed to help determine the predevelopment environment, assess the level of modification, and identify natural features within the project corridor indicative of increased archaeological site potential. Drainage characteristics and environmental association for each detailed soil type within the APE are included in Table 4.

Myakka Fine Sand is found north of 33rd Street, where Ponds 1C, 2C, 7C, and 8C are located. It is characterized by poorly drained soil. The soil type of the rest of the study area, between 30th to 33rd Streets from SR 5/US 1 to the west to 13th Avenue in the east, is considered "urban land". This soil type has been heavily disturbed by development. Based on the drainage

characteristics of the soil and the amount of disturbance from modern construction, Ponds 1B, 2B, 7B, and 8B are considered to have a low potential for archaeological sites.

Table 4. Characteristics of Detailed Soil Types within the Archaeological APE

Drainage Characteristics	Soil Type	Environmental Association
Poorly drained	Myakka fine sand	Myakka fine sand is located primarily in broad flatwoods. Natural vegetation consists of slash pine, saw palmetto, inkberry, fetterbush, and pineland threeawn.
Not applicable	Urban land	This area is covered by urban features, and natural soils cannot be identified. Most of these areas are heavily disturbed. Vegetation is not listed for these soils.

USDA 1987: 24–25, 36.

Summary

Based upon research of the FMSF and previous archaeological work by Janus Research, the study area has a low to moderate probability for archaeological sites. The area has not been previously surveyed for archaeological resources, however, site boundaries for the Old Vero Site 8IR9 go through the proposed area of Ponds 1A, 2A, 7A, and 8A. Considering that the area has been developed and the soil is no longer natural, there is a moderate chance in this area for archaeological sites. However, given the high level of local interest in the site, it may be best to avoid Ponds 1A, 2A, 7A, and 8A. Even if no evidence of a site is found during subsurface testing, archaeological monitoring of the area within site 8IR9 would be advised during construction.

There is also a moderate chance for archaeological sites in the northern portion of Ponds 1C, 2C, 7C, and 8C. This area is wooded, although there are not many hardwood hammocks, and the soil is poorly drained. The rest of the study area has a low probability for archaeological sites. A summary of archaeological probability by pond is found in Table 5.

The FMSF review and current Janus Research Aviation projects (Janus Research, in progress) identified 30 historic resources that are still extant in the study area. However, none of these historic structures are listed in the National Register of Historic Places nor have any been deemed eligible for it, either officially by the SHPO or unofficially by the surveyors. However, the SHPO has yet to evaluate many of these resources (Attachment 1). All potentially historic parcels in the study area have been reviewed for recent SR 5/US 1 at Aviation Boulevard projects (Janus Research in progress).

Based on the results of this desktop analysis, the “A” Ponds (1A, 2A, 7A, and 8A) and the “C” Ponds (1C, 2C, 7C, and 8C) have a moderate probability of having archaeological sites. The footprint of Ponds 1A, 2A, 7A, and 8A have little to no historic structures. Ponds 1B, 2B, 7B, and 8B have a low probability of having archaeological sites and their footprints have few historic structures. Table 5 provides a summary of the results of the desktop analysis by pond site.

Table 5. Recorded Archaeological Sites, Archaeological Probability, and Recorded Historic Resources Associated with the Proposed Study Areas

Alternative	Proposed Pond Site	Previously Recorded Archaeological Sites Within Pond Site	Archaeological Probability	Number of Previously Recorded Historic Resources Within or Adjacent to Pond Site	Number of Significant Historic Resources Within or Adjacent to Pond Site
1	Pond 1A	8IR9	Moderate*	6	0
	Pond 1B	0	Low	12	0
	Pond 1C	0	Moderate	9	0
2	Pond 2A	Southern pond: 8IR9 Northern pond: 0	Southern Pond: Moderate* Northern Pond: Low	8	0
	Pond 2B	8IR9	Low	12	0
	Pond 2C	0	Moderate	12	0
7	Pond 7A	8IR9	Moderate*	6	0
	Pond 7B	0	Low	12	0
	Pond 7C	0	Moderate	9	0
8	Pond 8A	8IR9	Moderate*	10	0
	Pond 8B	0	Low	14	0
	Pond 8C	0	Low	9	0

* Although only a moderate probability for archaeological sites, due to the local interest in the Old Vero Site 8IR9, these pond sites are not recommended

References Cited

Bureau of Land Management.
1845 Notes and Map, Township 32 South and Range 39 East. Electronic document, http://www.glorecords.blm.gov/search/, accessed January 26, 2023.

Florida Department of Environmental Protection (FDEP)
1844-1845 Surveyor's Notes for Township 32 South, Range 39 East. Land Boundary Information System (LABINS). Land Records. Electronic document, https://www.labins.org/survey_data/landrecords/landrecords.cfm, accessed January 26, 2023.
1846 Survey Plat Map for Township 32 South, Range 39 East. Land Boundary Information System (LABINS). Land Records. Electronic document, https://www.labins.org/survey_data/landrecords/landrecords.cfm, accessed January 26, 2023.
1846 Plat Map for Township 32 South, Range 39 East. Division of State Lands, Board of Trustees Land Document System. Electronic document, http://labins.org/survey_data/landrecords/landrecords.cfm accessed January 26, 2023.

Florida Department of Transportation (FDOT), Surveying and Mapping Office
2022 Aerial Photography Archive. Electronic documents, https://fdotewp1.dot.state.fl.us/AerialPhotoLookUpSystem/

Florida Master Site File
2004-2018 Site File Form for 8IR1 and 8IR9 Vero Man. On file, Florida Department of State, Division of Historical Resources, Tallahassee.

Hemmings, Andrew
2018 *8IR00001 Fellsmere Site is NOT Related to the Old Vero (8IR09).* Manuscript on file, Florida Division of Historical Resources, Tallahassee.

Historic Property Associates
1990 *Historic Properties Survey of the City of Vero Beach, Florida*. On file, Florida Department of State, Division of Historical Resources, Tallahassee, Florida.

Janus Research
In Progress Cultural Resources Assessment Survey of the Aviation Boulevard Extension Alternative Alignment Study, Indian River County, Florida
In Progress Cultural Resources Assessment Survey of SR 5/US-1 at Aviation Boulevard Financial Management Number: 441693-1-22-02, Indian River County, Florida

United States Department of Agriculture (USDA)
1985 *Soil Survey of Indian River County, Florida.* United States Department of Agriculture/Soil Conservation Service.

University of Florida, George A. Smathers Libraries
2023 Aerial Photography: Florida Collection. University of Florida Digital Collections. Electronic documents, http://ufdc.ufl.edu/aerials.

Attachment 1:

Previously Recorded Historic Resources Within the Project APE That are Still Extant

FMSF No.	Resource Name/Address	Year Built	Resource Type	National Register Evaluation	Relevant Pond Site
8IR744	3106 13th Avenue	c. 1935	Frame Vernacular	Not Evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard	1A, 2A, 2B, 7A, 8A, 8B
8IR745	3200 13th Avenue	c. 1935	Frame Vernacular	Not Evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard	1B,2A,2B 7B, 8B
8IR749	1326 32nd Street	c. 1935	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	2B, 1B, 7B, 8B
8IR750	1336 32nd Street	c. 1935	Frame Vernacular	Not Evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard	8B
8IR752	1337 32nd Street	c. 1925	Masonry Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	2A
8IR753	1345 32nd Street	c. 1935	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1B,2A, 2B, 7B, 8A,8B
8IR755	3236 13th Avenue	c. 1935	Frame Vernacular	Not Evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard	1B,2B, 7B,8B
8IR756	1304-06 33rd Street	c. 1935	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1B, 1C, 2C,7B,7C, 8C
8IR757	1316 33rd Street	c. 1935	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1B,1C, 2C 7B, 7C, 8C

FMSF No.	Resource Name/Address	Year Built	Resource Type	National Register Evaluation	Relevant Pond Site
8IR758	1326 33rd Street	c. 1925	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1B, 1C, 2C, 7C, 7B, 8C
8IR762	1365 33rd Street	c. 1935	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1C, 2C, 7C, 8C
8IR763	1366 33rd Street	c. 1935	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1C, 2C, 7C, 8C
8IR766	1394 33rd Street	c. 1935	Masonry Vernacular	Not Evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard	1C, 2C, 7C, 8C
8IR1148	Indian River Farms Main Canal	c. 1915	Linear Resource	Determined Ineligible	1A, 7A, 8A
8IR1519	Dixie Highway	c. 1914-1927	Linear Resource	Determined Eligible Outside of Current APE; Considered Ineligible Within APE as part of CRAS of Aviation Boulevard Extension	1A, 7A, 8A
8IR1883	3256 US 1	c. 1955	Masonry Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1C, 2C, 7C, 8C
8IR1884	1346 33rd Street	c. 1950	Masonry Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1C, 2C, 7C, 8C
8IR1885	1336 33rd Street	c. 1962	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1C, 2C, 7C, 8C

FMSF No.	Resource Name/Address	Year Built	Resource Type	National Register Evaluation	Relevant Pond Site
8IR1886	3245 13th Avenue	c. 1946	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	2C, 8B, 8C
8IR1887	1365 32nd Street	c. 1940	Frame Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	1B, 2B,8A, 7B, 8B
8IR1888	1375 32nd Street	c. 1940	Masonry Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	2B, 8A, 8B
8IR1889	1385 32nd Street	c. 1946	Masonry Vernacular	Not evaluated, Considered Ineligible as part of CRAS of Aviation Boulevard Extension	2B, 8A
8IR1895	3036 13th Avenue	c. 1962	Masonry Vernacular	Considered National Register-Ineligible	1A,2A, 7A, 8A, 8B
8IR1896	3146 13th Avenue	c. 1946	Frame Vernacular	Considered National Register-Ineligible	1B, 2A, 2B,7B, 8B
8IR1897	3156 13th Avenue	c. 1950	Frame Vernacular	Considered National Register-Ineligible	2A, 8B
8IR1898	3226 13th Avenue	c. 1945	Masonry Vernacular	Considered National Register-Ineligible	2A, 2B, 8B
8IR1899	3256 13th Avenue	c. 1927	Frame Vernacular	Considered National Register-Ineligible	1B,2A, 2B, 2C, 8B, 7B
8IR1900	3235 13th Avenue	c. 1940	Frame Vernacular	Considered National Register-Ineligible	2B, 2C, 8B
8IR1901	3106 US Highway 1	c. 1935	Frame Vernacular	Considered National Register-Ineligible	1A, 7A, 8A
8IR1904	3116 US 1; Vero's Motel Complex	c. 1951	Resource Group	Considered National Register–Ineligible	1A,7A, 8A, 8B

APPENDIX F-11

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

Post Office Box 1429
Palatka, Florida 32078-1429

PERMIT NO. 40-061-0027 DATE ISSUED ~~NOVEMBER 10, 1987~~

A PERMIT AUTHORIZING:

CLEARING ALL UNDERBRUSH AND BRAZILIAN PEPPER TREES FOR PROPOSED RETENTION/DETENTION PONDS TO SERVE A 21 ACRE SITE TO BE KNOWN AS INDIAN RIVER MEMORIAL HOSPITAL.

LOCATION:

Section 36, Township 32 South, Range 39 East
Indian River County

ISSUED TO:
(owner)

INDIAN RIVER MEMORIAL HOSPITAL
1000 36TH ST.
VERO BEACH, FL 32960
ATTN: MICHAEL O'GRADY

Permittee agrees to hold and save the St. Johns River Water Management District and its successors harmless from any and all damages, claims, or liabilities which may arise from permit issuance. Said application, including all plans and specifications attached thereto, is by reference made a part hereof.

This permit does not convey to permittee any property rights nor any rights or privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation or requirement affecting the rights of other bodies or agencies. All structures and works installed by permittee hereunder shall remain the property of the permittee.

This Permit may be revoked, modified or transferred at any time pursuant to the appropriate provisions of Chapter 373, Florida Statutes.

PERMIT IS CONDITIONED UPON:

See Conditions on Attached "Exhibit A", dated NOVEMBER 10, 1987

AUTHORIZED BY: St. Johns River Water Management District

Department of Resource Management

By: _____ (Director)

JEFF ELLEDGE

Governing Board

By: _____ (Assistant Secretary)

HENRY DEAN

"EXHIBIT A"

CONDITIONS FOR ISSUANCE OF PERMIT NUMBER 40-061-0027

INDIAN RIVER MEMORIAL HOSPITAL

DATED NOVEMBER 10, 1987

1. Prior to lot or unit sales, or construction, whichever occurs first, the District must receive the Permittee's proposal of an entity to be responsible for operation and maintenance of the permitted system. With the designation of the proposed entity, the District must also receive a draft document enumerating enforceable affirmative obligations on the entity to properly operate and maintain the system for its expected life. The draft document may consist of a showing of compliance with the requirements of a public body that will result in that body's acceptance of the system for maintenance, articles of incorporation for a condominium or homeowner's association, plat or deed restrictions apportioning maintenance responsibility, or in the event the property is being developed for a corporate permittee's corporate use without contemplating sales of lots or units, a letter signed by the corporate officer authorized to bind the corporation stating the corporation's acceptance of permanent maintenance responsibility. Prior to the District's acceptance of a completed system, the submitted document must be approved by the District and recorded, if the latter is appropriate. Failure to submit the designated entity and the appropriate document will result in the permittee remaining personally liable for carrying out maintenance and operation of the permitted system.

2. All construction, operation and maintenance shall be as set forth in the plans, specifications and performance criteria as approved by this permit.

3. District authorized staff, upon proper identification, will have permission to enter, inspect and observe the system to insure conformity with the plans and specifications approved by the permit.

4. Turbidity barriers must be installed at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the proposed work. Turbidity barriers must remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. Thereafter the permittee will be responsible for the removal of the barriers.

5. The operation phase of the permit shall not become effective until a Florida Registered Professional Engineer certifies that all facilities have been constructed in accordance with the design approved by the District. Within 30 days after completion of construction of the surface water management system, the permittee shall submit the certification or one set of plans which reflect the surface water management system as actually constructed and notify the District that the facilities are ready for inspection and approval. Upon approval of the completed surface water management system, the permittee shall request transfer of the permit to the responsible entity approved by the District.

6. If any other regulatory agency should require revisions or modification to the permitted project, the District is to be notified of the revisions so that a determination can be made whether a permit modification is required.

7. Within thirty (30) days after sale or conveyance of the permitted surface water management system or the land on which the system is located, the owner in whose name the permit was granted shall notify the District of such change of ownership. Transfer of this permit shall be in accordance with the provisions of Chapter 373, Florida Statutes, and Chapters 40C-4, 40C-40, and 40C-41, Florida Administrative Code. All terms and conditions of this permit shall be binding upon the transferee.

8. This permit for construction will expire 60 days from the date of issuance.

9. The proposed clearing must be performed as per plans received by the District on October 6, 1987.

10. Permanent vegetative cover must be established on all exposed surfaces until the master drainage system is constructed.

NOTICE OF RIGHTS

1. A party whose substantial interests are determined has the right to request an administrative hearing by filing a written petition with the St. Johns River Water Management District (District) within 14 days of receipt of notice of the District's intent to grant or deny a permit application by mailing it to the District or by presenting the written petition at the District Governing Board meeting in which action is proposed to be taken regarding the application, whichever is later.

2. A party whose substantial interests are determined has the right to request an administrative hearing by filing a written petition within 21 days of receipt of notice of final District action on a permit application, if the Governing Board took action inconsistent with the notice of intent to grant or deny the permit application, or if that substantially interested party did not receive notice of the District's intent to grant or deny the permit application.

3. A substantially interested party has the right to a formal administrative hearing pursuant to Section 120.57(1), *Florida Statutes*, where there is a dispute between the District and the party regarding an issue of material fact. A petition for a formal hearing must comply with the requirements set forth in Section 28-5.201, *Florida Administrative Code*, and Section 40C-1.11, *Florida Administrative Code*.

4. A substantially interested party has the right to an informal hearing pursuant to Section 120.57(2), *Florida Statutes*, where no material facts are in dispute. A petition for an informal hearing must comply with the requirements set forth in Section 40C-1.11, *Florida Administrative Code*.

5. Filing of a petition for an administrative hearing occurs upon delivery at the District headquarters or when the petition, properly addressed and stamped, is postmarked.

6. Failure to file a petition for an administrative hearing within the requisite time frame shall constitute a waiver of the right to an administrative hearing.

7. The right to an administrative hearing and the relevant procedures to be followed are governed by Chapter 120, *Florida Statutes*, and Chapters 40C-1 and 28-5, *Florida Administrative Code*.

8. Any substantially affected person who claims that final action of the District constitutes an unconstitutional taking of property without just compensation may seek review of the action in circuit court pursuant to Section 373.617, *Florida Statutes*, and the Florida Rules of Civil Procedure, by filing an action within 90 days of the rendering of the final District action.

9. Pursuant to Section 120.68, *Florida Statutes*, a party who is adversely affected by final District action may seek review of the action in the district court of appeal by filing a notice of appeal pursuant to *Fla.R.App.P.* 9.110 within 30 days of the rendering of the final District action.

10. A party to the proceeding who claims that a District order is inconsistent with the provisions and purposes of Chapter 373, *Florida Statutes*, may seek review of the order pursuant to Section 373.114, *Florida Statutes*, by the Land and Water Adjudicatory Commission (Commission) by filing a request for review with the Commission and serving a copy on the Department of Environmental Regulation and any person named in the order within 20 days of the rendering of the District order. However, if the order to be reviewed is determined by the Commission within 60 days after receipt of the request for review to be of statewide or regional significance, the Commission may accept a request for review within 30 days of the rendering of the order.

11. A District action or order is considered "rendered" after it is signed by the Chairman of the Governing Board on behalf of the District and is filed by the District Clerk.

12. Failure to observe the relevant time frames for filing a petition for judicial review as described in paragraphs #8 and #9 or for Commission review as described in paragraph #10 will result in waiver of that right to review.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a copy of the foregoing Notice of Rights has been furnished by U.S. Mail to

INDIAN RIVER MEMORIAL HOSPITAL
1000 36TH STREET
VERO BEACH, FL 32960

at 4:00P.M. this 19TH day of NOVEMBER, 19 87.

Dannise Kemp

Dannise Kemp, Director
Division of Records
St. Johns Water Management District
Post Office Box 1429
Palatka, FL 32078-1429
(904) 328-8321

40-061-0027

APPENDIX F-12

Permit 42-061-86755-2
Modified to
42-061-86755-3

St. Johns River Water Management District

Kirby B. Green III, Executive Director • David W. Fisk, Assistant Execu

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500

REGULATION OF STORMWATER MANAGEMENT SYSTEMS

CHAPTER 40C-42, F.A.C.

PERMIT NO. 42-061-86755-3
A PERMIT AUTHORIZING:

DATE ISSUED: December 22, 2003

Construction and operation of a Stormwater Management System with stormwater treatment by retention and wet detention for Alcohope of the Treasure Coast and adjacent facilities, a 28.35-acre project to be constructed as per plans received by the District on November 26, 2003.

LOCATION:

Section(s): 36 Township(s): 32S Range(s): 39E

Indian River County

Health Systems of Indian River Inc.
1000 36th Street
Vero Beach, FL 32960

This document shall serve as the formal permit for construction and operation of stormwater management system in accordance with Chapter 40C-42, F.A.C., issued by the staff of the St. Johns River Water Management District on December 22, 2003. This permit is subject to the standard limiting conditions and other special conditions approved by the staff. These conditions are enclosed.

This permit is a legal document and should be kept with your other important records. The permit requires the submittal of an As-built certification and may require submittal of other documents. All information provided in compliance with permit conditions should be submitted to the District office from which the permit was issued. An As-built certification form is attached. Complete this form within 30 days of completion of construction of the permitted system, including all site work.

Upon receipt of the As-built certification, staff will inspect the project site. Once the project is found to be in compliance with all permit requirements, the permit may be converted to its operation phase and responsibility transferred to the operation and maintenance entity in accordance with Chapter 40C-42.028, F.A.C.

Permit issuance does not relieve you from the responsibility for obtaining permits from any federal, state, and/or local agencies asserting concurrent jurisdiction over this work. Please note that if dewatering is to occur during any phase of construction or thereafter and the surface

water pump(s), wells, or facilities are capable of withdrawing one million gallons of water per day or more, or an average of 100,000 gallons per day or more over a year, and any discharge is to be off-site, you must apply for and obtain a Consumptive Use Permit (40C-2) from the District prior to starting the dewatering. Please contact the District if you need additional information or application materials.

Permittee agrees to hold and save the St. Johns River Water Management District and its successors harmless from any and all damages, claims, or liabilities which may arise from permit issuance. Said application, including all plans and specifications attached thereto, is by reference made a part thereof.

This permit does not convey to Permittee any property rights nor any rights or privileges other than those specified herein, nor relieve the Permittee from complying with any law, regulation or requirement affecting the rights of other bodies or agencies. All structures and works installed by Permittee hereunder shall remain the property of the Permittee.

This permit may be revoked, modified, or transferred at any time pursuant to the appropriate provisions of Chapter 373, Florida Statutes.

In the event you sell your property, the permit will be transferred to the new owner, if we are notified by you within thirty days of the sale. Please assist us in this matter so as to maintain a valid permit for the new property owner.

Thank you for your cooperation, and if this office can be of any further assistance to you, please do not hesitate to contact us.

Fariborz Zanganeh, Supervising Prof Engineer - Palm Bay

Department of Water Resources

Enclosures: As-built Certification Form
Exhibit A

cc: District Permit File

Agent: Carter Assoc Inc
1708 21st St
Vero Beach, FL 32960

Consultant: Carter Assoc Inc
1708 21st St
Vero Beach, FL 32960

APPENDIX F-13

St. Johns River
Water Management District
Kirby B. Green III, Director • David W. Fisk, Assistant Executive Director

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500
On the Internet at floridaswater.com

July 12, 2011

Indian River County
1801 27th St
Vero Beach, FL 32960

SUBJECT: Permit Number 40-061-123418-1
Aviation Boulevard Roadway Widening - 43rd Avenue to US Highway 1

Dear Sir/Madam:

Enclosed is your general permit as authorized by the staff of the St. Johns River Water Management District on July 12, 2011.

This permit is a legal document and should be kept with your other important documents. The attached MSSW/Stormwater As-Built Certification Form should be filled in and returned to the Palatka office within thirty days after the work is completed. By so doing, you will enable us to schedule a prompt inspection of the permitted activity.

In addition to the MSSW/Stormwater As-Built Certification Form, your permit also contains conditions which require submittal of additional information. All information submitted as compliance to permit conditions must be submitted to the Palatka office address.

Permit issuance does not relieve you from the responsibility of obtaining permits from any federal, state and/or local agencies asserting concurrent jurisdiction for this work.

Please be advised that the District has not published a notice in the newspaper advising the public that it is issuing a permit for this proposed project. Publication, using the District form, notifies members of the public (third parties) of their rights to challenge the issuance of the general permit. If proper notice is given by publication, third parties have a 21-day time limit on the time they have to file a petition opposing the issuance of the permit. If you do not publish, a party's right to challenge the issuance of the general permit extends for an indefinite period of time. If you wish to have certainty that the period for filing such a challenge is closed, then you may publish, at your own expense, such a notice in a newspaper of general circulation. A copy of the form of the notice and a list of newspapers of general circulation is attached for your use.

In the event you sell your property, the permit will be transferred to the new owner, if we are notified by you within thirty days of the sale and if you provide the information required by 40C-1.612, F.A.C. Please assist us in this matter so as to maintain a valid permit for the new property owner.

Thank you for your cooperation, and if this office can be of any further assistance to you, please do not hesitate to contact us.

Sincerely,

Janet White

Janet White
Regulatory Support Specialist I
Division of Regulatory Support

Enclosures: Permit with As-built Certification Form
Notice of Rights
List of Newspapers for Publication

cc: District Permit File

Consultant: Brian Good
Kimley-Horn & Associates Inc
601 21st St Ste 300
Vero Beach, FL 32960

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
Post Office Box 1429
Palatka, Florida 32178-1429

PERMIT NO. 40-061-123418-1 **DATE ISSUED:** July 12, 2011
PROJECT NAME: Aviation Boulevard Roadway Widening - 43rd Avenue to US Highway 1

A PERMIT AUTHORIZING:

Construction of a Surface Water Management System with stormwater treatment by wet detention and retention for Aviation Boulevard Roadway Widening - 43rd Avenue to US Highway 1, a 87.65 - acre project to be constructed as per plans received by the District on January 14, 2010, revised sheets receive on March 12, 2010, and additional sheets A through H received on June 14, 2011.

LOCATION:

Section(s):	33, 34, 35 3, 4	Township(s):	32S 33S	Range(s):	39E 39E

Indian River County

Indian River County
1801 27th St
Vero Beach, FL 32960

Permittee agrees to hold and save the St. Johns River Water Management District and its successors harmless from any and all damages, claims, or liabilities which may arise from permit issuance. Said application, including all plans and specifications attached thereto, is by reference made a part hereof.

This permit does not convey to permittee any property rights nor any rights or privileges other than those specified herein, nor relieve the permittee from complying with any law, regulation or requirement affecting the rights of other bodies or agencies. All structures and works installed by permittee hereunder shall remain the property of the permittee.

This permit may be revoked, modified or transferred at any time pursuant to the appropriate provisions of Chapter 373, Florida Statutes.

PERMIT IS CONDITIONED UPON:

See conditions on attached "Exhibit A", dated July 12, 2011

AUTHORIZED BY: St. Johns River Water Management District
Department of Environmental Resource Management

By: _____
(Service Center Director - Palm Bay)
John Juilianna

APPENDIX F-14

St. Johns River
Water Management District
Ann B. Shortelle, Ph.D., Executive Director

4049 Reid Street • P.O. Box 1429 • Palatka, FL 32178-1429 • (386) 329-4500
On the Internet at floridaswater.com.

October 28, 2015

Kollen Cobb
All Aboard Florida - Operations, LLC
2855 S Le Jeune Rd Ste 100
Coral Gables, FL 33134-6612

SUBJECT: General Permit 144190-1

Dear Ms. Cobb:

The District has received your notice to use a general permit. Based on the submitted information, the proposed activity qualifies for a General Environmental Resource Permit pursuant to section 62-330.447, Florida Administrative Code, provided it is constructed and operated in accordance with that general permit and the general and special conditions set forth in section 62-330.405 and 62-330.447, Florida Administrative Code (attached).

Please be advised that the St. Johns River Water Management District will not publish a notice in the newspaper advising the public that it has determined your project qualifies for this general permit. Newspaper publication, using the District's notice form, notifies members of the public of their right to challenge the use of the general permit. If proper notice is given by newspaper publication, then there is a 21-day time limit for someone to file a petition for an administrative hearing to challenge the use of the permit. To close the point of entry for filing a petition, you may publish (at your own expense) a one-time notice of the District's decision in a newspaper of general circulation within the affected area as defined in Section 50.11 of the *Florida Statutes*. If you do not publish a newspaper notice to close the point of entry, the time to challenge your use of the permit will not expire and someone could file a petition even after your project is constructed.

A copy of the notice form and a partial list of newspapers of general circulation are attached for your convenience. However, you are not limited to those listed newspapers. If you choose to close the point of entry and the notice is published, the newspaper will return to you an affidavit of publication. In that event, it is important that you either submit a scanned copy of the affidavit by emailing it to *compliancesupport@sjrwmd.com* (preferred method) or send a copy of the original affidavit to:

Margaret Daniels, Bureau Chief
Bureau of Regulatory Support
4049 Reid Street
Palatka, FL 32177

A copy of your application was transmitted to the U.S. Army Corps of Engineers for review. This

authorization to use a general environmental resource permit does not obviate the need for obtaining all necessary permits or approval from other agencies.

Sincerely,

M. Daniels

Margaret Daniels, Bureau Chief
Bureau of Regulatory Support

Enclosures: Notice of Rights
List of Newspapers for Publication

cc: District Permit File

ST. JOHNS RIVER WATER MANAGEMENT DISTRICT
GENERAL ENVIRONMENTAL RESOURCE PERMIT

PERMIT NO: 144190-1 **DATE ISSUED:** October 28, 2015

PROJECT NAME: All Aboard Florida - D08 Fiber Optic Cable Installation

A PERMIT AUTHORIZING:
Use of the General Permit for Installation, Maintenance, Repair, and Removal of Utility Lines for installation of 67 miles of fiber optic cable to be constructed as per plans received by the District on October 22, 2015.

LOCATION:

Section(s):	31, 36	Township(s):	23S	Range(s):	35E
	17, 28, 20, 6, 7, 33, 21, 18		24S		36E
	31, 30		28S		38E
	35, 10, 4, 15, 22, 26, 3, 23		32S		39E
	10, 9, 26, 4, 36, 14, 23, 15, 35		25S		36E
	5, 33, 21, 16, 28, 8, 17, 34, 6		29S		38E
	11, 14, 10, 3		30S		38E
	31, 30, 19		33S		40E
	12, 1, 13		26S		36E
	8, 17, 6, 33, 7, 28, 21, 29, 20		31S		39E
	31, 32, 30, 18, 19		26S		37E
	28, 16, 8, 9, 34, 5, 27, 21		27S		37E
	24, 11, 2, 13, 25, 3, 14		28S		37E
	2, 12, 1, 13, 24		33S		39E

Indian River; Brevard County

Receiving Water Body:
Indian River Lagoon

ISSUED TO:
All Aboard Florida - Operations, LLC
2855 S Le Jeune Rd Ste 100
Coral Gables, FL 33134-6612

The District received your notice to use a General Environmental Resource Permit pursuant to Chapter 62-330, Florida Administrative Code (F.A.C.) on October 7, 2014.

Based on the forms, design plans, and other documents submitted with your notice, it appears that the project meets the requirements for a General Environmental Resource Permit. Any

activities performed under a General Environmental Resource Permit are subject to the general conditions and special conditions specified in rules 62-330.405 and, , F.A.C. respectively (attached). Any deviations from these conditions may subject you to enforcement action and possible penalties.

Please be advised that the General Environmental Resource Permit expires 5 years from the date on which the notice of intent to use a General Environmental Resource Permit was received by the District.

A copy of your notice also has been sent to the U.S. Army Corps of Engineers (USACOE) for review. The USACOE may require a separate permit. Failure to obtain this authorization prior to construction could subject you to enforcement action and possible penalties.

AUTHORIZED BY: St. Johns River Water Management District
Division of Regulatory Engineering and Environmental Services

By: Susan Moor

Susan Moor
Supervising Regulatory Scientist

U.S. Department
of Transportation
**Federal Aviation
Administration**

Advisory Circular

Subject: Hazardous Wildlife Attractants on or near Airports

Date: 02/21/2020
Initiated By: AAS-300

AC No: 150/5200-33C
Change:

1 **Purpose.**

This Advisory Circular (AC) provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports. It also discusses airport development projects (including airport construction, expansion, and renovation) affecting aircraft movement near hazardous wildlife attractants. Appendix 1 provides definitions of terms used in this AC.

2 **Cancellation.**

This AC cancels AC 150/5200-33B, *Hazardous Wildlife Attractants on or near Airports*, dated August 28, 2007.

3 **Application.**

The Federal Aviation Administration recommends the guidance in this AC for land uses that have the potential to attract hazardous wildlife on or near public-use airports. This AC does not constitute a regulation, is not mandatory, and is not legally binding in its own right. It will not be relied upon as a separate basis by the FAA for affirmative enforcement action or other administrative penalty. Conformity with this AC is voluntary, and nonconformity will not affect rights and obligations under existing statutes and regulations, except as follows:

1. Airports that hold Airport Operating Certificates issued under Title 14, Code of Federal Regulations (CFR), Part 139, Certification of Airports, Subpart D, may use the standards, practices and recommendations contained in this AC as one, but not the only, acceptable means of compliance with the wildlife hazard management requirements of Part 139.
2. The FAA recommends the guidance in this AC for airports that receive funding under Federal grant assistance programs, including the Airport Improvement Program. See Grant Assurance #34.

3. The FAA recommends the guidance in this AC for projects funded by the Passenger Facility Charge program. See PFC Assurance #9.
4. The FAA recommends the guidance in this AC for land-use planners and developers of projects, facilities, and activities on or near airports.

4 Principal Changes.

Changes are marked with vertical bars in the margin. Change in this AC include:

1. Clarification by the FAA that non-certificated airports are recommended to conduct a Wildlife Hazard Assessment (Assessment) or a Wildlife Hazard Site Visit (Site Visit);
2. Table 1, Ranking of Hazardous Species, has been moved to Advisory Circular 150/5200-32, *Reporting Wildlife Aircraft Strikes* (5/31/2013);
3. Consolidation and reorganization of discussion on land uses of concern; and updated procedures for evaluation and mitigation. Discussion addresses off-airport hazardous wildlife attractants, followed by discussion of on-airport attractants. It also clarifies language regarding the applicability of the AC.

5 Background.

1. Information about the risks posed to aircraft by certain wildlife species has increased a great deal in recent years. Improved reporting, studies, documentation, and statistics clearly show that aircraft collisions with birds and other wildlife are a serious economic and public safety problem. While many species of wildlife can pose a risk[1] to aircraft safety, they are not equally hazardous[2]. These hazard rankings can help focus hazardous wildlife management efforts on those species or groups that represent the greatest risk to safe air and ground operations in the airport environment. Used in conjunction with a site-specific Assessment that will determine the relative abundance and use patterns of wildlife species, these rankings combined with a systematic risk analysis can help airport operators better understand the general threat level (and consequences) of certain wildlife species. Also, the rankings can assist with the creation of a "high risk" list of hazardous species that warrant immediate attention.
2. Most public-use airports have large tracts of open, undeveloped land that provide added margins of safety and noise mitigation. These areas can also present potential hazards to aviation if they encourage wildlife to enter an airport's approach or departure airspace or aircraft operations area. Constructed or natural areas— such as

[1] Risk is the relationship between the severity and probability of a threat. It is the product of hazard level and abundance in the critical airspace, and is thus defined as the probability of a damaging strike with a given species.
[2] Hazardous wildlife are species of wildlife (birds, mammals, reptiles), including feral and domesticated animals, not under control that may pose a direct hazard to aviation (i.e., strike risk to aircraft) or an indirect hazard such as an attractant to other wildlife that pose a strike hazard or are causing structural damage to airport facilities (e.g., burrowing, nesting, perching).

poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, agricultural or aquaculture activities, surface mining, wetlands, or some conservation-based land uses — can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife.

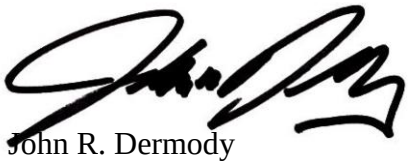
3. During the past century, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, as well as billions of dollars in aircraft damage. Hazardous wildlife attractants on and near airports can jeopardize future airport expansion, making proper community land-use planning essential. This AC provides airport operators and those parties with whom they cooperate with the guidance they need to assess and address potentially hazardous wildlife attractants when locating new facilities and implementing certain land-use practices on or near public-use airports.

6 Memorandum of Agreement Between Federal Resource Agencies.

The FAA, the U.S. Air Force, the U.S. Army Corps of Engineers, the U.S. Environmental Protection Agency, the U.S. Fish and Wildlife Service, and the U.S. Department of Agriculture - Wildlife Services signed a Memorandum of Agreement (MOA) to acknowledge their respective missions in protecting aviation from wildlife hazards. Through the MOA, the agencies established procedures necessary to coordinate their missions to address more effectively existing and future environmental conditions contributing to collisions between wildlife and aircraft (wildlife strikes) throughout the United States. These efforts are intended to minimize wildlife risks to aviation and human safety while protecting the Nation’s valuable environmental resources.

7 Feedback on this AC.

If you have suggestions for improving this AC, you may use the Advisory Circular Feedback form at the end of this AC.



John R. Dermody
Director of Airport Safety and Standards

CONTENTS

Paragraph **Page**

Chapter 1. General Separation Criteria for Hazardous Wildlife Attractants on or Near Airports 1-1

1.1 Introduction. 1-1

1.2 Airports Serving Piston-Powered Aircraft. 1-1

1.3 Airports Serving Turbine-Powered Aircraft. 1-2

1.4 Protection of Approach, Departure, and Circling Airspace. 1-2

Chapter 2. Land-Use Practices on or Near Airports that Potentially Attract Hazardous Wildlife 2-1

2.1 General. 2-1

2.2 Waste Disposal Operations. 2-2

2.3 Water Management Facilities. 2-4

2.4 Wetlands. 2-8

2.5 Dredge Spoil Containment Areas. 2-10

2.6 Agricultural Activities. 2-10

2.7 Aquaculture. 2-12

2.8 Golf Courses, Landscaping, Structures and Other Land-Use Considerations. 2-14

2.9 Habitat for State and Federally-Listed Species on Airports. 2-16

2.10 Synergistic Effects of Surrounding Land Uses. 2-17

Chapter 3. Procedures for Wildlife Hazard Management by Operators of Public-Use Airports and Conditions for Non-Certificated Airports to Conduct Wildlife Hazard Assessments and Wildlife Hazard Site Visits 3-1

3.1 Introduction. 3-1

3.2 Coordination with Qualified Airport Wildlife Biologists. 3-1

3.3 Wildlife Hazard Management at Airports: A Manual For Airport Personnel. 3-1

3.4 Wildlife Hazard Site Visits and Wildlife Hazard Assessments. 3-2

3.5 Wildlife Hazard Management Plan. 3-2

3.6 Local Coordination. 3-3

3.7 Operational Notifications of Wildlife Hazards. 3-3

3.8 Federal and State Depredation Permits. 3-4

2.2.7 Recycling Centers.

Recycling centers that accept previously sorted non-food items, such as glass, newspaper, cardboard, aluminum, electronic, and household wastes such as paint, batteries, and oil, are, in most cases, not attractive to hazardous wildlife and are acceptable.

2.2.8 Construction and Demolition Debris Facilities.

2.2.8.1 Construction and demolition landfills generally do not attract hazardous wildlife and are acceptable if maintained in an orderly manner, admit no putrescible waste, and are not co-located with other waste disposal operations. However, construction and demolition landfills have similar visual and operational characteristics to putrescible waste disposal sites. When co-located with putrescible waste disposal operations, construction and demolition landfills are more likely to attract hazardous wildlife because of the similarities between these disposal facilities.

2.2.8.2 Therefore, a construction and demolition landfill co-located with another waste disposal operation should be located outside of the separations identified in Paragraphs 1.2 through 1.4.

2.2.8.3 Airport operators should be aware that on-site storage of construction and maintenance debris, as well as out-of-service aircraft or aircraft components, may provide an attractant for hazardous species (e.g., nesting or perching locations). The FAA recommends these on-site areas be monitored and/or mitigated, if necessary.

2.2.9 Fly Ash Disposal.

2.2.9.1 The incinerated residue from resource recovery power/heat-generating facilities that are fired by municipal solid waste, coal, or wood is generally not a wildlife attractant because it no longer contains putrescible matter. Landfills accepting only fly ash are generally not considered to be wildlife attractants and are acceptable as long as they admit no putrescible waste of any kind, and are not co-located with other disposal operations that attract hazardous wildlife.

2.2.9.2 Since varying degrees of waste consumption are associated with general incineration (not resource recovery power/heat-generating facilities), the FAA considers the ash from general incinerators a regular waste disposal by-product and, therefore, a hazardous wildlife attractant if disposed of within the separation criteria outlined in Paragraphs 1.2 through 1.4.

2.3 Water Management Facilities.

Drinking water intake and treatment facilities, storm water and wastewater treatment facilities, associated retention and settling ponds, ponds built for recreational use, ponds

and fountains for ornamental purposes, and ponds that result from mining activities often attract large numbers of potentially hazardous wildlife. Development of new open water facilities within the separation criteria identified in Paragraphs 1.2 through 1.4 should be avoided to prevent wildlife attractants. If necessary, land-use developers and airport operators may need to develop management plans, in compliance with local and state regulations, to support the operation of storm water management facilities on or near all public-use airports to ensure a safe airport environment. The FAA recommends these plans be developed in consultation with a Qualified Airport Wildlife Biologist[3], to minimize hazardous wildlife attractants.

2.3.1 Existing Stormwater Management Facilities.

2.3.1.1 On-airport stormwater management facilities allow the quick removal of surface water, including discharges related to aircraft deicing, from impervious surfaces, such as pavement and terminal/hangar building roofs. Existing on-airport detention ponds collect stormwater, protect water quality, and control runoff. Because they slowly release water after storms, they may create standing bodies of water that can attract hazardous wildlife. Where the airport has developed a Wildlife Hazard Management Plan, Part 139 regulations require the immediate correction of any wildlife hazards arising from existing stormwater facilities located on or near airports using appropriate wildlife hazard mitigation techniques. Airport operators should develop measures to minimize hazardous wildlife attraction in consultation with a Qualified Airport Wildlife Biologist.

2.3.1.2 Where possible, airport operators should modify stormwater detention ponds to allow a maximum 48-hour detention period for the design storm. The combination of open water and vegetation is particularly attractive to waterfowl and other hazardous wildlife. Water management facilities holding water longer than 48 hours should be maintained in a manner that keeps them free of both emergent and submergent vegetation. The FAA recommends that airport operators avoid or remove retention ponds and detention ponds featuring dead storage to eliminate standing water. Detention basins should remain totally dry between rainfalls. Where constant flow of water is anticipated through the basin, or where any portion of the basin bottom may remain wet, the detention facility should include a concrete or paved pad and/or ditch/swale in the bottom to prevent vegetation that may provide nesting habitat. Drainage basins with a concrete or paved pad should be maintained to prevent or remove any sediment build-up to prevent vegetation growth.

2.3.1.3 When it is not possible to drain a large detention pond completely, airport operators may use physical barriers, such as bird balls, wire grids, pillows,

[3] See Advisory Circular 150/5200-36, *Qualifications for Wildlife Biologist Conducting Wildlife Hazard Assessments and Training Curriculums for Airport Personnel Involved in Controlling Wildlife Hazards on Airports.*

or netting, to deter birds and other hazardous wildlife. When physical barriers are proposed, airport operators must evaluate their use, effectiveness and maintenance requirements. Airport operators must also ensure physical barriers will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, airport operators must get approval from the appropriate FAA Regional Airports Division Office.

2.3.1.4 The FAA recommends that airport operators encourage off-airport stormwater treatment facility operators to incorporate appropriate wildlife hazard mitigation techniques into stormwater treatment facility operating practices when their facility is located within the separation criteria specified in Paragraphs 1.2 through 1.4.

2.3.2 New Stormwater Management Facilities.

The FAA recommends that storm water management systems located within the separations identified in Paragraphs 1.2 through 1.4 be designed and operated so as not to create above-ground standing water. Stormwater detention ponds should be designed, engineered, constructed, and maintained for a maximum 48–hour detention period after the design storm and to remain completely dry between storms. To facilitate the control of hazardous wildlife, the FAA recommends the use of steep-sided, rip-rap or concrete lined, narrow, linear-shaped water detention basins. When it is not possible to place these ponds away from an airport's aircraft operations area (but still on airport property), airport operators may use physical barriers, such as bird balls, wire grids, floating covers, vegetation barriers (bottom liners), or netting, to prevent access of hazardous wildlife to open water and minimize aircraft-wildlife interactions. Caution is advised when nets or wire grids are used for deterring birds from attractants. Mesh size should be < 5 cm (2") to avoid entangling and killing birds and should not be made of a monofilament material. Grids installed above and across water to deter hazardous birds (e.g., waterfowl, cormorants, etc.) are different than using a small mesh covering but also provides an effective deterrent. Grid material, size, pattern and height above water may differ on a case-by-case basis. When physical barriers are used, airport operators must evaluate their use and ensure they will not adversely affect water rescue. Before installing any physical barriers over detention ponds on Part 139 airports, a review by a Qualified Airport Wildlife Biologist should be conducted, prior to approval from the appropriate FAA Regional Airports Division Office. All vegetation in or around detention basins that provide food or cover for hazardous wildlife should be eliminated. If soil conditions and other requirements allow, the FAA encourages the use of underground storm water infiltration systems because they are less attractive to wildlife.

2.3.3 Existing Wastewater Treatment Facilities.

2.3.3.1 The FAA recommends that airport operators immediately correct any wildlife hazards arising from existing wastewater treatment facilities located on or near the airport.