

DRAFT LOCATION HYDRAULICS REPORT

Florida Department of Transportation

District Five

SR 535 PD&E Study

Limits of Project: FROM US 192 TO NORTH OF WORLD CENTER DRIVE (SR 536)

Orange and Osceola Counties, Florida

Financial Management Number: 437174-2

ETDM Number: 14325

Date: May 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 the Florida Department of Transportation (FDOT) pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022 and executed by the Federal Highway Administration and FDOT.

Authorized Signature

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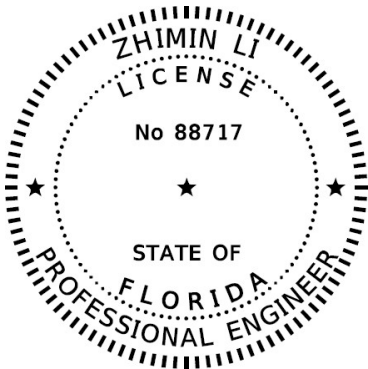
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PROFESSIONAL ENGINEERING CERTIFICATE

I hereby certify that I am a registered professional engineer in the State of Florida practicing with BCC Engineering LLC, a corporation, authorized to operate as an engineering business by the State of Florida, and that I have reviewed or approved the evaluation, findings, opinions, conclusions, or technical advice hereby reported for:

Project: SR 535 PD&E from US 192 to North of World Center Drive
FM Number: 437174-2
Location: Osceola and Orange County, Florida
Client: FDOT District Five

This PD&E Location Hydraulics Report includes a summary of data collection efforts and engineering analysis for this SR 535 project. 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 and planning as applied through professional judgment and experience.



Name: Zhimin Li, P.E.
P.E. Number 88717
Date May 20, 2024

This item has been electronically signed and sealed by Zhimin Li, P.E. on _____ using a digital signature. Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Executive Summary

SR 535 is a four-lane divided minor arterial facility located within unincorporated Osceola and Orange Counties in Central Florida. SR 535 is known as Vineland Road in Osceola County and Kissimmee-Vineland Road in Orange County. The project limits extend approximately 2.35 miles from the US 192 intersection in Osceola County to just north of the SR 536 intersection in Orange County. The purpose of the project is to accommodate future projected traffic demand and improve safety. The need for the project is based on addressing future transportation demand and safety concerns.

The project is within the jurisdiction of MetroPlan Orlando. The MetroPlan Orlando 2045 Cost Feasible Plan (CFP) includes widening of SR 535 from US 192 in Osceola County to SR 536 in Orange County in years 2031 to 2035 (construction). The SR 535 improvements are funded for design in the Florida Department of Transportation (FDOT) 2024-2029 Five-Year Work Program and MetroPlan Orlando 2023-2028 Transportation Improvement Program (TIP). This project was screened in the Efficient Transportation Decision Making (ETDM) system as ETDM #14325.

'No-Build' and Construction ('Build') Alternatives were evaluated during the study. The build alternative consists of widening SR 535 from four to six lanes. The study evaluated a range of typical section and intersection alternatives including inside widening and outside widening of the existing roadway. The build alternative analysis included the evaluation of open and closed stormwater drainage conveyance systems together with the evaluation of pond site locations. The study also evaluated Transportation System Management and Operations (TSMO) and multimodal improvements.

The Preferred Alternative consists of inside widening from four to six lanes with a shared use path along both sides and intersection improvements. The Preferred Alternative has a design speed of 45-miles per hour (mph) and consists of full reconstruction with the additional lanes constructed towards the median. The typical section consists of three (3) 11-foot travel lanes in each direction separated by a 32-foot to 47-foot median with a 14-foot shared use path on the west side and a 12-foot shared use path on the east side of the roadway. The Preferred Alternative will be constructed within the existing right-of-way width of 200-feet to 224-feet. Swales with ditch bottom inlets in conjunction with flume inlets at the curb line will be provided for drainage conveyance.

The Preferred Alternative will also implement intersection improvements including the following innovative intersection concepts.

- Polynesian Isle Boulevard Partial Median U-Turn (PMUT): Implementation of the PMUT involves the removal of northbound and southbound direct left turn movements from SR 535 to Polynesian Isle Boulevard and the addition of signalized U-turns at the existing median openings located just north and south of the intersection along SR 535 to accommodate vehicles wishing to travel east or west on Polynesian Isle Boulevard.
- International Drive Partial Displaced Left Turn (PDLT). Implementation of the PDLT involves the removal of direct eastbound and westbound left turns from International Drive at SR 535 with the displaced left turns installed on both legs International Drive. The

northbound and southbound left turn movements for SR 535 continue to take place at the main intersection.

- SR 536 (World Center Drive) Partial Displaced Left Turn (PDLT). Implementation of the PDLT involves the removal and replacement of direct northbound and southbound left turns from SR 535 at SR 536 with the displaced left turns installed on both legs of SR 535. The eastbound and westbound left turn movements for the SR 536/World Center Drive continue to take place at the main intersection.

Protection of floodplains and floodways is required by Executive Order 11988: Floodplain Management, USDOT Order 5650.2, Floodplain Management and Protection, and Federal-Aid Policy Guidance on Location and Hydraulic Design of Encroachment on Flood Plains, 23 CFR Part 650A. The intent of these regulations is to avoid or minimize highway and land use development encroachments that reduce storage and increase water surface elevations within base floodplains. Where encroachment is unavoidable, the regulations require FDOT to take appropriate measures to minimize impacts. The LHR identifies and evaluates these impacts.

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRMs) for the study area. The relevant FIRM panel numbers are 12095C0585F and 12095C0605F for Orange County, Florida dated September 25, 2009, and 12097C0055G for Osceola County, Florida dated June 18, 2013.

There are no floodplains in the vicinity of the project within the Osceola County limits. There is a floodplain located on the west side of SR 535 between the Osceola/Orange County line and SR 536 within the Orange County limits, which is designated as Zone A (no base flood elevations determined). The floodplain through this area is traversed by International Drive and SR 417, which creates 3 distinct sections (identified as Floodplain 1, 2 and 3), although the floodplains are hydraulically connected.

There are no regulatory floodways within the project limits.

Five cross drains have been identified under SR 535 and SR 536 within the project limits as shown on **Table ES-1**.

Table ES-1: Cross Drain Summary

County	Road	Station	Location (Milepost)	Cross Drain Size and Type
Osceola	SR 535	1521+30	0.600	2-30" RCP
Osceola	SR 535	1544+00	1.037	2-24" RCP
Orange	SR 535	1570+00	0.382	1-24" RCP
Orange	SR 536	1599+00 LT	1.694	1-3'x8' CBC
Orange	SR 536	1609+50 LT	1.920	1-36" RCP

Project improvements will result in longitudinal and transverse impacts to the 100-year floodplain. Longitudinal impacts are anticipated from encroaching into the floodplain areas due to the proposed roadway improvements, as well as from a stormwater pond berm. SR 535 does not bisect the floodplain but is instead on the upstream fringe of the mapped floodplain. Transverse impacts are anticipated from the extension or replacement of the existing cross drains. A summary of the floodplain impacts is summarized in **Table ES-2**.

Table ES-2: Base Flood Elevations and Floodplain Impacts

Floodplain ID	Station Range	Base Flood Elevation	Floodplain Impacts (ac-ft)
1	1582+00 to 1600+00	95	4.82
2	1569+00 to 1582+00	91	1.78
3	1550+00 to 1569+00	89.5	2.29
Total			8.89

Since the three impact locations are hydraulically connected and within close proximity of each other, it was determined that the impacts from the three locations could be combined for developing compensation options. Equivalent storage was checked to ensure impacts at the lower elevations could be accommodated at each floodplain compensation site. Five floodplain compensation (FPC) sites have been developed as part of this analysis. All FPC sites analyzed will provide sufficient storage to mitigate floodplain impacts. A summary of the floodplain compensation volume provided for all alternatives is provided in **Table ES-3**.

Table ES-3 Floodplain Compensation Alternatives

FPC Site	Station	Offset	Floodplain Compensation Provided (ac-ft)
1	1586+00	Rt	14.45
2	1581+00	Rt	19.74
3	1575+00	Rt	19.74
4	1572+00	Lt	10.08
5	1566+00	Rt	12.75

All FPC sites analyzed will provide the requisite storage to offset floodplain impacts. As part of this analysis a comparison matrix was developed to determine which location would be the preferred alternative. Based on this preliminary analysis, FPC Site 1 is the recommended alternative

The floodplain is located in a low density, urbanized area, and the encroachments are classified as "minimal". Minimal encroachments on a floodplain occur when there is a floodplain involvement but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Normally, these minimal efforts to address the impacts will consist of applying the Department's drainage design standards and following the South Florida Water Management District (SFWMD) procedures to achieve the results that will not increase or significantly change the flood elevations and/or limits.

This project will make every effort to minimize the floodplain impacts resulting from the placement of fill. The maximum allowable roadway embankment slope will be used within the floodplain area to minimize the floodplain impacts, and floodplain compensation will be utilized in the stormwater ponds and roadside ditches where possible.

There is no change in flood "risk" associated with this project. The encroachments will not have a significant potential for interruption or termination of transportation facilities needed for emergency vehicles or used as an evacuation route. In addition, no significant adverse impacts on natural and beneficial floodplain values are anticipated and no significant impacts to highway users are expected.

All proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. Thus, there will be no significant adverse impacts on natural and beneficial floodplain values. It has been determined, through consultation with local, state, and federal water resources and floodplain management agencies that there is no regulatory floodway involvement on the project and that the project will not support base floodplain development that is incompatible with the existing floodplain management program.

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1.0 Introduction

In November 2017, the Florida Department of Transportation (FDOT) District Five (D-5) completed a Corridor Planning Study (CPS) to evaluate State Road 535 (SR 535) from US 192 in Osceola County to I-4 in Orange County. The purpose of the CPS was to identify specific problem areas along the corridor and evaluate multimodal alternatives that will be carried forward into future phases of project development in order to optimize the operations of the existing facility. Improvements identified as a result of the CPS included widening from four to six lanes, TSM&O and multimodal improvements, and intersection improvements (including innovative intersection designs).

FDOT D-5 is conducting a Project Development and Environment (PD&E) Study to evaluate the recommendations from the CPS including the widening of SR 535 from four to six lanes from US 192 in Osceola County to just north of World Center Drive (SR 536) in Orange County, approximately 2.35 miles. The Preliminary Engineering Report (PER) documents the project's purpose and need, the alternatives developed, the process of selecting the preferred alternative, and presents the preliminary design analysis for the preferred alternative.

This Pond Siting Report (PSR) was prepared as a component of the PD&E Study in accordance with the Florida Department of Transportation (FDOT) PD&E Manual (July 1, 2023). This report will preliminarily analyze the appropriate location and size of stormwater ponds to account for the increase of stormwater runoff due to the proposed roadway improvements.

The purpose of this pond siting report is to:

- Size ponds to provide the required water quality treatment and runoff attenuation
- Evaluate alternatives for stormwater management ponds
- Identify stormwater pond alternative locations
- Analyze impacts to adjacent properties
- Analyze impacts to wetlands and other environmental resources
- Identify opportunities for joint use locations
- Identify right-of-way needs
- Recommend preferred pond sites

Evaluation of floodplain impacts and alternative floodplain compensation (FPC) site analysis is provided in the Location Hydraulics Report (LHR) under separate cover.

The horizontal datum for the project is Florida State Plane (NAD 1983), East Zone. The vertical datum for the project is the North American Vertical Datum of 1988 (NAVD 88), and the elevation difference between NAVD 88 and NGVD 29 is -0.90 feet (i.e., the NAVD 88 elevation is 0.90 feet lower than the corresponding NGVD 29 elevation).

1.1 Project Description

SR 535 is a four-lane divided minor arterial facility located within unincorporated Osceola and Orange Counties in Central Florida. SR 535 is known as Vineland Road in Osceola

County and Kissimmee-Vineland Road in Orange County. The project limits extend approximately 2.35 miles from the US 192 intersection in Osceola County to just north of the SR 536 intersection in Orange County, as shown in **Figure 1-1**.

Figure 1-1: Project Location



1.2 Purpose & Need

The purpose of the project is to accommodate future projected traffic demand and improve safety. The need for the project is based on addressing future transportation demand and safety concerns.

1.2.1 Transportation Demand

In the existing condition, the section of SR 535 from US 192 to Kyngs Heath Road operates at a Level of Service (LOS) D with an Annual Average Daily Traffic (AADT) of 28,300; the section from Kyngs Heath Road to Poinciana Boulevard operates at LOS D with an AADT of 26,900; the section from Poinciana Boulevard to Polynesian Isle Boulevard operates at LOS D with an AADT of 46,800; the section from Polynesian Isle Boulevard to World Center Drive operates at LOS D with an AADT of 44,300.

In the future year (2045) No-Build condition, the section of SR 535 from US 192 and Kyngs Heath Road is projected to operate at LOS F with an AADT of 42,000; the section from Kyngs Heath Road to Poinciana Boulevard is projected to operate at LOS E with an AADT of 40,000; the section from Poinciana Boulevard to Polynesian Isle Boulevard is projected to operate at LOS F with an AADT of 69,000; the section from Polynesian Isle Boulevard to World Center Drive is projected to operate at LOS F with an AADT of 66,000.

1.2.2 Safety

A total of 981 crashes were reported on SR 535 from US 192 to Lake Bryan Beach Boulevard in the five-year period from 2014 through 2018. Of those reported crashes, 463 (47%) resulted in injury and four (4) resulted in a fatality. The most frequent crash type was rear end with 605 (62%) total crashes, indicating congestion. Sideswipe crashes were the second highest with 106 (11%), followed by left-turn with 93 (9%) total crashes. Of the 981 crashes, 602 (61%) crashes occurred during daylight conditions. The crash rates along this segment of SR 535 exceed the FDOT statewide **averages for similar facilities.**

1.3 Project Status

The project is within the jurisdiction of MetroPlan Orlando. The MetroPlan Orlando 2045 Cost Feasible Plan (CFP) includes widening of SR 535 from US 192 in Osceola County to SR 536 in Orange County in years 2031 to 2035 (construction). The SR 535 improvements are funded for design in the Florida Department of Transportation (FDOT) 2024-2029 Five-Year Work Program and MetroPlan Orlando 2023-2028 Transportation Improvement Program (TIP). This project was screened in the Efficient Transportation Decision Making (ETDM) system as ETDM #14325.

1.4 Commitments

This section will be included as part of the Final Preliminary Engineering Report (PER).

1.5 Alternatives Analysis Summary

The following alternatives were evaluated during the study:

- 'No-Build' Alternative
- Construction ('Build') Alternative

The build alternative consists of widening SR 535 from four to six lanes. The study evaluated a range of typical section and intersection alternatives including inside widening and outside widening of the existing roadway. The build alternative analysis included the evaluation of open and closed stormwater drainage conveyance systems together with the evaluation of pond site locations. The study

also evaluated Transportation System Management and Operations (TSMO) and multimodal improvements.

1.6 Description of Preferred Alternative

The Preferred Alternative consists of inside widening from four to six lanes with a shared use path along both sides and intersection improvements. The preferred alternative is shown on **Figure 1-2**.

The Preferred Alternative has a design speed of 45-miles per hour (mph) and consists of full reconstruction with the additional lanes constructed towards the median. The typical section consists of three (3) 11-foot travel lanes in each direction separated by a 32-foot to 47-foot median with a 14-foot shared use path on the west side and a 12-foot shared use path on the east side of the roadway. The Preferred Alternative will be constructed within the existing right-of-way width of 200-feet to 224-feet. Swales with ditch bottom inlets in conjunction with flume inlets at the curb line will be provided for drainage conveyance. Stormwater attenuation and floodplain compensation will be provided.

Figure 1-2: Preferred Typical Section



1.6.1 Intersection Improvements

The Preferred Alternative will also implement intersection improvements including the following innovative intersection concepts.

- Polynesian Isle Boulevard Partial Median U-Turn (PMUT): Implementation of the PMUT involves the removal of northbound and southbound direct left turn movements from SR 535 to Polynesian Isle Boulevard and the addition of signalized U-turns at the existing median openings located just north and south of the intersection along SR 535 to accommodate vehicles wishing to travel east or west on Polynesian Isle Boulevard.

- International Drive Partial Displaced Left Turn (PDLT). Implementation of the PDLT involves the removal of direct eastbound and westbound left turns from International Drive at SR 535 with the displaced left turns installed on both legs International Drive. The northbound and southbound left turn movements for SR 535 continue to take place at the main intersection.
- SR 536 (World Center Drive) Partial Displaced Left Turn (PDLT). Implementation of the PDLT involves the removal and replacement of direct northbound and southbound left turns from SR 535 at SR 536 with the displaced left turns installed on both legs of SR 535. The eastbound and westbound left turn movements for the SR 536/World Center Drive continue to take place at the main intersection.

1.6.2 Right-of-Way and Construction Cost

SR 535 has an existing right-of-way (R/W) of 224 feet which is ample R/W to accommodate the Preferred Alternative. Some R/W impacts will be required to accommodate intersection improvements at the International Drive and World Center Drive (SR 536) intersections and for offsite ponds. See **Table 1-1** for the cost estimate.

Table 1-1: Cost Estimate

	Cost
Construction	\$76.5M
R/W	\$38.1M
Utility Relocation	\$7M
Sub Total	\$121.6M
Design (15%)	\$11.5M
CEI (10%)	\$7.7M
Total Estimated Project Cost	\$140.8M

2.0 Data Collection

In order to locate the existing stormwater facilities, determine existing drainage patterns within the limits of the corridor, potential site availability, and design criteria and requirements, the following sources were used:

- FDOT Drainage Manual, 2024
- FDOT Drainage Design Guide, 2024
- SFWMD Environmental Resource Permit Applicant's Handbook, Volumes I (2020) and II (2016)
- Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps, Panel Nos. 12095C0605F, 12097C0055G, 12095C0585F
- Osceola and Orange County Property Appraiser Websites
- SFWMD Environmental Permit Research
- USDA Natural Resources Conservation Service (NRCS) Web Soil Survey
- NOAA LiDAR Data
- FDOT Aerial Maps
- USGS Topographic Map Quadrangles
- FDOT Straight Line Diagrams
- Geotechnical Investigations

3.0 Existing Conditions

3.1 Topography

SR 535 within the project limits is located within the Shingle Creek basin (WBID 3169A) and Lake Okeechobee Basin Management Action Plan (BMAP), and within the regulatory jurisdiction of the South Florida Water Management District (SFWMD). It should be noted that north of SR 417 SR 535 is located on the divide between WBID 3169A and WBID 3169B (Reedy Creek Basin), and the historical discharge from SR 535 is to WBID 3169A. The topography along the project corridor generally slopes from north to south, with elevations ranging from 101 feet NAVD at the SR 535/SR 536 intersection to 87 feet NAVD at the SR 535/SR 530 intersection). The existing project basin limits and existing permitted stormwater ponds are shown in **Table 3-1**.

Table 3-1: Summary of Existing Project Basins

Basin	Road	From	To	Outfall
1	SR 535	1490+00	1499+31	Exist. Pond 1-1
2	SR 535	1499+31	1595+75	Exist. Pond 2-1
3	SR 535	1595+75	1642+20	Exist. Pond 3-1 & Exist. Pond 3-2
4	International Dr	West of SR 535	End Construction	Exist. Pond 4-1 & Exist. Pond 4-2

3.2 Soils and Geotechnical Investigations

Based on the USDA Natural Resources Conservation Service (NRCS) Web Soil Survey, soils in the area are predominantly fine sands with a groundwater depth of approximately 1 foot below the ground surface. The soils encountered along the project limits are mostly hydrologic soil group (HSG) A/D and B/D soils. For dual classification soils, the first letter represents the drained condition, and the second letter represents the undrained condition. A summary of the soil types found in the vicinity of the project is provided in **Appendix D**.

The hydrologic soil groups are defined as follows:

- 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.

Please see **Appendix D** for NRCS Soil Survey information as well as preliminary geotechnical investigation at potential floodplain compensation site locations.

3.3 Contamination Screening

A total of 19 sites of potential contamination risk were identified along the project corridor in the Draft Contamination Screening Evaluation (CSER) Report for this PD&E Study. The 19 sites included 2 high-risk sites, 8 medium-risk sites and 9 low-risk sites. No sites are located at potential floodplain compensation site alternatives identified in **Section 6.0** of this report. Please see exhibits of potential contamination sites from the CSER in **Appendix A**.

3.4 Environmental Characteristics

3.4.1 Land Use Data

The project corridor is a mixture of residential, commercial, upland and wetland forest and wetlands. In general, the SR 535 corridor is heavily developed within the Osceola County limits, while there are more undeveloped areas on both sides of SR 535 within the Orange County limits. The widening of SR 535 does not alter the existing or future land uses in the area. Please see the Land Use Maps in **Appendix A**.

3.4.2 Cultural Features

Cultural features preserve and enhance the cultural nature of a community and include parks, schools, churches and other religious institutions. Also included are historic sites, archaeologically significant sites and resources, and potential historic districts. Based on a review of the project corridor, there are no sites within the Area of Probable Effect (APE) eligible for the National Register of Historic Places (NRHP) and no archeological sites within the APE.

3.4.3 Natural and Biological Features

The proposed project has potential to involve several State and/or Federally listed protected wildlife species. The project corridor was evaluated for the presence of potentially occurring species. These species and their anticipated involvement are identified in the Natural Resources Evaluation Report (NRE). The preferred alternative has “no effect”, “no effect anticipated”, “not likely to affect”, or “no adverse effect anticipated” on listed or protected species.

The potential presence of wetlands and other surface waters (OSW) were identified on the west side of SR 535 in Orange County through a desktop review of the FDOT Environmental Screening Tool (EST). In addition, Orange County and SFWMD conservation easements have also been identified in this area. Please see Appendix A for an exhibit showing the location of wetlands and conservation easements in relation to the project limits.

3.5 Cross Drains

Five cross drains have been identified under SR 535 and SR 536 within the project limits. A summary of the cross drain locations is provided in **Table 3-2**.

Table 3-2 Cross Drain Summary

Cross Drain	Road	Station	Location (Milepost)	Basin	Cross Drain Size and Type
CD-1	SR 535	1521+30	0.600	2	2-30" RCP
CD-2	SR 535	1544+00	1.037	2	2-24" RCP
CD-3	SR 535	1570+00	0.382	2 (offsite)	1-24" RCP
CD-4	SR 536	1599+00 LT	1.694	3	1-3'x8' CBC
CD-5	SR 536	1609+50 LT	1.920	3	1-36" RCP

- Cross drain CD-1 conveys runoff from the west side of SR 535 in Basin 2 to Exist. Pond 2-1
- Cross drain CD-2 conveys runoff from the west side of SR 535 to the east side of SR 535 in Basin 2. Runoff is conveyed by roadside ditch to Exist. Pond 2-1.
- Cross drain CD-3 conveys offsite runoff from the west side of SR 535 (Floodplain 2) on the north side of SR 417 to an existing ditch which runs east to Shingle Creek.
- Cross drain CD-4 is an equalizer pipe under SR 536 that interconnects Exist. Pond 3-1 and Exist. Pond 3-2.
- Cross drain CD-5 conveys runoff from the north side of SR 536 to the south side of SR 536 west of SR 535 (Floodplain 1).

3.6 Floodplains and Floodways

The Federal Emergency Management Agency (FEMA) has developed Flood Insurance Rate Maps (FIRMs) for the study area. The relevant FIRM panel numbers are 12095C0605F and 12095C0585F for Orange County, Florida dated September 25, 2009, and 12097C0055G for Osceola County, Florida dated June 18, 2013.

Based on the information contained within the FIRMs, there are no floodplains in the vicinity of the project within the Osceola County limits. There is a floodplain located on the west side of SR 535 between the Osceola/Orange County line and SR 536 within the Orange County limits, which is designated as Zone A (no base flood elevations determined).

The floodplain through this area is traversed by International Drive and SR 417, which creates 3 distinct sections (identified as Floodplain 1, 2 and 3), although the floodplain sections are hydraulically connected. There are no floodways located within the limits of the project. Please see **Appendix A** for exhibits showing the floodplain limits in the vicinity of the project, as well as the FEMA FIRMs.

In order to approximate a value for the BFEs to utilize in the floodplain impact calculations, the floodplain shapes were superimposed on contours generated from LiDAR data. The BFEs associated with each impact location have been identified in **Table 3-3**. This floodplain limit corresponds to approximately Sta. 1550+00 to 1597+00, Lt. along the SR 535 baseline.

There are no regulatory floodways within the project limits.

Table 3-3 Floodplain Limits and Approximate Base Flood Elevations

Floodplain ID	Location	SR 535 Station Range	Estimated Base Flood Elevation (ft)
1	Between International Drive and SR 536	1582+00 to 1597+00	95
2	Between SR 417 and International Drive	1569+00 to 1582+00	91
3	Between Osceola/Orange County line and SR 417	1550+00 to 1569+00	89.5

4.0 Proposed Conditions

The preferred typical section for SR 535 is a 6-lane divided urban roadway with shared use paths on both sides of the roadway. A combination of closed storm drain system and shallow roadside ditches located between the proposed curb and gutter and shared use paths are proposed on both sides of the roadway as shown in **Figure 1-2**. In general, basin limits and discharge points in the proposed condition will remain the same as the existing condition. The proposed project basin limits and outfalls are shown in **Table 4-1**.

Table 4-1: Summary of Proposed Project Basins

Basin	Road	From	To	Outfall (Preferred Pond Alternative)
1	SR 535	1490+00	1496+07	Exist. Pond 1-1
2	SR 535	1496+07	1595+75	Exist. Pond 2-1 & prop. pond
3	SR 535	1595+75	1642+20	Exist. Pond 3-1 & prop. pond
4	International Dr	West of SR 535	End Construction	Exist. Pond 4-1

4.1 Cross Drains

It is anticipated that cross drain improvements will consist of minor extensions or hydraulic replacements in kind to accommodate the proposed improvements. Several cross drains that convey runoff within on-site areas (e.g., CD-2 and CD-5) may be removed or plugged and filled if no longer needed for use in the proposed drainage system.

Modifications to cross drains will consist of minor extensions or replacement with hydraulically equivalent structures. Since the proposed structures will be hydraulically equivalent to or greater than the existing structures, backwater elevations are not expected to increase. As a result, the project will not adversely impact properties upstream of these cross drains.

4.2 Bridge Structures

There are no bridge structures over waterways within the project limits.

4.3 Floodplain Impacts and Mitigation

This project will impact the 100-year floodplain in 2 different ways:

- Longitudinal roadway impacts resulting from filling the floodplain areas. Project improvements will impact the 100-year floodplain as a result of longitudinal impacts as SR 535 does not bisect the floodplain but is instead on the upstream fringe of the mapped floodplain. Impacts to the floodplain were conservatively estimated based on the existing profile and the potential impacts of the road widening within the project limits. In addition to the impacts that result from the road widening, the Pond 3-2 maintenance berm will also encroach into the 100-year floodplain. Impacts from Pond 3-2 (part of the preferred Alternative 3A for Basin 3 in the Pond Siting Report) were conservatively estimated at the pond berm.
- Transverse impacts resulting from the extension or replacement of the existing cross drain culverts

The longitudinal impacts from the roadway improvements cannot be avoided as the project involves the widening of an existing roadway with site constraints (FGT line) to the east of SR 535. Minimization of impacts is accomplished by utilizing an urban typical section with widening to the inside as the preferred typical section. During the design phase, opportunities to minimize these impacts by optimizing the grading for ditches and proposed side slopes, or whether Pond 3-2 (which is an expansion of Exist. Pond 3-2) is able to provide any floodplain compensation, should be investigated. A summary of the estimated floodplain impacts is provided in **Table 4-2**, and calculations detailing the floodplain impacts within the project limits are provided in **Appendix B**.

Table 4-2: Base Flood Elevations and Floodplain Impacts

Floodplain ID	Station Range	Base Flood Elevation	Floodplain Impacts (ac-ft)
1	1582+00 to 1600+00	95	4.82*
2	1569+00 to 1582+00	91	1.78
3	1550+00 to 1569+00	89.5	2.29
Total			8.89

*the impacts for floodplain area 1 include the impacts associated with Pond 3-2

Since the three impact locations are hydraulically connected and within close proximity of each other, it was determined that the impacts from the three locations could be combined for developing compensation options. Five floodplain compensation (FPC) site alternatives have been developed and are included as part of this analysis. Equivalent

storage was checked to ensure impacts at the lower elevations could be accommodated at each floodplain compensation site. Pond liners have been assumed at FPC sites 1, 2, and 3 in order to provide compensation at equivalent elevations for those impacts at the lower end of the spectrum. Once more detailed information is obtained during the design phase it is anticipated that additional storage can be provided within the right of way at these lower elevations and the need for liners will either be reduced or eliminated. Since land adjacent to the floodplain in the vicinity of the project is limited due to the extent of floodplain and the conservation easements, four of the five FPC sites will be hydraulically connected to the floodplain utilizing storm drain piping. As discussed with SFWMD at the pre-application meeting, the average wet season water table was used to determine the vertical extents of the floodplain compensation available at each FPC site. The location of the five FPC sites are shown on the Pond Alternatives Drainage Map included in **Appendix A** and the compensation provided at each location is summarized in **Table 4-3** below. Detailed calculations for each floodplain compensation site are provided in **Appendix B**.

Table 4-3: Floodplain Compensation Site Alternatives

FPC Site	Station	Offset	Floodplain Compensation Provided (ac-ft)
1	1586+00	Rt	14.45
2	1581+00	Rt	19.74
3	1575+00	Rt	19.74
4	1572+00	Lt	10.08
5	1566+00	Rt	12.75

All FPC sites analyzed will provide the requisite storage to offset floodplain impacts. As part of this analysis a comparison matrix was developed to determine which location would be the preferred alternative. Based on this preliminary analysis, FPC Site 1 is the recommended alternative.

The evaluation matrix which outlines all of the variables included in the analysis has been provided in **Appendix C**.

4.4 Project Classification

The floodplain is located in a low density, urbanized area, and the encroachments are classified as "minimal". Minimal encroachments on a floodplain occur when there is a floodplain involvement but the impacts on human life, transportation facilities, and natural and beneficial floodplain values are not significant and can be resolved with minimal efforts. Normally, these minimal efforts to address the impacts will consist of applying the

Department's drainage design standards and following the Water Management District's procedures to achieve the results that will not increase or significantly change the flood elevations and/or limits.

4.5 Risk Evaluation

There is no change in flood "risk" associated with this project. The encroachments will not have a significant potential for interruption or termination of transportation facilities needed for emergency vehicles or used as an evacuation route. In addition, no significant adverse impacts on natural and beneficial floodplain values are anticipated and no significant impacts to highway users are expected.

4.6 Coordination with Local Agencies

Coordination with local agencies has occurred throughout the life of the study. The public involvement effort for this phase of the project included 4 Community Advisory Group (CAG) meetings as well as multiple meetings with representatives from Osceola and Orange Counties. All input received served as valuable information that was taken into consideration for the refinement of the alternatives and the development of the preferred alternative.

4.7 PD&E Manual Requirements for Projects with Minimal Encroachments

Part 2, Chapter 13 of the FDOT's PD&E Manual defines four categories of encroachments as they pertain to base floodplain involvement: no involvement, no encroachment, minimal encroachment and significant encroachment. The PD&E manual also lists the report criteria corresponding to these encroachment categories. The FDOT has different requirements based on the category of the encroachment. This SR 535 project is determined to have minimal encroachments, and as a result the requirements for this category are listed as follows:

1. Determination of whether the proposed action is within the base floodplain.
The proposed project is within the base floodplain.
2. The history of flooding of the existing facilities and/or measures to minimize any impacts due to the proposed project improvements.

According to FDOT District 5 Maintenance staff, there are no areas of flooding concern along SR 535 within the project limits. Compensating areas will be constructed to mitigate loss of storage in the floodplain due to the project improvements. The project will have no adverse impact on the existing condition.

3. Determination of whether the encroachment is longitudinal or transverse, and if it is a longitudinal encroachment an evaluation and discussion of practicable avoidance alternatives.

With the increase in the number of travel lanes and multimodal improvements proposed, there will be longitudinal and transverse impacts to the floodplain. There will also be isolated longitudinal impacts due to a stormwater pond berm. Longitudinal impacts will be minimized by widening the roadway towards the median and utilizing the maximum allowable roadway embankment slope. The transverse floodplain impacts from the project occur due to the minor extension or replacement of the existing cross drains. These impacts are not analyzed during this study and will need to be addressed during the design phase. The existing roadway is adjacent to the floodplain. Due to site constraints, there are no economically feasible avoidance alternatives.

4. The practicability of avoidance alternatives and/or measures to minimize impacts.

This project will make every effort to minimize the floodplain impacts resulting from the placement of fill. The maximum allowable roadway embankment slope will be used within the floodplain area to minimize the floodplain impacts, and floodplain compensation will be utilized in the stormwater ponds and roadside ditches.

5. Impact of the proposed improvements on emergency services and evacuation.

The cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. Compensating areas will be constructed to mitigate loss of storage in the floodplain due to the project improvements. As a result, there will be no significant change in flood risk, and there will not be a significant change in the potential for interruption or termination of emergency service or in emergency evacuation routes.

6. Impacts of the proposed improvement on the base flood, likelihood of flood risk, overtopping, location of overtopping, backwater, etc.

The proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. Compensating areas will be constructed to mitigate loss of storage in the floodplain due to the project improvements. As a result, there will be no significant change in flood risk or overtopping.

7. Determination of the impact of the proposed improvements on regulatory floodways, if any, and documentation of coordination with FEMA and local agencies to determine the project's consistency with the regulatory floodway.

There is no involvement with regulatory floodways within the project limits.

8. The impacts on natural and beneficial floodplain values, and measures to restore and preserve these values (this information may also be addressed as part of the wetland impact evaluation and recommendations).

No impacts to natural and beneficial floodplain values are anticipated. Longitudinal floodplain impacts are limited to the upstream fringe of the mapped floodplain, and compensating areas will be constructed to mitigate loss of storage in the floodplain due to the project improvements. The proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase.

- 9. Consistency of the proposed improvements with the local floodplain development plan or the land use elements in the Comprehensive Plan, and the potential impacts of encouraging development within the 100-year base floodplain.

The project will remain consistent with local floodplain development plans. The project will not support base floodplain development that is incompatible with existing floodplain management programs.

- 10. A map showing project, location and impacted floodplains. Provide copies of all applicable FIRM maps should be included within the final LHR report appendix.

See Appendix A for exhibits.

- 11. Results of any and all project risk assessments performed.

The proposed cross drains will perform hydraulically in a manner equal to or greater than the existing condition, and backwater surface elevations are not expected to increase. As a result, there will be no significant change in flood risk.

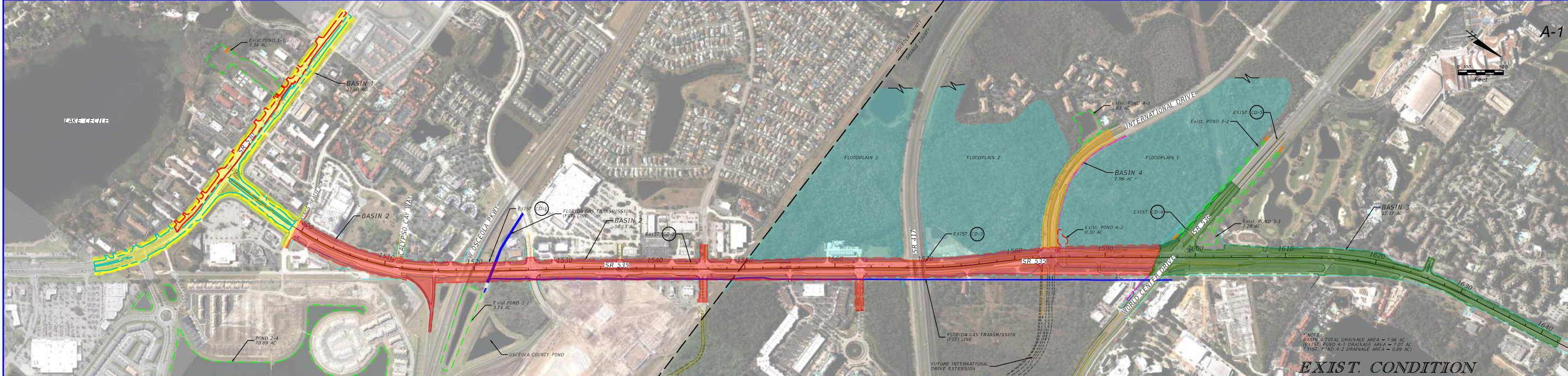
5.0 Conclusions

The modifications to drainage structures included in the project will result in an insignificant change in their capacity to carry stormwater. This change will cause minimal increases in flood heights and flood limits. Replacement drainage structures for this project are limited to hydraulically equivalent structures. The limitations to the hydraulic equivalency being proposed are basically due to restrictions imposed by the geometrics of design, existing development, cost feasibility, or practicability. An alternative encroachment location is not considered in this category since it defeats the project purpose or is economically unfeasible.

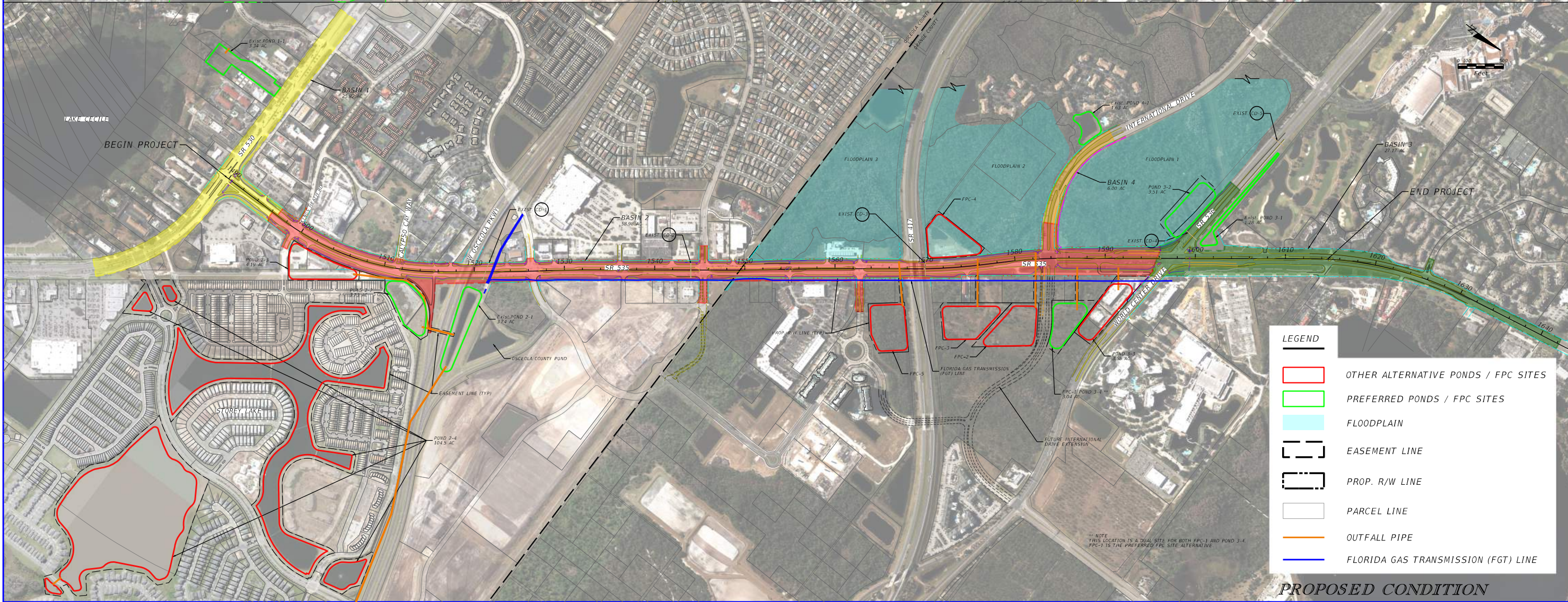
The proposed cross drains will be hydraulically equivalent to or greater than the existing condition, and backwater surface elevations are not expected to increase. Equivalent volumetric compensation will be provided for all locations where fill will be placed within the floodplain. As a result, the project will not affect existing flood heights or floodplain limits. This project will not result in any new or increased adverse environmental impacts. There will be no significant change in the potential for interruption or termination or emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

Appendix A

Exhibits



EXIST. CONDITION



PROPOSED CONDITION

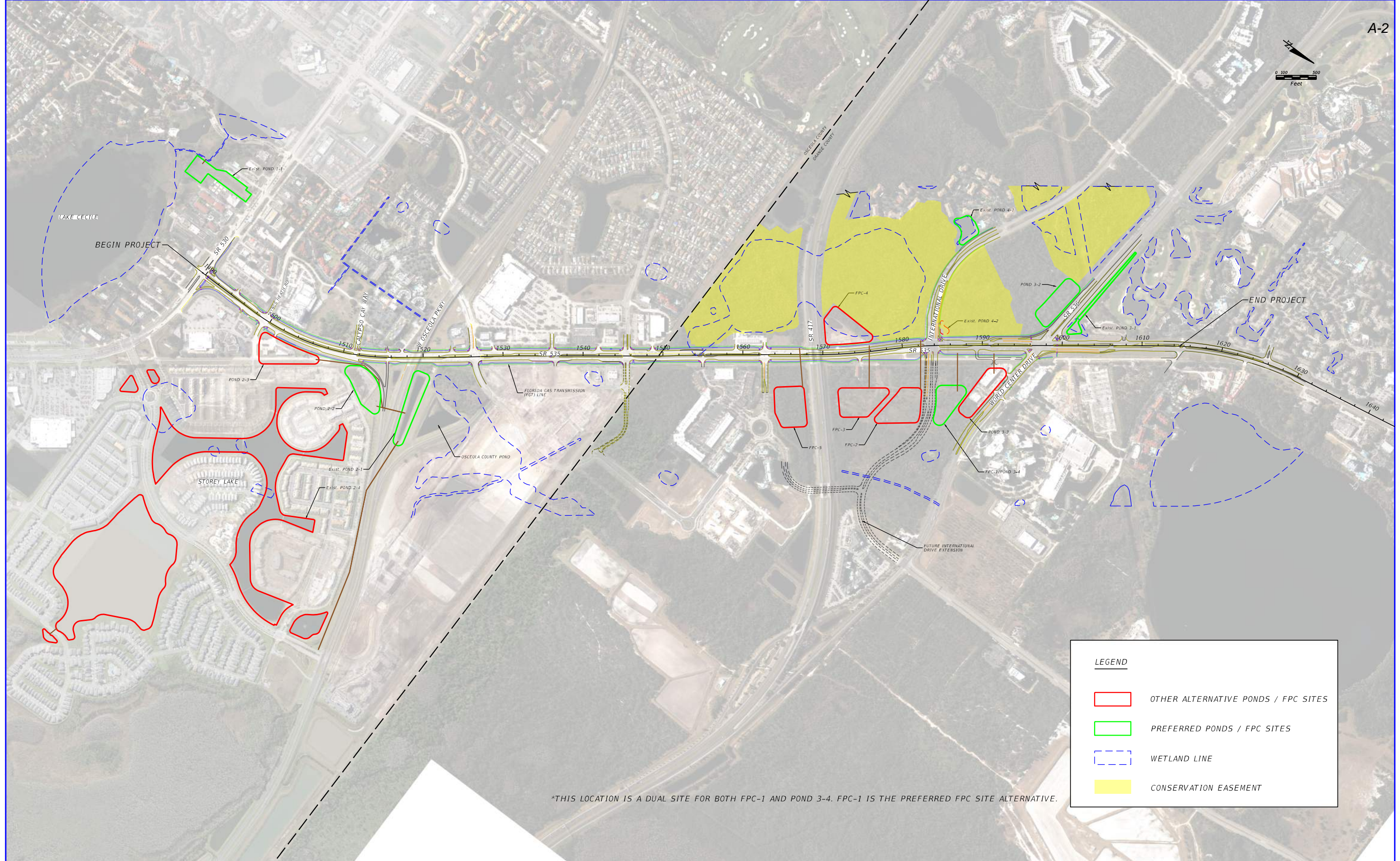
REVISIONS	
DATE	DESCRIPTION

ZHIMIN LI, P.E.
 P.E. LICENSE NUMBER 88717
 BCC ENGINEERING, LLC.
 160 N. WESTMONTE DRIVE, SUITE 2000
 ALTAMONTE SPRINGS, FLORIDA 32714

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 535	ORANGE OSCEOLA	43717422201

POND ALTERNATIVES DRAINAGE MAP

SHEET NO.



*THIS LOCATION IS A DUAL SITE FOR BOTH FPC-1 AND POND 3-4. FPC-1 IS THE PREFERRED FPC SITE ALTERNATIVE.

LEGEND

- OTHER ALTERNATIVE PONDS / FPC SITES
- PREFERRED PONDS / FPC SITES
- WETLAND LINE
- CONSERVATION EASEMENT

REVISIONS				ZHIMIN LI, P.E. P.E. LICENSE NUMBER 88717 BCC ENGINEERING, LLC. 160 N. WESTMONTE DRIVE, SUITE 2000 ALTAMONTE SPRINGS, FLORIDA 32714	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			<h2 style="margin: 0;">POND ALTERNATIVES ENVIRONMENTAL EXHIBIT</h2>	SHEET NO.	
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		POND ALTERNATIVES ENVIRONMENTAL EXHIBIT	SHEET NO.
					SR 535	ORANGE OSCEOLA	43717422201			



LEGEND

- OTHER ALTERNATIVE PONDS / FPC SITES
- PREFERRED PONDS / FPC SITES
- WETLAND LINE
- FLOODPLAIN

NOTE:
 *THIS LOCATION IS A DUAL SITE FOR BOTH FPC-1 AND POND 3-4.
 FPC-1 IS THE PREFERRED FPC SITE ALTERNATIVE.

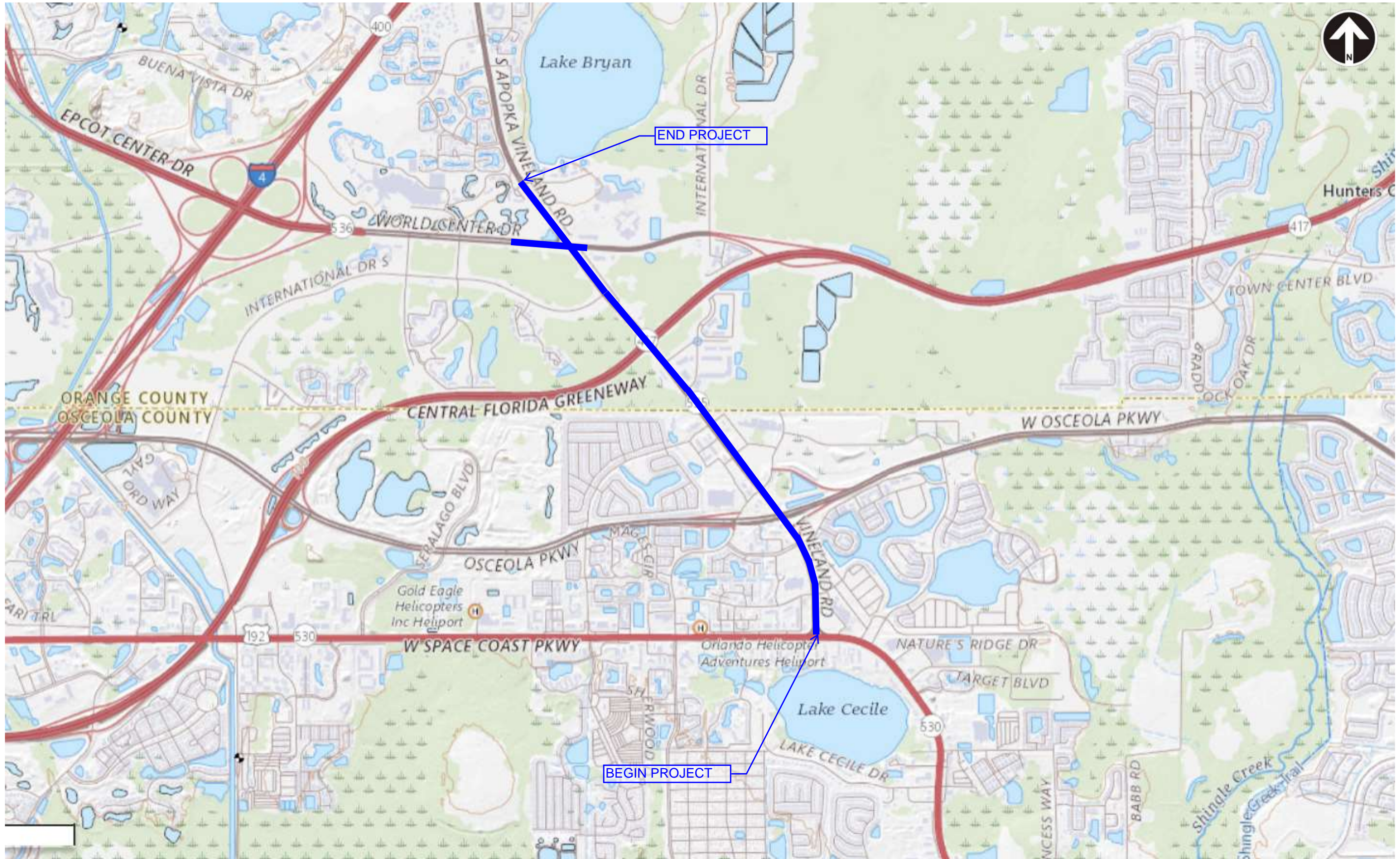
REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ZHIMIN LI, P.E.
 P.E. LICENSE NUMBER 88717
 BCC ENGINEERING, LLC.
 160 N. WESTMONTE DRIVE, SUITE 2000
 ALTAMONTE SPRINGS, FLORIDA 32714

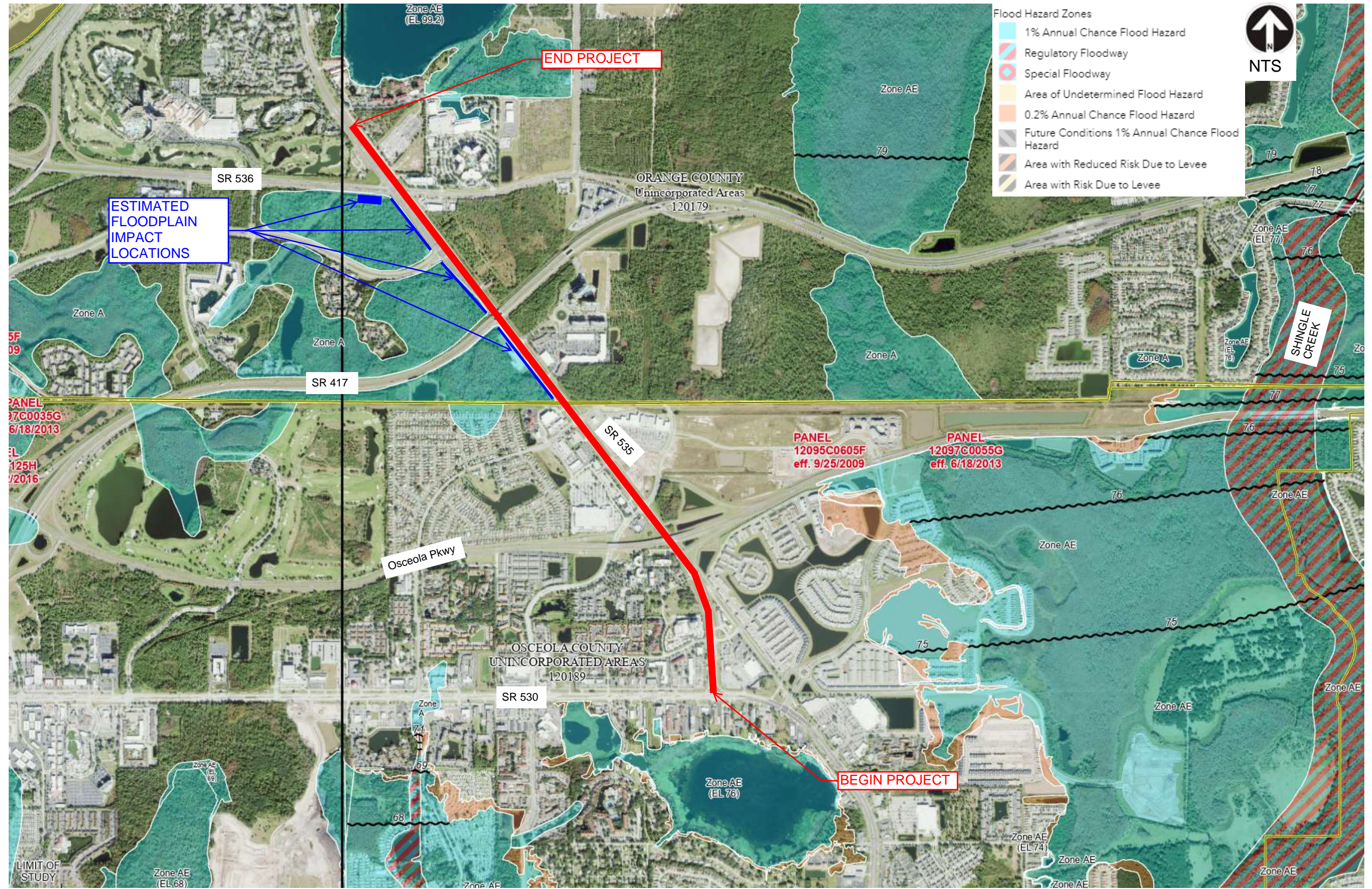
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 535	ORANGE OSCEOLA	43717422201

POND ALTERNATIVES FLOODPLAIN EXHIBIT

SHEET
NO.



SR 535 PD&E
FEMA Floodplains within Vicinity of Project Limits



LIMIT OF STUDY

NOTES TO USERS

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

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

Coastal Base Flood Elevations (CBFEs) shown on this map apply only landward of 0.7 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The projection used in the preparation of this map was Transverse Mercator State Plane Florida East FIPS 0901. The horizontal datum was NAD83 HARN, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

NGS Information Services
NOAA, NNGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

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

Base map information shown on this FIRM was provided in digital format by the Osceola County Planning Office. Orthophotography was collected in late 2007/early 2008.

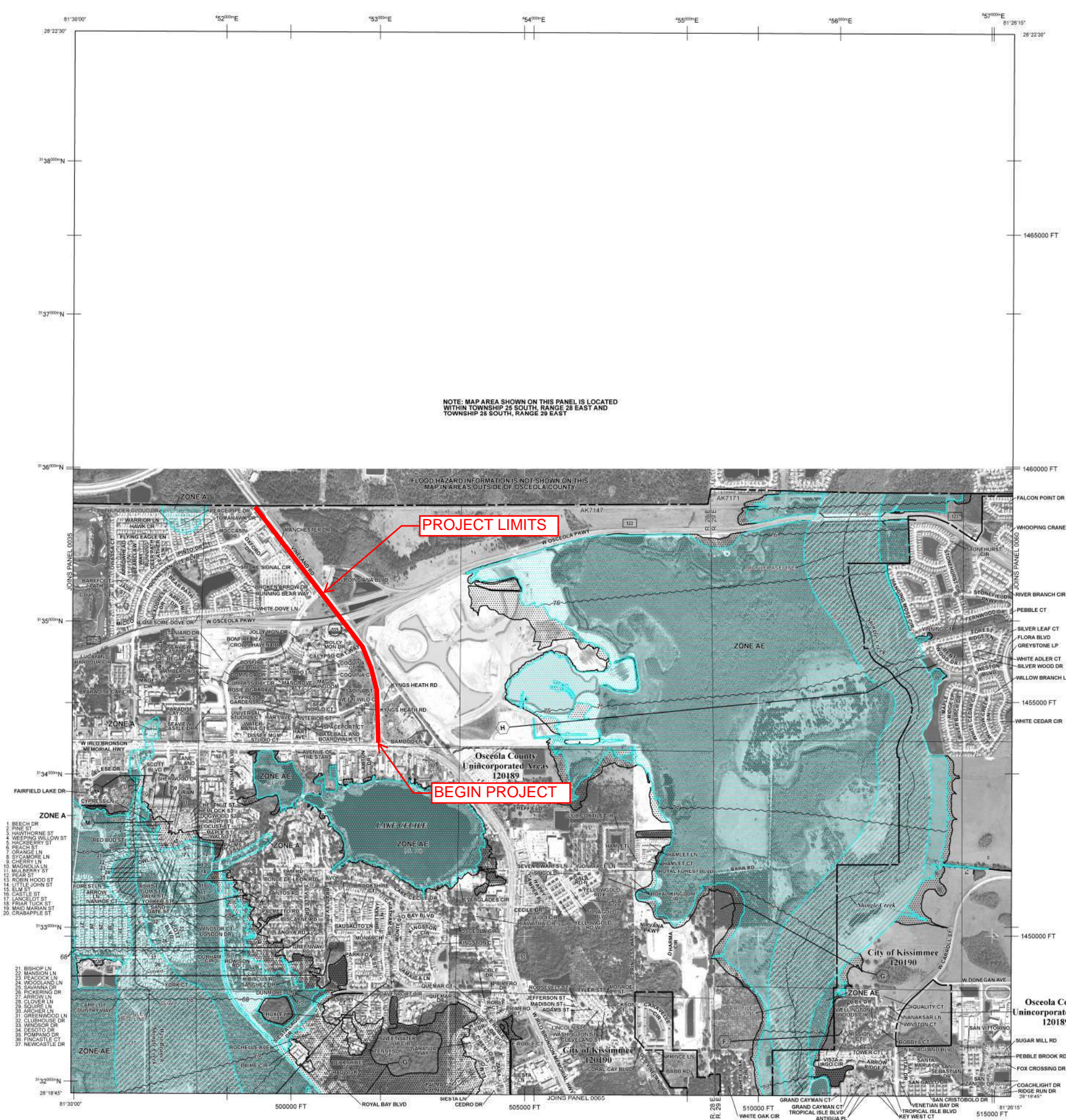
This map reflects more detailed and up-to-date stream channel configurations than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result,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

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

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

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

The "profile base lines" depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the "profile base line", in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.



NOTE: MAP AREA SHOWN ON THIS PANEL IS LOCATED WITHIN TOWNSHIP 25 SOUTH, RANGE 28 EAST AND TOWNSHIP 26 SOUTH, RANGE 29 EAST

PROJECT LIMITS

BEGIN PROJECT

LEGEND

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

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

ZONE A No Base Flood Elevations determined.

ZONE AE Base Flood Elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decommissioned. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE ARB Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

1% annual chance floodplain boundary
0.2% annual chance floodplain boundary
Floodway boundary
Zone D boundary
CBRS and OPA boundary
Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities
Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A --- A Cross section line
--- Transact line
Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
47°07'00"E
6000000 FT
DX5510
1:5000
River Mile
MAP REPOSITORIES
Refer to Map Repositories List on Map Index
EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
MAY 7, 2001
EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
JUNE 6, 2001 - To correct datum reference note.
JUNE 18, 2013 - To update corporate limits, change Base Flood Elevations, add Base Flood Elevations, change Special Flood Hazard Areas, change zone designations, update roads and road names, incorporate previously issued Letters of Map Revision, and reflect updated topographic information.

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

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

MAP SCALE 1" = 1000'

0 500 1000 1500 2000 FEET
0 500 1000 1500 METERS

NFIP **PANEL 0055G**

FIRM
FLOOD INSURANCE RATE MAP
OSCEOLA COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 55 OF 900
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KISSIMMEE, CITY OF	120190	0055	G
OSCEOLA COUNTY	120189	0055	G

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

MAP NUMBER 12097C0055G
MAP REVISED JUNE 18, 2013

Federal Emergency Management Agency

NOTES TO USERS

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

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

The **projection** used in the preparation of this map was State Plane Florida East FIPS Zone 0901. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

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

Base map information shown on this FIRM was provided in digital format by Orange County, Florida.

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

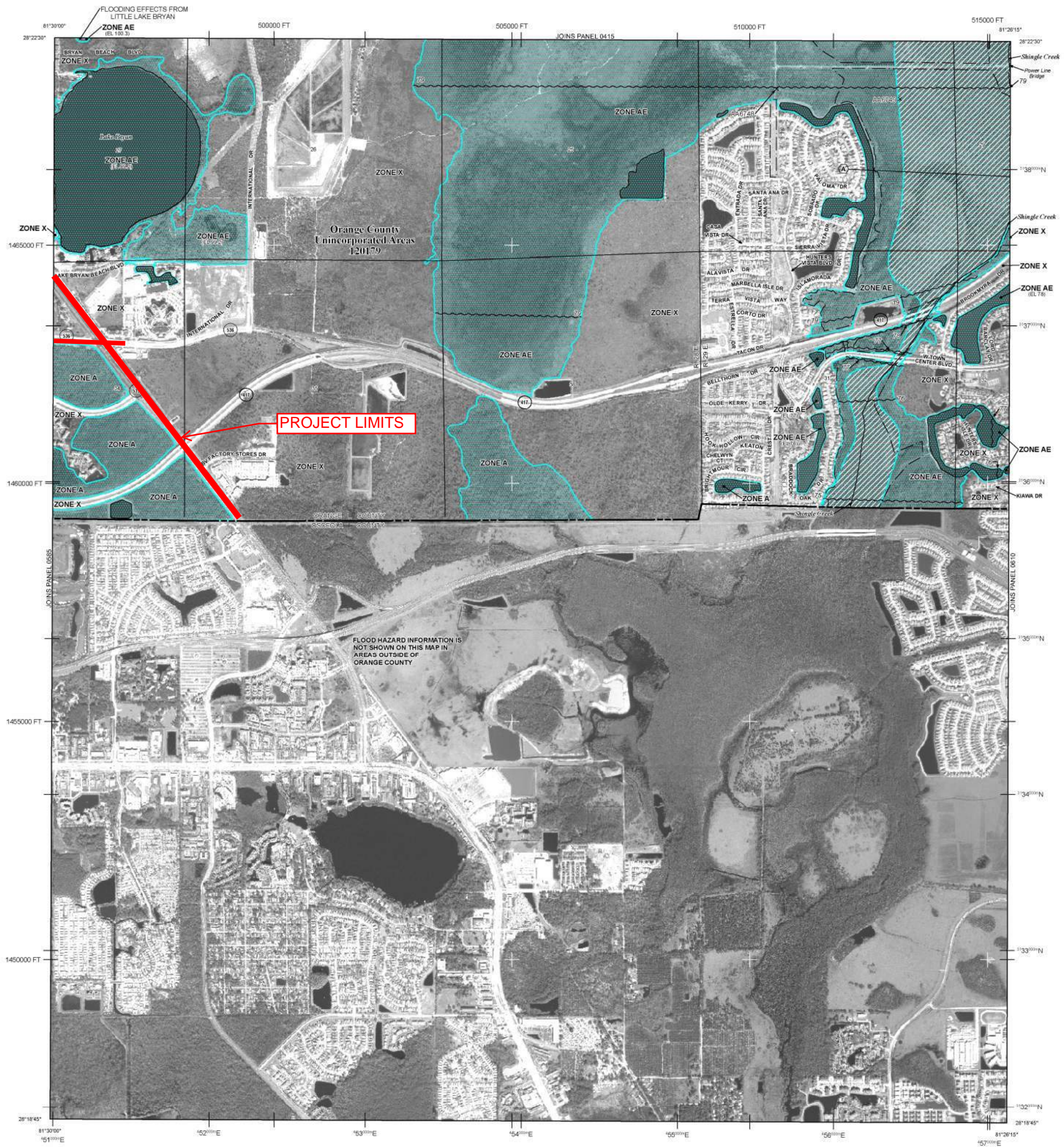
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Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions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

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

Watershed Name	Minimum Conversion	Maximum Conversion	Average Conversion	Maximum Offset
Big Econlockhatchee River	-1.03	-1.15	-1.09	0.06
Boggy Creek	-0.91	-1.01	-0.96	0.05
Cypress Creek	-0.87	-0.91	-0.89	0.02
Howell Branch	-0.90	-1.05	-0.98	0.07
Lake Apopka	-0.87	-0.97	-0.91	0.06
Lake Hart	-0.97	-1.07	-1.02	0.05
Little Econlockhatchee River	-0.92	-1.07	-1.01	0.09
Little Weeoka River	-0.91	-1.02	-0.95	0.07
Reedy Creek	-0.86	-0.89	-0.88	0.02
Shingle Creek	-0.88	-0.95	-0.91	0.04
St. Johns River	-1.08	-1.33	-1.19	0.14
Weeoka River	-0.88	-1.01	-0.94	0.07



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

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

- ZONE A:** No Base Flood Elevations determined.
- ZONE AE:** Base Flood Elevations determined.
- ZONE AH:** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO:** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR:** Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently determined. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE AR1:** Areas to be protected from 1% annual chance flood event by a federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V:** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE:** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

- ZONE X:** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D:** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- 1% annual chance floodplain boundary
- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 (EL 967) Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

①-② Cross section line

--- Transsect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

475°00'E
6000000 FT
5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPS ZONE = 901), Transverse Mercator projection

Bench mark (see explanation in Notes to Users section of this FIRM panel)

• M1.5 River Mile

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
DECEMBER 6, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

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

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

MAP SCALE 1" = 1000'

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0605F

FIRM
FLOOD INSURANCE RATE MAP
ORANGE COUNTY,
FLORIDA
AND INCORPORATED AREAS

PANEL 605 OF 750
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
ORANGE COUNTY 120179 0605 F

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

MAP NUMBER 12095C0605F

MAP REVISED SEPTEMBER 25, 2009
Federal Emergency Management Agency

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only to landward of 0.7 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was State Plane Florida East FIPS Zone 0901. The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

Spatial Reference System Division
National Geodetic Survey, NOAA
Silver Spring Metro Center
1315 East-West Highway
Silver Spring, Maryland 20910
(301) 713-3191

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (201) 713-3242 or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was provided in digital format by Orange County, Florida.

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

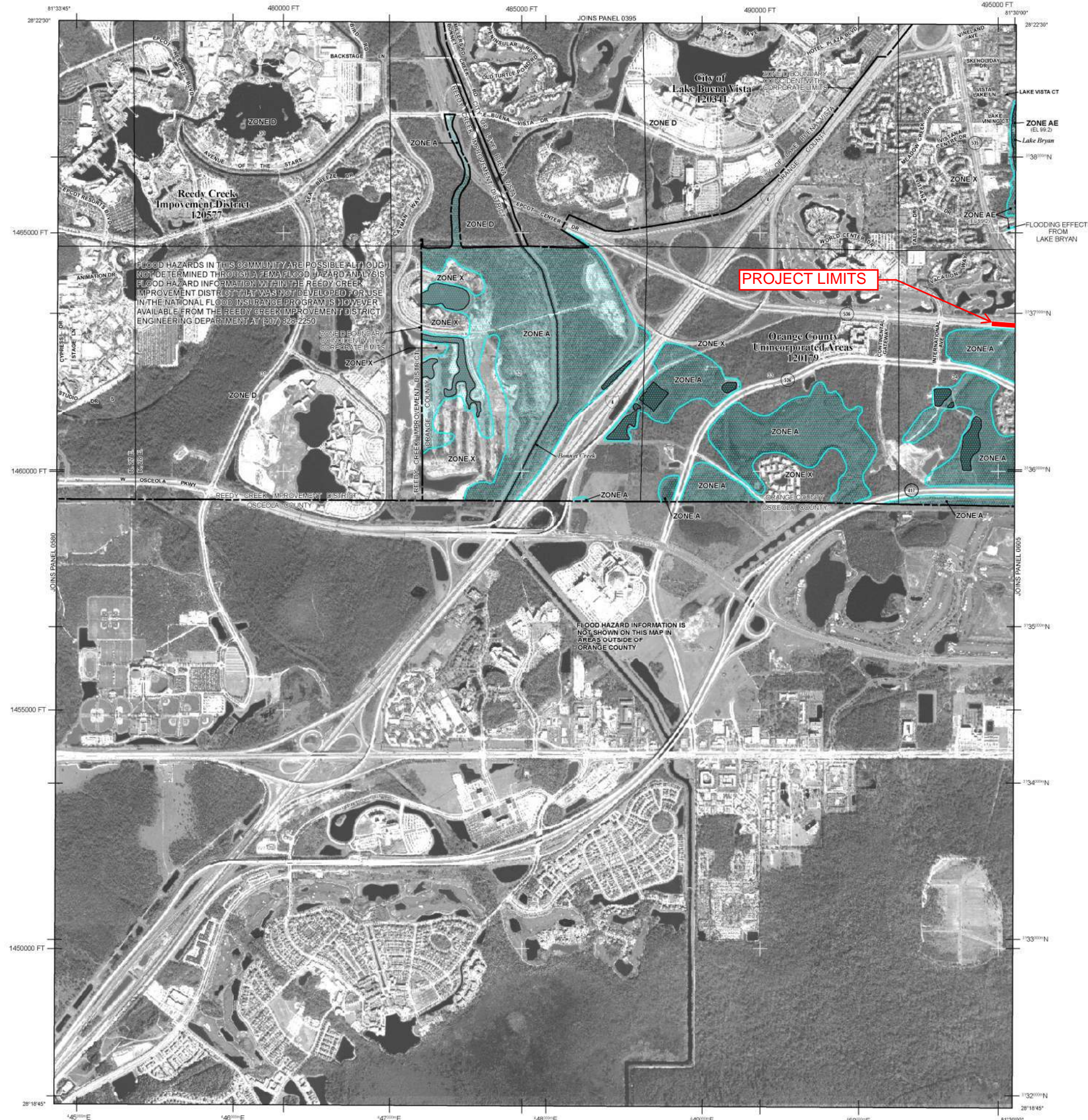
Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

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

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

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

NGVD29 to NAVD88 Vertical Datum Conversion Table (feet)				
Watershed Name	Minimum Conversion	Maximum Conversion	Average Conversion	Maximum Offset
Big Econlockhatchee River	-1.03	-1.15	-1.09	0.06
Boggy Creek	-0.91	-1.01	-0.96	0.05
Cypress Creek	-0.87	-0.91	-0.89	0.02
Howell Branch	-0.90	-1.05	-0.98	0.07
Lake Apopka	-0.87	-0.97	-0.91	0.06
Lake Hart	-0.97	-1.07	-1.02	0.05
Little Econlockhatchee River	-0.92	-1.07	-1.01	0.06
Little Weeoka River	-0.91	-1.02	-0.95	0.07
Reedy Creek	-0.86	-0.90	-0.88	0.02
Shingle Creek	-0.88	-0.95	-0.91	0.04
St. Johns River	-1.08	-1.33	-1.19	0.14
Weeoka River	-0.88	-1.01	-0.94	0.07



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT

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

ZONE A: No Base Flood Elevations determined.

ZONE AE: Base Flood Elevations determined.

ZONE AH: Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.

ZONE AO: Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of atypical fan flooding, velocities also determined.

ZONE AR: Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently identified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

ZONE AP: Areas to be protected from 1% annual chance flood event by a federal flood protection system under construction; no Base Flood Elevations determined.

ZONE V: Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.

ZONE VE: Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

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

OTHER FLOOD AREAS:

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

OTHER AREAS:

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

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

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- 0.2% annual chance floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 (EL 967)
- Base Flood Elevation line and value; elevation in feet*
- Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

A-A Cross section line

20-20 Transsect line

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

1000-meter Universal Transverse Mercator grid ticks, zone 17

5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPS/ZONE = 901), Transverse Mercator projection

Bench mark (see explanation in Notes to Users section of the FIRM panel)

River Mile

MAP REPOSITORIES

Refer to Map Repositories list on Map Index:

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP

DECEMBER 6, 2009

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

SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

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To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6520.

MAP SCALE 1" = 1000'

500 0 500 1,000 1,500 2,000 FEET
150 0 150 300 450 METERS

A-8

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0585F

FIRM

FLOOD INSURANCE RATE MAP

ORANGE COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 585 OF 750

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
LAKE BUENA VISTA, CITY OF	120341	0585	F
ORANGE COUNTY	120179	0585	F
REEDY CREEK IMPROVEMENT DISTRICT	120577	0585	T

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

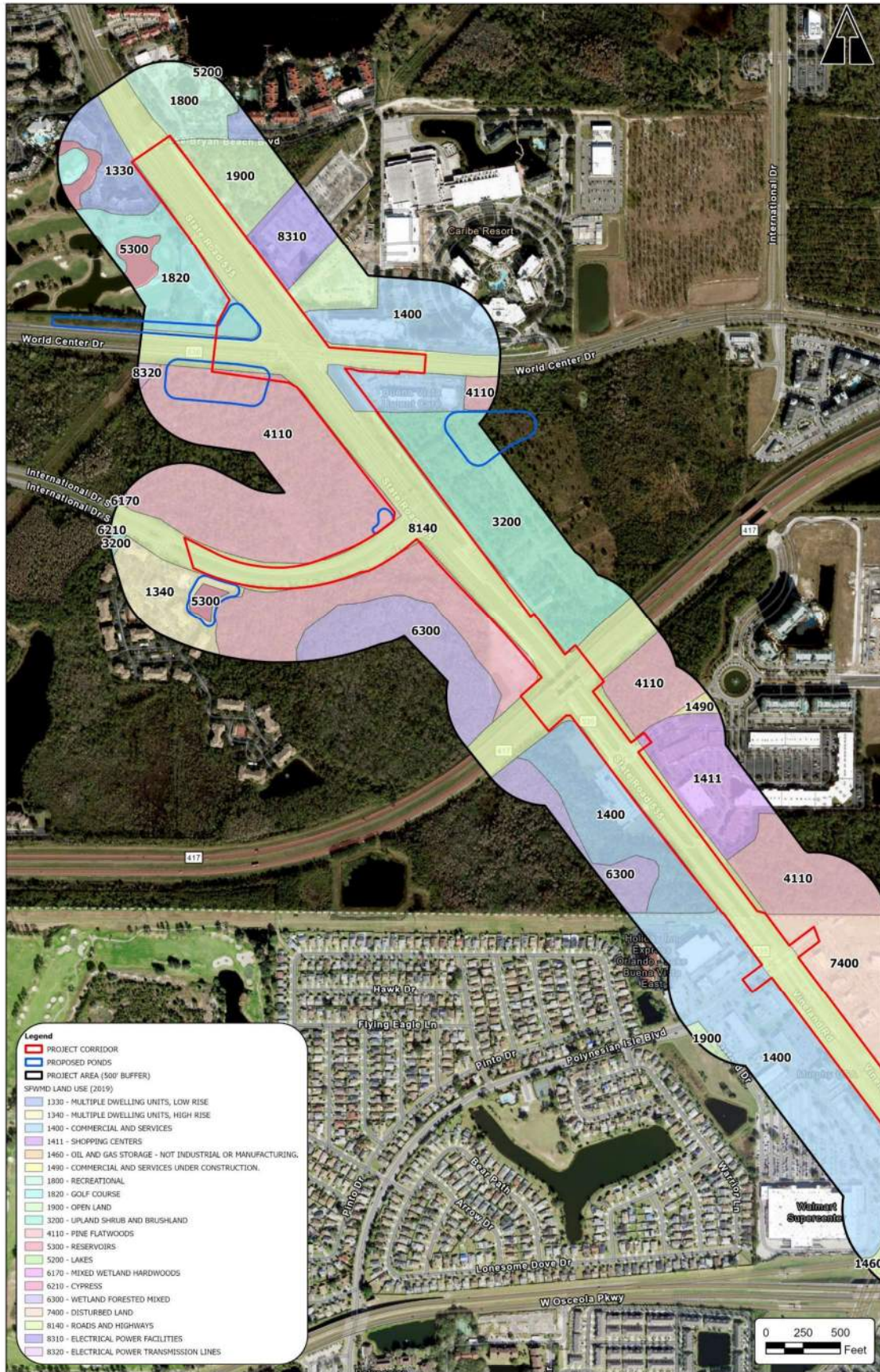
MAP NUMBER 12095C0585F

MAP REVISED

SEPTEMBER 25, 2009

Federal Emergency Management Agency

Land Use in Orange County Project Area



Land Use in Osceola County Project Area

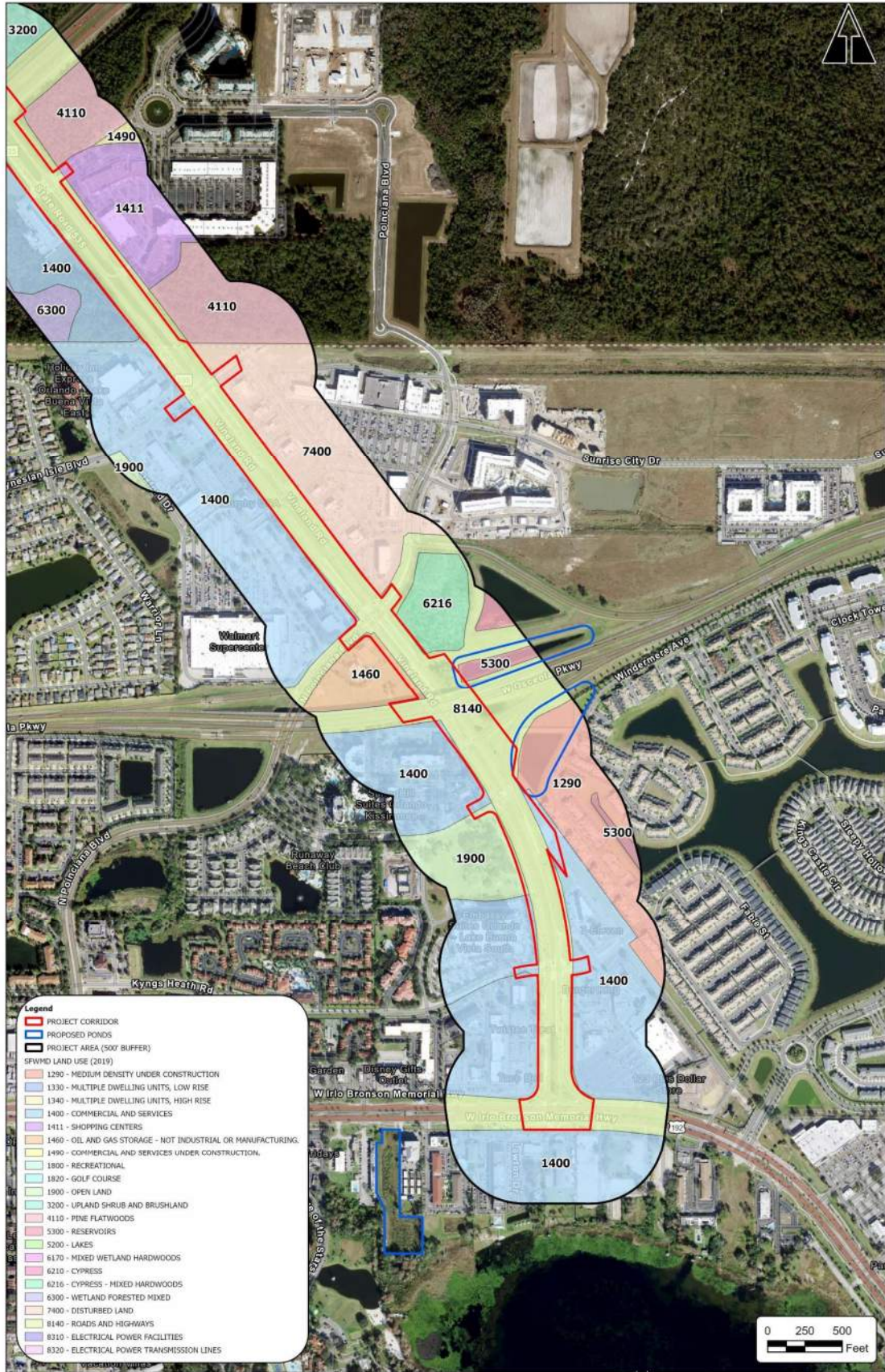


Figure 7.1 Contaminated Sites in Orange County Project Area

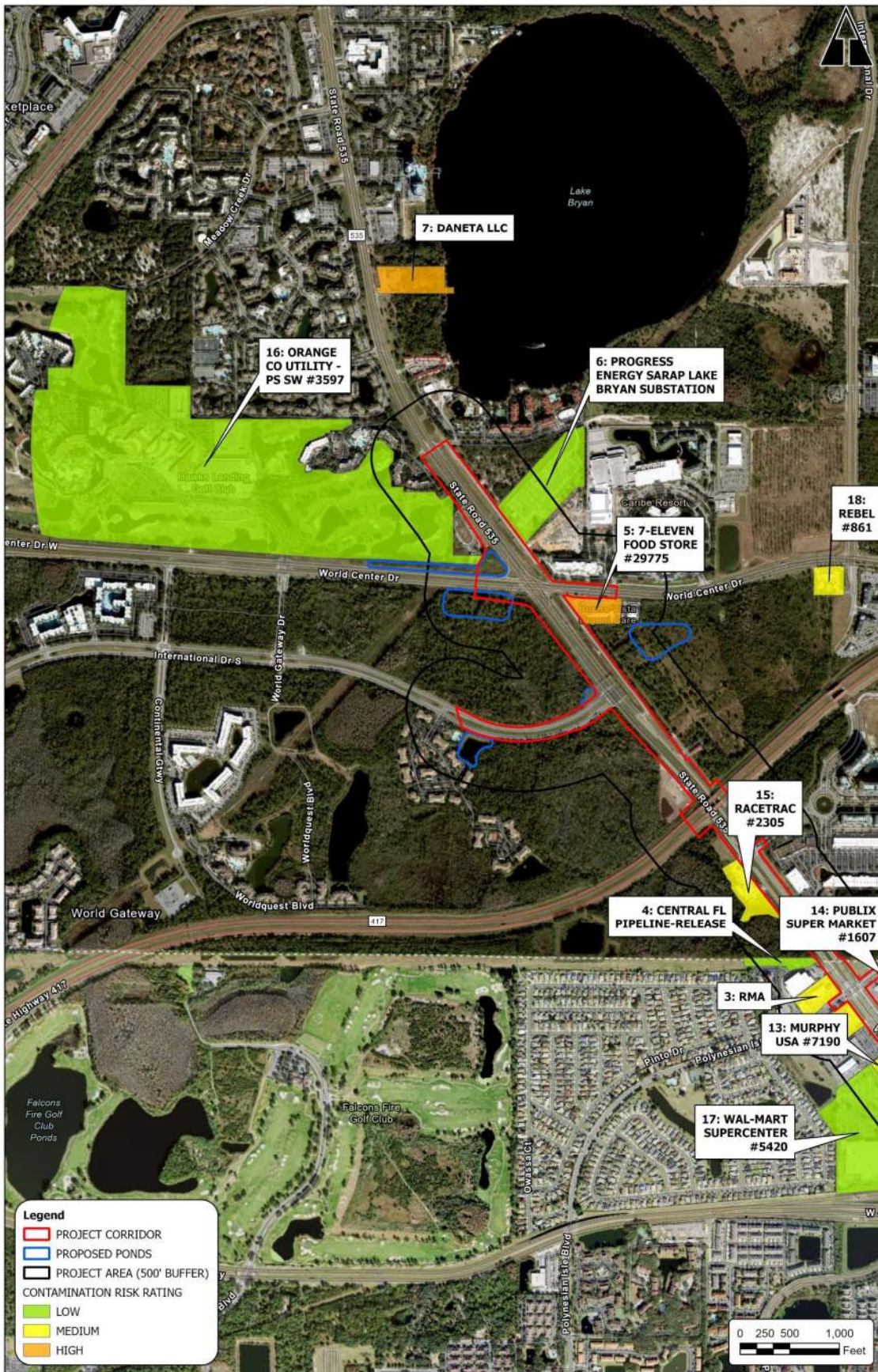
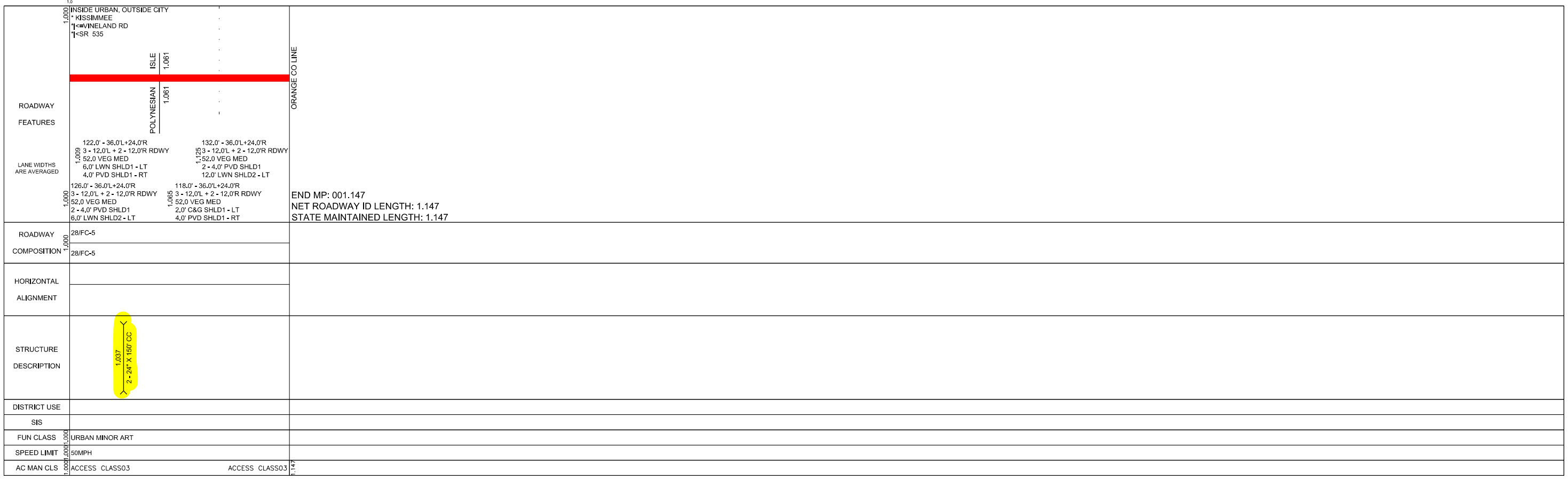
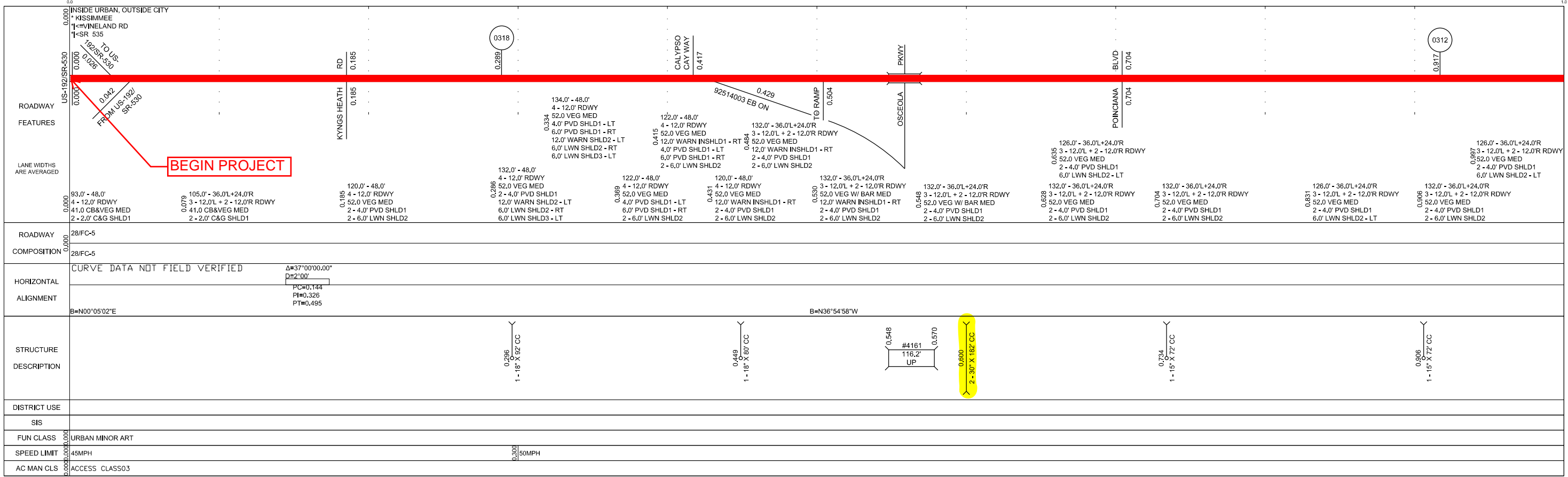
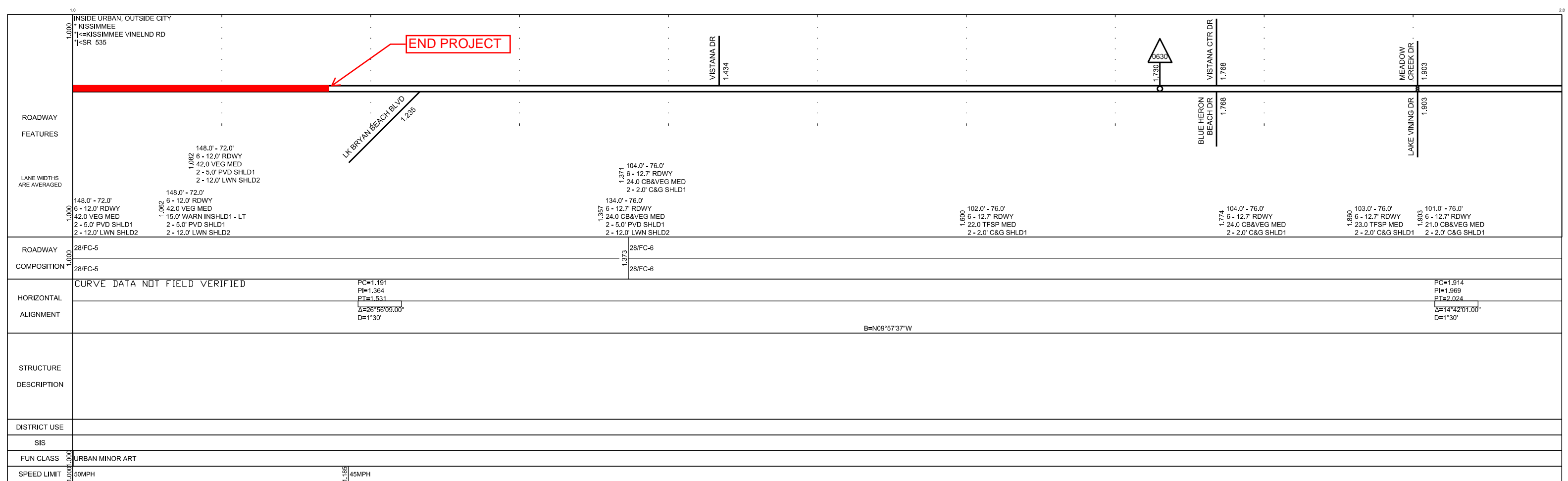
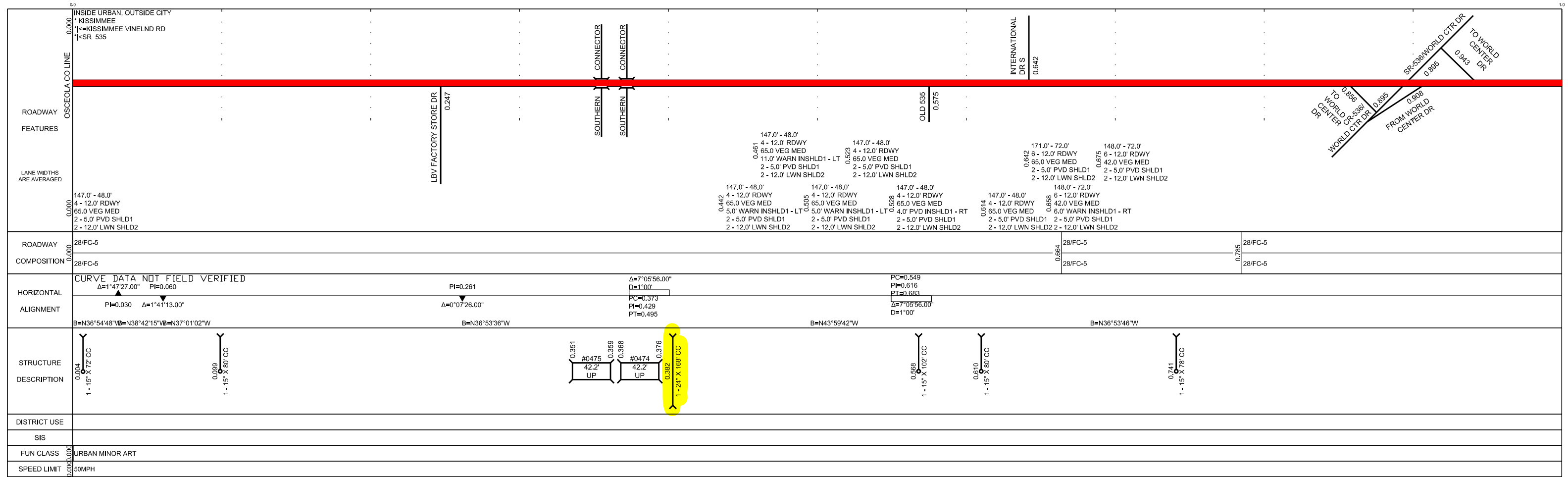
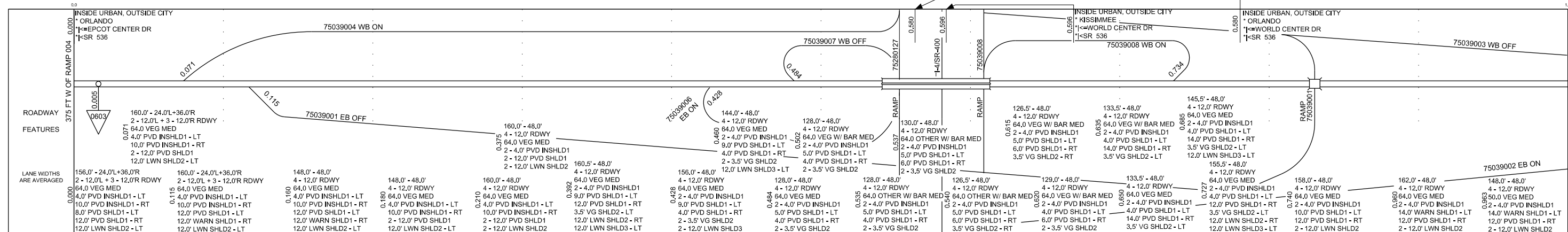


Figure 7.2 Contaminated Sites in Osceola County Project Area



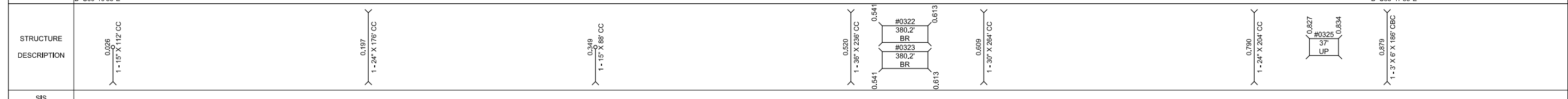






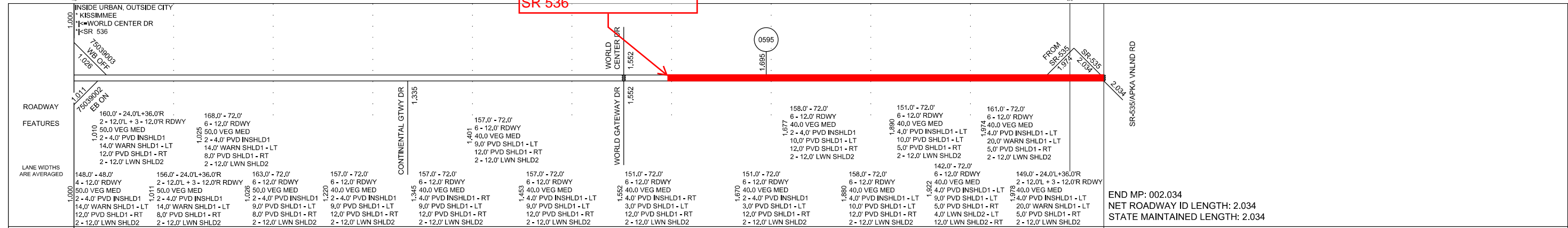
ROADWAY	28/FC-5	28/FC-5	28/FC-5	08/FC-5	28/FC-5	28/FC-5	28/FC-5
COMPOSITION	28/FC-5	28/FC-5	28/FC-5	08/FC-5	28/FC-5	28/FC-5	28/FC-5

HORIZONTAL ALIGNMENT	CURVE DATA NOT FIELD VERIFIED						$\Delta=19^{\circ}28'00.00"$ $D=2^{\circ}00'$ $PC=0.884$ $PI=0.777$ $PT=0.868$
	B=S69°19'33"E						B=S85°47'33"E



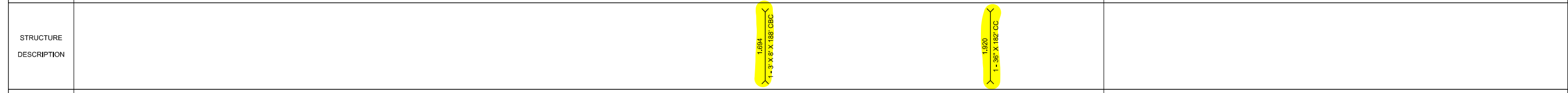
SIS	
FUN CLASS	URBAN MINOR ART
SPEED LIMIT	55MPH
AC MAN CLS	ACCESS CLASS03

BEGIN CONSTRUCTION
SR 536



ROADWAY	28/FC-5	28/FC-5	28/FC-5	28/FC-5	28/FC-5	28/FC-5	28/FC-5
COMPOSITION	28/FC-5	28/FC-5	28/FC-5	28/FC-5	28/FC-5	28/FC-5	28/FC-5

HORIZONTAL ALIGNMENT						
----------------------	--	--	--	--	--	--



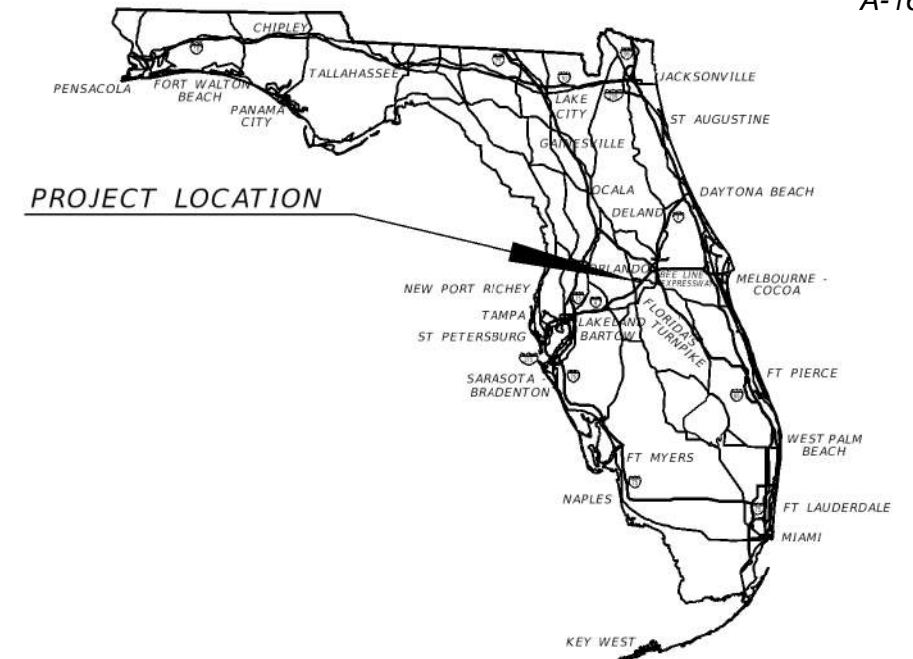
SIS	
FUN CLASS	URBAN MINOR ART
SPEED LIMIT	55MPH
AC MAN CLS	ACCESS CLASS03

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

TYPICAL SECTION PACKAGE

FINANCIAL PROJECT ID 437174-2-22-01
(FEDERAL FUNDS)
OSCEOLA COUNTY (92040) & ORANGE COUNTY (75035)
STATE ROAD NO. 535

ADD LANES AND RECONSTRUCT FROM US 192 TO
NORTH OF WORLD CENTER DRIVE (SR 536)



FDOT DISTRICT DESIGN ENGINEER
FDOT DISTRICT TRAFFIC OPERATIONS ENGINEER

CONCURRING WITH:
TYPICAL SECTION ELEMENTS
DESIGN & POSTED SPEEDS

CONCURRING WITH:
DESIGN & POSTED SPEEDS

FDOT DISTRICT INTERMODAL SYSTEMS
DEVELOPMENT MANAGER

FDOT DISTRICT STRUCTURES
DESIGN ENGINEER

CONCURRING WITH:
CONTEXT CLASSIFICATION
TARGET SPEED

CONCURRING WITH:
TYPICAL SECTION ELEMENTS

FHWA TRANSPORTATION ENGINEER

NOT USED

CONCURRING WITH:
TYPICAL SECTION ELEMENTS
TARGET SPEED

CONCURRING WITH:

NOT USED

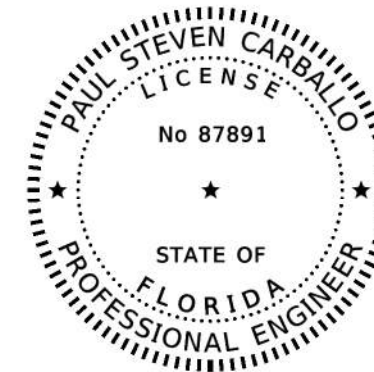
NOT USED

CONCURRING WITH:

CONCURRING WITH:

PROJECT LOCATION URL: <http://tinyurl.com/SR535>
PROJECT LIMITS: OSCEOLA COUNTY
MP 0.000 TO 1.147
ORANGE COUNTY
MP 0.000 TO 1.325
EXCEPTIONS: NONE
BRIDGE LIMITS: NONE
RAILROAD CROSSING: NONE

APPROVED BY:



THIS ITEM HAS BEEN DIGITALLY
SIGNED AND SEALED BY
PAUL STEVEN CARBALLO, 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.
METRIC ENGINEERING, INC.
13940 SW 136TH ST
MIAMI, FLORIDA, 33186
PAUL STEVEN CARBALLO, P.E. NO. 87891

THE ABOVE NAMED PROFESSIONAL ENGINEER SHALL BE RESPONSIBLE FOR THE
FOLLOWING SHEETS IN ACCORDANCE WITH RULE 61G15-23.004, F.A.C.

INDEX OF SHEETS

SHEET NO	SHEET DESCRIPTION
01	COVER SHEET
02	TYPICAL SECTION - A
03	TYPICAL SECTION - B
04	TYPICAL SECTION - C
05	TYPICAL SECTION - D

SHEET NO.

01

S:\DATEs - STIMES - s\USERS - s\pwwork\kingdir\metric-pw\diego.tamayo@metriceng.com\dms14147\TYPDRD02.dgn

PROJECT CONTROLS

TYPICAL SECTION - A

CONTEXT CLASSIFICATION

- () C1 : NATURAL (X) C3C : SUBURBAN COMM.
- () C2 : RURAL () C4 : URBAN GENERAL
- () C2T : RURAL TOWN () C5 : URBAN CENTER
- () C3R : SUBURBAN RES. () C6 : URBAN CORE
- () N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

- () INTERSTATE () MAJOR COLLECTOR
- () FREEWAY/EXPWY. () MINOR COLLECTOR
- () PRINCIPAL ARTERIAL () LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- () NATIONAL HIGHWAY SYSTEM
- () STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- () OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

- () 1 - FREEWAY
- () 2 - RESTRICTIVE w/Service Roads
- (X) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- () 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- () 5 - RESTRICTIVE w/440 ft. Connection Spacing
- () 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- () 7 - BOTH MEDIAN TYPES

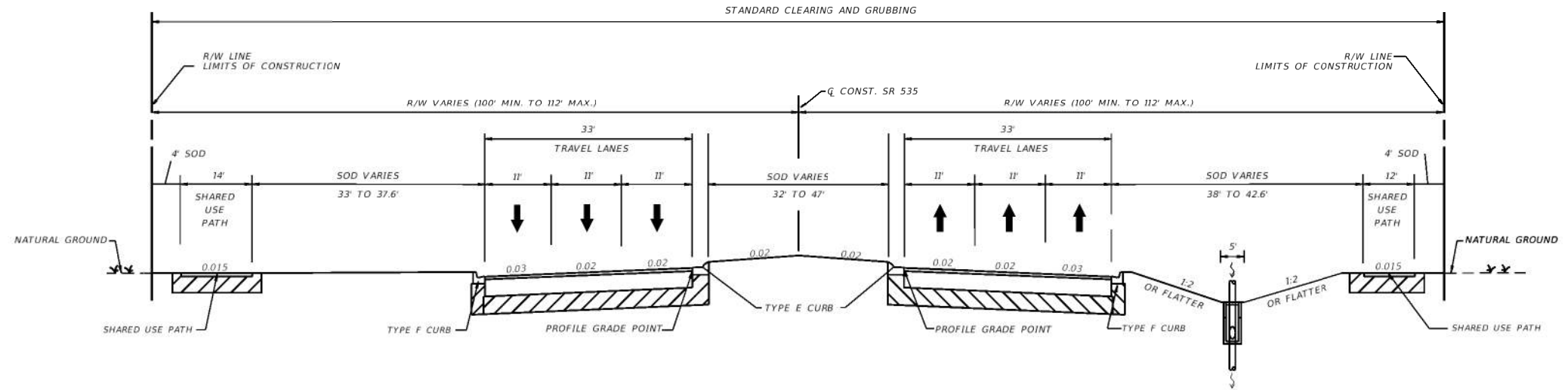
CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- () RESURFACING (LA FACILITIES)
- () RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

DESIGN VARIATIONS

N/A



SR 535

NOT TO SCALE

- STA. 1489+00.00 to STA. 1518+39.58
- STA. 1519+68.44 to STA. 1568+24.47
- STA. 1569+61.08 to STA. 1588+07.14

TRAFFIC DATA

EXISTING CONDITIONS =2020 AADT = 56,000
 ESTIMATED OPENING YEAR =2025 AADT = 59,500
 ESTIMATED DESIGN YEAR =2045 AADT = 73,500
 K = 7.5% D = 52.2% T = 9.4% (72 HOUR)
 DESIGN HOURS T = 12.0%
 DESIGN SPEED = 45 MPH
 POSTED SPEED = 45 MPH
 TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID

SHEET NO.

437174-2-22-01

02

PROJECT CONTROLS

TYPICAL SECTION - B

CONTEXT CLASSIFICATION

- () C1 : NATURAL (X) C3C : SUBURBAN COMM.
- () C2 : RURAL () C4 : URBAN GENERAL
- () C2T : RURAL TOWN () C5 : URBAN CENTER
- () C3R : SUBURBAN RES. () C6 : URBAN CORE
- () N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

- () INTERSTATE () MAJOR COLLECTOR
- () FREEWAY/EXPWY. () MINOR COLLECTOR
- () PRINCIPAL ARTERIAL () LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- () NATIONAL HIGHWAY SYSTEM
- () STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- () OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

- () 1 - FREEWAY
- () 2 - RESTRICTIVE w/Service Roads
- (X) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- () 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- () 5 - RESTRICTIVE w/440 ft. Connection Spacing
- () 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- () 7 - BOTH MEDIAN TYPES

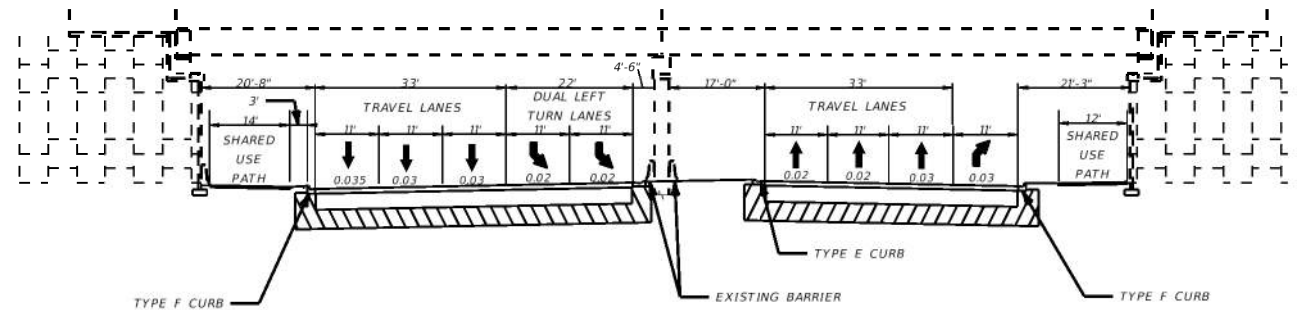
CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- () RESURFACING (LA FACILITIES)
- () RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

DESIGN VARIATIONS

N/A



OSCEOLA PARKWAY OVER SR 535
STA. 1518+39.58 to STA. 1519+68.44

NOT TO SCALE

TRAFFIC DATA

EXISTING CONDITIONS =2020 AADT = 56,000
 ESTIMATED OPENING YEAR =2025 AADT = 59,500
 ESTIMATED DESIGN YEAR =2045 AADT = 73,500
 K = 7.5% D = 52.2% T = 9.4% (72 HOUR)
 DESIGN HOURS T = 12.0%
 DESIGN SPEED = 45 MPH
 POSTED SPEED = 45 MPH
 TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID

SHEET NO.

437174-2-22-01

03

PROJECT CONTROLS

TYPICAL SECTION - C

CONTEXT CLASSIFICATION

- () C1 : NATURAL (X) C3C : SUBURBAN COMM.
- () C2 : RURAL () C4 : URBAN GENERAL
- () C2T : RURAL TOWN () C5 : URBAN CENTER
- () C3R : SUBURBAN RES. () C6 : URBAN CORE
- () N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

- () INTERSTATE () MAJOR COLLECTOR
- () FREEWAY/EXPWY. () MINOR COLLECTOR
- () PRINCIPAL ARTERIAL () LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- () NATIONAL HIGHWAY SYSTEM
- () STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- () OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

- () 1 - FREEWAY
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- (X) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- () 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- () 5 - RESTRICTIVE w/440 ft. Connection Spacing
- () 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- () 7 - BOTH MEDIAN TYPES

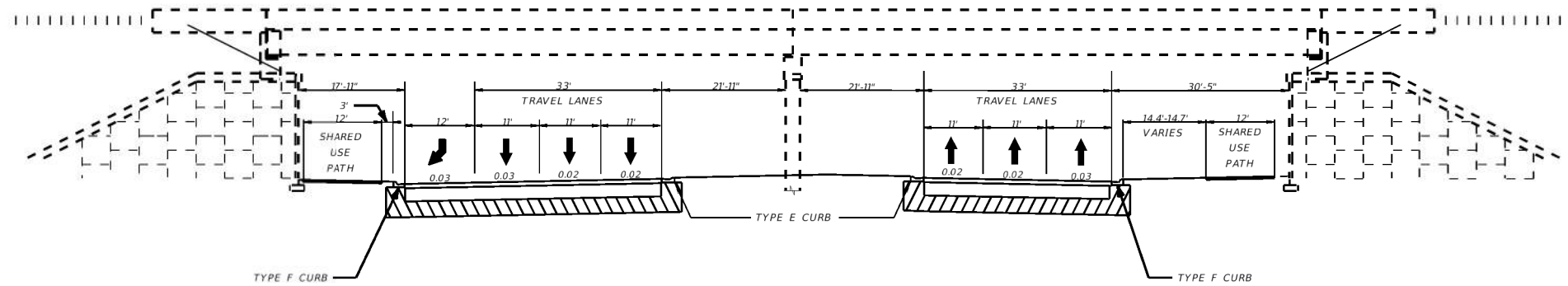
CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- () RESURFACING (LA FACILITIES)
- () RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

DESIGN VARIATIONS

N/A



SR 417 OVER SR 535
STA. 1568+24.47 to STA. 1569+61.08

NOT TO SCALE

TRAFFIC DATA

EXISTING CONDITIONS =2020 AADT = 56,000
 ESTIMATED OPENING YEAR =2025 AADT = 59,500
 ESTIMATED DESIGN YEAR =2045 AADT = 73,500
 K = 7.5% D = 52.2% T = 9.4% (72 HOUR)
 DESIGN HOURS T = 12.0%
 DESIGN SPEED = 45 MPH
 POSTED SPEED = 45 MPH
 TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID

SHEET NO.

437174-2-22-01

04

PROJECT CONTROLS

TYPICAL SECTION - D

CONTEXT CLASSIFICATION

- () C1 : NATURAL (X) C3C : SUBURBAN COMM.
- () C2 : RURAL () C4 : URBAN GENERAL
- () C2T : RURAL TOWN () C5 : URBAN CENTER
- () C3R : SUBURBAN RES. () C6 : URBAN CORE
- () N/A : L.A. FACILITY

FUNCTIONAL CLASSIFICATION

- () INTERSTATE () MAJOR COLLECTOR
- () FREEWAY/EXPWY. () MINOR COLLECTOR
- () PRINCIPAL ARTERIAL () LOCAL
- (X) MINOR ARTERIAL

HIGHWAY SYSTEM

- () NATIONAL HIGHWAY SYSTEM
- () STRATEGIC INTERMODAL SYSTEM
- (X) STATE HIGHWAY SYSTEM
- () OFF-STATE HIGHWAY SYSTEM

ACCESS CLASSIFICATION

- () 1 - FREEWAY
- () 2 - RESTRICTIVE w/Service Roads
- (X) 3 - RESTRICTIVE w/660 ft. Connection Spacing
- () 4 - NON-RESTRICTIVE w/2640 ft. Signal Spacing
- () 5 - RESTRICTIVE w/440 ft. Connection Spacing
- () 6 - NON-RESTRICTIVE w/1320 ft. Signal Spacing
- () 7 - BOTH MEDIAN TYPES

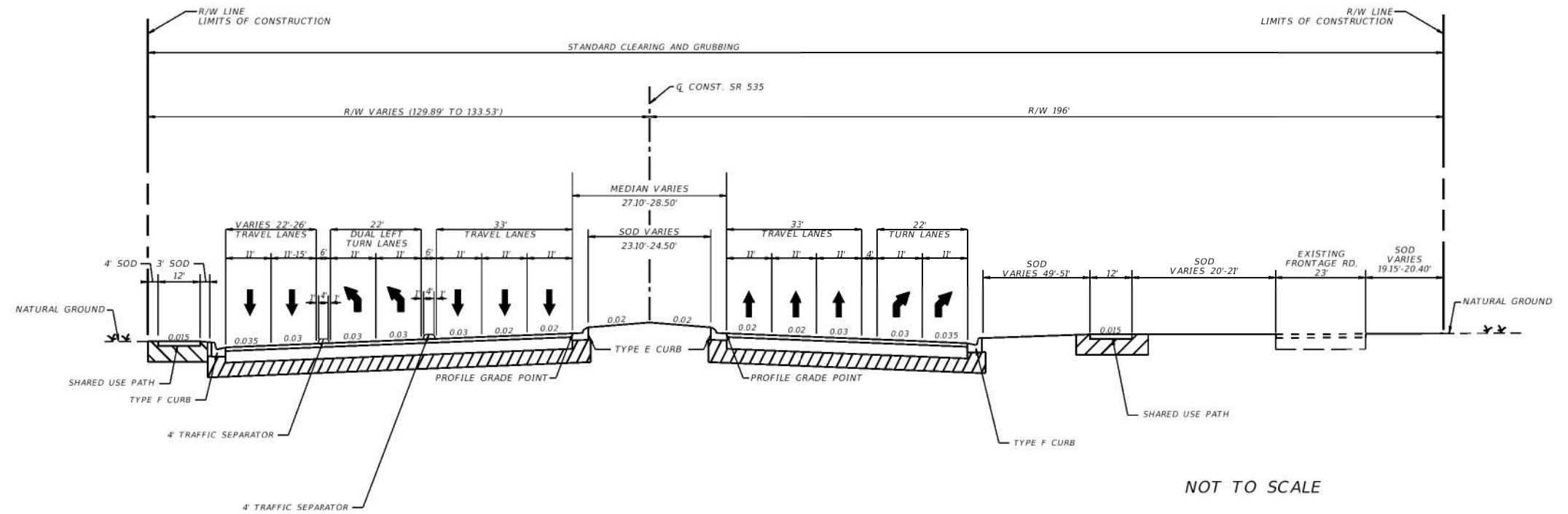
CRITERIA

- (X) NEW CONSTRUCTION / RECONSTRUCTION
- () RESURFACING (LA FACILITIES)
- () RRR (ARTERIALS & COLLECTORS)

POTENTIAL EXCEPTIONS AND VARIATIONS RELATED TO TYPICAL SECTION:

DESIGN VARIATIONS

N/A



DISPLACED LEFT INTERSECTION ALONG SR 535 AT THE WORLD CENTER DRIVE (SR 536) INTERSECTION

STA. 1592+47.83 to STA. 1594+45.82

TRAFFIC DATA

EXISTING CONDITIONS =2020 AADT = 56,000
 ESTIMATED OPENING YEAR =2025 AADT = 59,500
 ESTIMATED DESIGN YEAR =2045 AADT = 73,500
 K = 7.5% D = 52.2% T = 9.4% (72 HOUR)
 DESIGN HOURS T = 12.0%
 DESIGN SPEED = 45 MPH
 POSTED SPEED = 45 MPH
 TARGET SPEED = 45 MPH

FINANCIAL PROJECT ID	SHEET NO.
437174-2-22-01	05

SDATES STIMES SUSERS c:\pwworkingdir\metric-pw-bentley.com\metric-pw-01\diego.lamayo\metric.com\dms14147\TYPRD02.dgn

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

Appendix B
Floodplain Impact and
Compensation Calculations

BCC ENGINEERING, INC.				DATE	
PROJECT:	SR 535 PD&E			12/11/2023	
FPID:	437174-2	Floodplain Impacts & Compensation		BY: ZL	
				CHECKED: JF	1/10/2024
				REVISED: ZL	4/3/2024

Summary of Floodplain Impacts & Compensation

Floodplain Impacts from Roadway Fill

Location	Floodplain Encroachment	BFE *	Weighted Average Elev. At Location of Impact	Impact Area (AC)	Impact Volume (AC-FT)
Floodplain 1	1	95.0	92.42	1.67	4.32
Floodplain 2	2	91.0	89.58	1.25	1.78
Floodplain 3	3	89.5	87.44	1.11	2.29
Sub-total				4.04	8.38

* Zone A BFE is estimated based on LIDAR contour information

Floodplain Impacts from Pond 3-2

Location	Floodplain Encroachment	BFE *	Weighted Average Elev. At Location of Impact	Impact Area (AC)	Impact Volume (AC-FT)
Floodplain 1	Pond	95.0	94.62	1.34	0.51
Sub-total				1.34	0.51

* Zone A BFE is estimated based on LIDAR contour information

Total Estimated Floodplain Impacts	8.89 AC-FT
---	-------------------

Total Floodplain Compensation

Floodplain Compensation Alternative	Compensation Volume (AC-FT)
FPC 1	14.45
FPC 2	19.74
FPC 3	19.74
FPC 4	10.08
FPC 5	12.75

BCC ENGINEERING, INC.				DATE
PROJECT: SR 535 PD&E				
FPID: 437174-2	Floodplain Impacts & Compensation	BY: ZL	12/11/2023	
		CHECKED: JF	1/10/2024	
		REVISED: ZL	2/22/2024	

Summary of Floodplain Impacts

Floodplain Encroachment 1 (Station 1585+00 to 1604+00 LT)

El.	Area (AC)
95.0	0.18
94.5	0.24
92.5	0.47
91.5	0.52
90.5	0.26

Total Area 1.67
 Weighted Average Elev. 92.42

Floodplain Encroachment 2 (Station 1570+00 to 1583+00 LT)

El.	Area (AC)
91.0	0.22
90.5	0.29
89.5	0.40
88.5	0.16
87.5	0.18

Total Area 1.25
 Weighted Average Elev. 89.58

Floodplain Encroachment 3 (1550+00 to 1568+00 LT)

El.	Area (AC)
89.5	0.01
89.0	0.08
88.0	0.29
87.5	0.43
86.3	0.30

Total Area 1.11
 Weighted Average Elev. 87.44

Floodplain encroachment at Pond 3-2

El.	Area (AC)
95.0	0.32
94.5	1.02

Total Area 1.34
 Weighted Average Elev. 94.62

BCC ENGINEERING, INC.				
PROJECT:	SR 535 PD&E			DATE
FPID:	437174-2	Floodplain Impacts & Compensation	BY:	ZL 12/11/2023
			CHECKED:	JF 1/10/2024
			REVISED:	ZL 4/2/2024

Summary of Floodplain Compensation

FPC Site 1

Floodplain Compensation Site 1 Available Storage Volume	
Average Existing Ground Elevation=	92.00
Base Flood Elevation* =	91.00
Seasonal High Water Elevation=	90.90
Control Elevation* =	86.30
FPC Depth=	4.70 FT
FPC R/W Area=	4.10 AC
FPC R/W area reduced 25% for grading/maintenance berm=	3.08 AC
FPC Volume=	14.45 AC-FT

FPC Site 2

Floodplain Compensation Site 2 Available Storage Volume	
Average Existing Ground Elevation=	91.00
Base Flood Elevation* =	91.00
Seasonal High Water Elevation=	89.80
Control Elevation* =	86.30
FPC Depth=	4.70 FT
FPC R/W Area=	5.60 AC
FPC R/W area reduced 25% for grading/maintenance berm=	4.20 AC
FPC Volume=	19.74 AC-FT

FPC Site 3

Floodplain Compensation Site 3 Available Storage Volume	
Average Existing Ground Elevation=	90.60
Base Flood Elevation* =	91.00
Seasonal High Water Elevation=	89.20
Control Elevation* =	86.30
FPC Depth=	4.70 FT
FPC Area=	5.60 AC
FPC R/W area reduced 25% for grading/maintenance berm=	4.20 AC
FPC Volume=	19.74 AC-FT

FPC Site 4

Floodplain Compensation Site 4 Available Storage Volume	
Average Existing Ground Elevation=	94.00
Base Flood Elevation* =	89.50
Seasonal High Water Elevation=	87.70
Avg Wet Season Water Table Elev=	86.70
FPC Depth=	2.80 FT
FPC R/W Area=	4.80 AC
FPC R/W area reduced 25% for grading/maintenance berm=	3.60 AC
FPC Volume=	10.08 AC-FT

FPC Site 5

Floodplain Compensation Site 5 Available Storage Volume	
Average Existing Ground Elevation=	89.30
Base Flood Elevation* =	89.50
Seasonal High Water Elevation=	87.10
Avg Wet Season Water Table Elev=	86.10
FPC Depth=	3.40 FT
FPC R/W Area=	5.00 AC
FPC R/W area reduced 25% for grading/maintenance berm=	3.75 AC
FPC Volume=	12.75 AC-FT

Note: * The lowest BFE from the 3 impact sites was conservatively utilized at the FPC Sites to determine compensation volume. Since the entire volume could not be provided below 89.5 at FPC Sites 1, 2 & 3, calculations for these sites assume a liner is used to lower the stage within each FPC site.
 **Seasonal High Water Elevations were provided by Tierra. See Appendix D for boring information for each site.

Appendix C

FPC Site Evaluation Matrix

BCC ENGINEERING, INC.					DATE
PROJECT:	SR 535 FROM US 192 TO NORTH OF WORLD CENTER DRIVE				2/13/2024
FPID:	437174-2				2/23/2024
					5/6/2024

FPC EVALUATION MATRIX					
ALTERNATIVE NO.	FPC 1	FPC 2	FPC 3	FPC 4	FPC 5
ALTERNATIVE DESCRIPTION	UNDEVELOPED PARCEL	UNDEVELOPED PARCEL	UNDEVELOPED PARCEL	DEVELOPED PARCEL	UNDEVELOPED PARCEL
NO. PARCELS IMPACTED	2	1	1	1	1
PARCEL SIZE	4.1 AC	5.6 AC	5.6 AC	4.8 AC	5.0 AC
WHOLE TAKE/PARTIAL TAKE/JOINT-USE POND	PARTIAL (2 PARCELS)	PARTIAL	PARTIAL	WHOLE	PARTIAL
LAND USE	UNDEVELOPED	UNDEVELOPED	UNDEVELOPED	COMMERCIAL	UNDEVELOPED
EST. COST	\$9,037,100	\$11,600,700	\$11,265,100	\$18,794,200	\$15,525,900
DRAINAGE CONSIDERATIONS	• WILL REQUIRE AN EASEMENT TO CONVEY RUNOFF TO SITE AND IMPACT LOCATIONS	• WILL REQUIRE AN EASEMENT TO CONVEY RUNOFF TO SITE AND IMPACT LOCATIONS	• WILL REQUIRE AN EASEMENT TO CONVEY RUNOFF TO SITE AND IMPACT LOCATIONS	• WILL REQUIRE PIPING TO CONVEY RUNOFF TO 2 OF THE 3 IMPACT LOCATIONS	• WILL REQUIRE AN EASEMENT TO CONVEY RUNOFF TO SITE AND IMPACT LOCATIONS
FEMA FLOOD ZONE	NO IMPACTS	NO IMPACTS	NO IMPACTS	NO IMPACTS (SITE RECENTLY DEVELOPED)	NO IMPACTS
CONTAMINATION-HAZARDOUS MATERIALS	NO APPARENT INVOLVEMENT	NO APPARENT INVOLVEMENT	NO APPARENT INVOLVEMENT	NO APPARENT INVOLVEMENT	NO APPARENT INVOLVEMENT
UTILITIES	CONVEYANCE WILL CROSS FGT	CONVEYANCE WILL CROSS FGT	CONVEYANCE WILL CROSS FGT	NO SIGNIFICANT ISSUE IDENTIFIED	CONVEYANCE WILL CROSS FGT
THREATENED & ENDANGERED SPECIES	• POTENTIAL SAND SKINK HABITAT • POTENTIAL CARACARA HABITAT	• POTENTIAL SAND SKINK HABITAT • POTENTIAL CARACARA HABITAT	• POTENTIAL SAND SKINK HABITAT • POTENTIAL CARACARA HABITAT	• POTENTIAL SAND SKINK HABITAT	• POTENTIAL SAND SKINK HABITAT • POTENTIAL CARACARA HABITAT
WETLANDS OR PROTECTED UPLANDS	NO IMPACTS	NO IMPACTS	NO IMPACTS	NO IMPACTS	NO IMPACTS
CULTURAL RESOURCES INVOLVEMENT	LOW	TBD	TBD	TBD	TBD
CONSTRUCTION	• ADDITIONAL PIPING REQUIRED TO REACH FPC SITE & IMPACT LOCATIONS=3000'	• ADDITIONAL PIPING REQUIRED TO REACH FPC SITE & IMPACT LOCATIONS=2500'	• ADDITIONAL PIPING REQUIRED TO REACH FPC SITE & IMPACT LOCATIONS=2500'	• ADDITIONAL PIPING REQUIRED TO REACH FPC SITE & IMPACT LOCATIONS=900'	• ADDITIONAL PIPING REQUIRED TO REACH FPC SITE & IMPACT LOCATIONS=2400'
MAINTENANCE	NO SIGNIFICANT MAINTENANCE	NO SIGNIFICANT MAINTENANCE	NO SIGNIFICANT MAINTENANCE	NO SIGNIFICANT MAINTENANCE	NO SIGNIFICANT MAINTENANCE
AESTHETICS	N/A	N/A	N/A	N/A	N/A
OTHER	EASEMENT REQUIRED FOR CONVEYANCE AND ACCESS	EASEMENT REQUIRED FOR CONVEYANCE AND ACCESS	EASEMENT REQUIRED FOR CONVEYANCE AND ACCESS		EASEMENT REQUIRED FOR CONVEYANCE AND ACCESS
COMMENTS	FPC 1 , FPC 2 & FPC 3 SITES LOCATED ON SAME PARCEL	FPC 1 , FPC 2 & FPC 3 SITES LOCATED ON SAME PARCEL	FPC 1 , FPC 2 & FPC 3 SITES LOCATED ON SAME PARCEL		
PREFERRED ALTERNATIVE	SEE BASIN 3 & FPC SITE EVALUATION MATRIX. ANALYSIS ASSUMES ONLY 1 POND OR FPC SITE PER PARCEL FOR PREFERRED ALTERNATIVE, SO FPC SITES 1 & 5 CARRIED FORWARD BASED ON LOWEST EST. COSTS (FPC 1 HAS LOWEST EST. COST OF FPC SITES 1-3)				

BCC ENGINEERING, INC.		
PROJECT:	SR 535 FROM US 192 TO NORTH OF WORLD CENTER DRIVE	DATE
FPID:	437174-2	BY: JAG 5/6/2024
		CHECKED: JAF 5/16/2024
		REVISED:

POND SITE EVALUATION MATRIX - BASIN 3 & FPC SITE

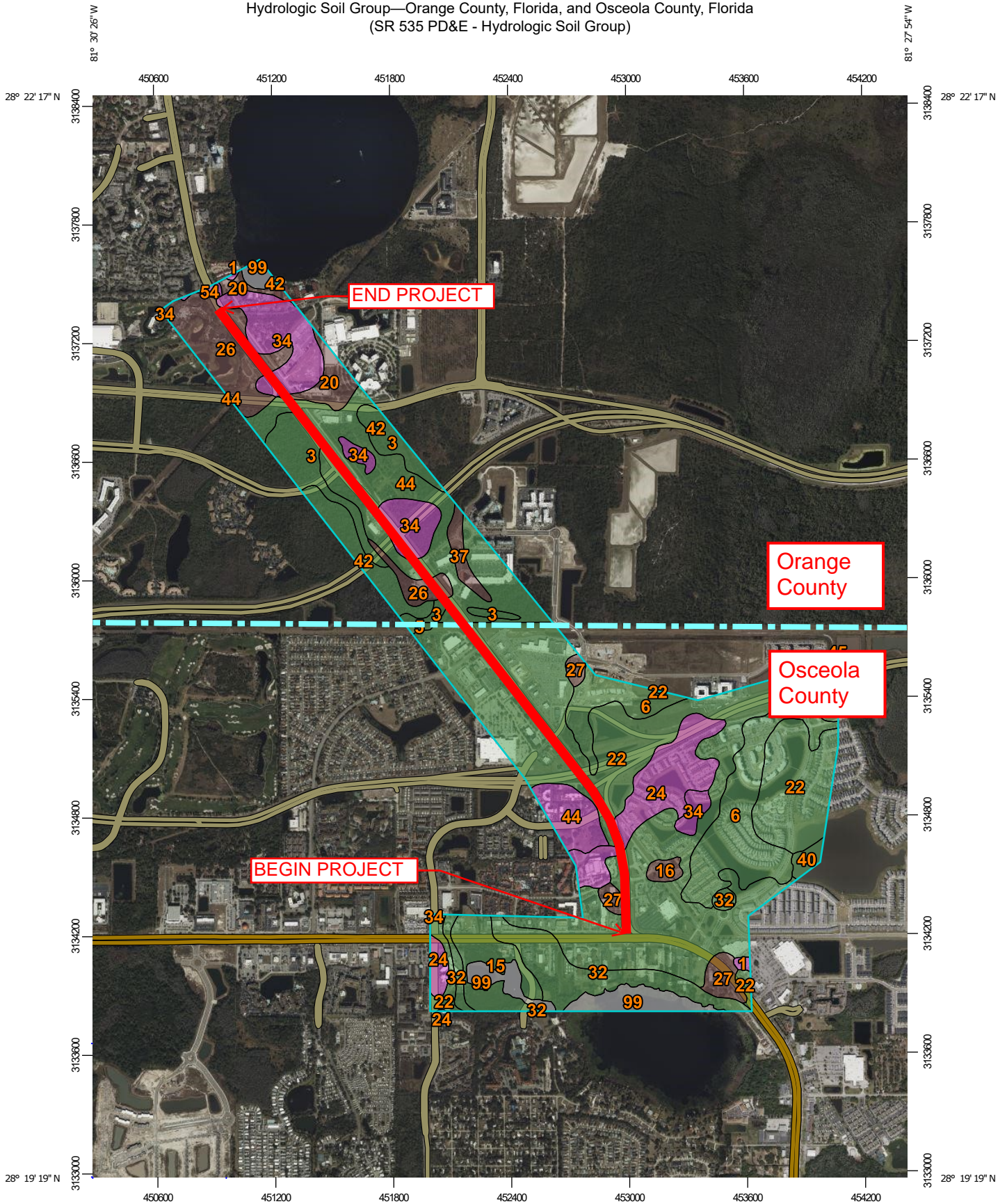
ALTERNATIVE	POND ALT 3A & FPC 1	POND ALT. 3C & FPC 5	
ALTERNATIVE DESCRIPTION	EXIST. POND 3-1, POND 3-2 & FPC 1	EXIST. POND 3-1, POND 3-4 & FPC 5	
DRAINAGE CONSIDERATIONS	INTERCONNECTED PONDS. POND 3-2 IS IN CLOSE PROXIMITY TO EXIST. POND 3-1. MOST HYDRAULICALLY FAVORABLE, PONDS ARE CLOSE TO ROADWAY LOW POINT.	INTERCONNECTED PONDS. POND 3-4 IS FARTHEST AWAY FROM EXIST. POND 3-1, LONGEST INTERCONNECTION REQUIRED. POND 3-4 FARTHEST AWAY FROM ROADWAY LOW POINT. WILL REQUIRE AN EASEMENT TO CONVEY RUNOFF TO POND 3-4 AND TO THE OUTFALL.	
FLOODPLAIN CONSIDERATIONS	EASEMENT REQUIRED FOR CONVEYANCE AND ACCESS	EASEMENT REQUIRED FOR CONVEYANCE AND ACCESS	
EST. POND COST	\$15,974,000	\$7,811,600	
EST. FPC COST	\$9,037,100	\$15,525,900	
EST. TOTAL COST	\$25,011,100	\$23,337,500	
PREFERRED ALTERNATIVE	PREFERRED		
COMMENTS	POND ALT 3A & FPC 1 HAVE LESS IMPACTS TO SR 535/SR 536 INTERSECTION WHEN COMPARED TO POND ALTE 3C & FPC 5. DRAINAGE MODIFICATIONS REQUIRED FOR POND ALT 3C WILL HAVE INCREASED IMPACTS TO EXIST. DRAINAGE SYSTEM, UTILITIES AND MAINTENANCE OF TRAFFIC OPERATIONS. THEREFORE, POND ALT 3A & FPC 1 IS CHOSEN AS THE PREFERRED ALTERNATIVE.		

Appendix D

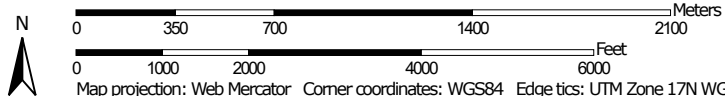
Geotechnical Information

NRCS Web Soil Survey

Hydrologic Soil Group—Orange County, Florida, and Osceola County, Florida
(SR 535 PD&E - Hydrologic Soil Group)




Map Scale: 1:26,700 if printed on A portrait (8.5" x 11") sheet.



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 Rating Polygons

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available


Soil Rating Lines

-  A
-  A/D
-  B
-  B/D
-  C
-  C/D
-  D
-  Not rated or not available






Soil Rating Points

-  A
-  A/D
-  B
-  B/D


Water Features

-  Streams and Canals





Transportation

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

Background

-  Aerial Photography

Soil Rating Polygons

-  C
-  C/D
-  D
-  Not rated or not available

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Orange County, Florida
 Survey Area Data: Version 20, Aug 28, 2023

Soil Survey Area: Osceola County, Florida
 Survey Area Data: Version 21, Sep 5, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Feb 2, 2020—Mar 21, 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.

Hydrologic Soil Group

Orange County				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Arents, nearly level	A	0.3	0.0%
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	A/D	41.8	4.2%
20	Immokalee fine sand	B/D	16.9	1.7%
26	Ona fine sand, 0 to 2 percent slopes	B/D	53.8	5.4%
34	Pomello fine sand, 0 to 5 percent slopes	A	59.2	6.0%
37	St. Johns fine sand	B/D	7.9	0.8%
42	Sanibel muck	A/D	20.9	2.1%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	A/D	101.5	10.2%
54	Zolfo fine sand, 0 to 2 percent slopes	A	1.6	0.2%
99	Water		4.0	0.4%
Subtotals for Soil Survey Area			308.1	31.1%
Totals for Area of Interest			991.5	100.0%
Osceola County				
Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
1	Adamsville sand, 0 to 2 percent slopes	A	1.2	0.1%
5	Basinger fine sand, 0 to 2 percent slopes	A/D	1.4	0.1%
6	Basinger fine sand, depressionnal, 0 to 1 percent slopes	A/D	90.1	9.1%
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes	A/D	27.6	2.8%
16	Immokalee fine sand, 0 to 2 percent slopes	B/D	4.4	0.4%
22	Myakka fine sand, 0 to 2 percent slopes	A/D	379.4	38.3%
24	Narcoossee fine sand, 0 to 2 percent slopes	A	53.9	5.4%
27	Ona fine sand, 0 to 2 percent slopes	B/D	15.8	1.6%
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	A/D	50.1	5.1%

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
34	Pomello fine sand, 0 to 5 percent slopes	A	6.1	0.6%
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	A/D	1.3	0.1%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	A/D	4.9	0.5%
44	Tavares fine sand, 0 to 5 percent slopes	A	20.2	2.0%
45	Wabasso fine sand, 0 to 2 percent slopes	A/D	0.0	0.0%
99	Water		26.8	2.7%
Subtotals for Soil Survey Area			683.5	68.9%
Totals for Area of Interest			991.5	100.0%

Description

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 soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

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. Only the soils that in their natural condition are in group D are assigned to dual classes.

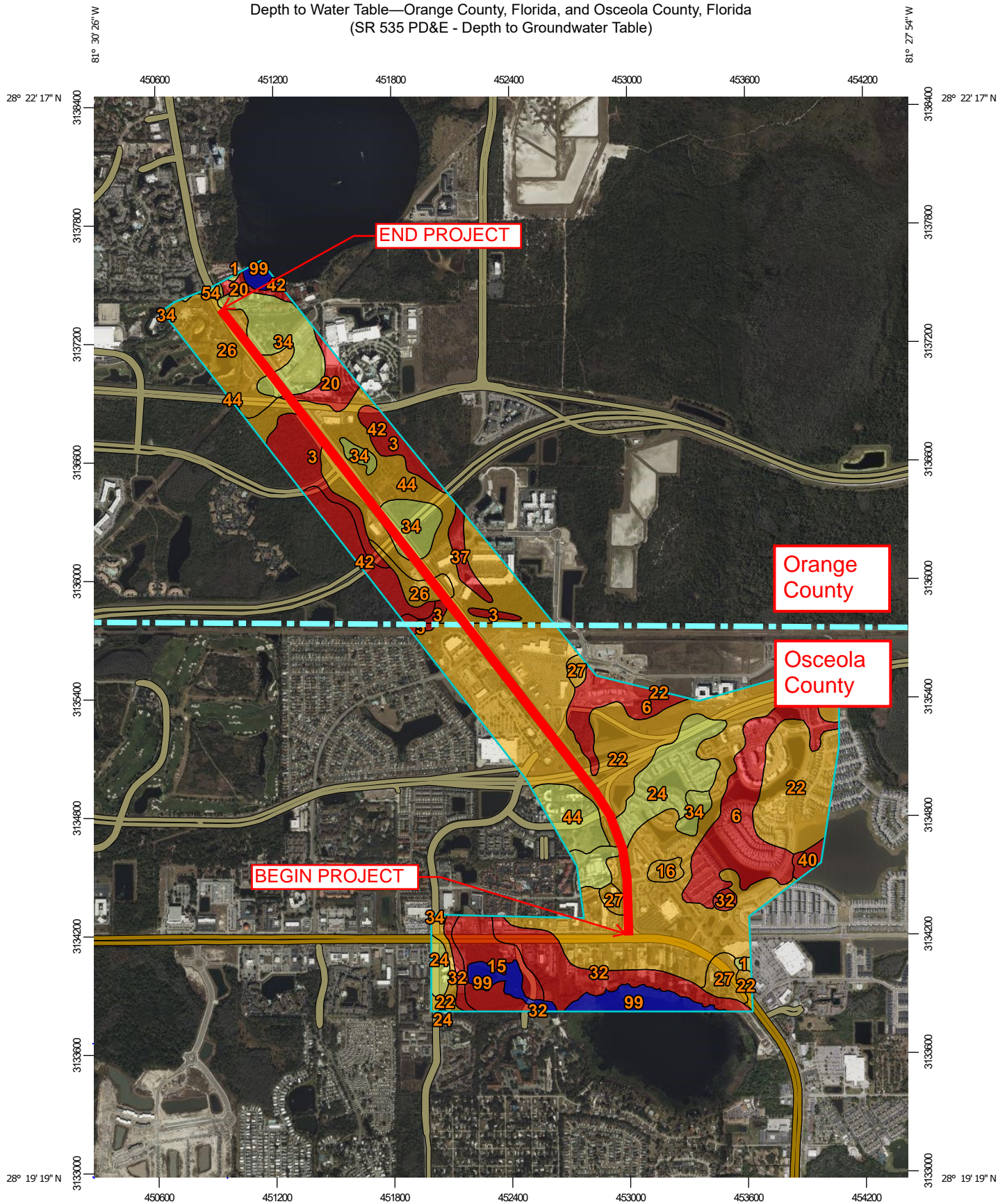
Rating Options

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

Depth to Water Table—Orange County, Florida, and Osceola County, Florida
(SR 535 PD&E - Depth to Groundwater Table)



Map Scale: 1:26,700 if printed on A portrait (8.5" x 11") sheet.




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










Depth to Water Table—Orange County, Florida, and Osceola County, Florida
(SR 535 PD&E - Depth to Groundwater Table)

MAP LEGEND








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

Soils







Soil Rating Polygons


-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

Soil Rating Lines


-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200
-  Not rated or not available

Soil Rating Points






-  0 - 25
-  25 - 50
-  50 - 100
-  100 - 150
-  150 - 200
-  > 200

 Not rated or not available


Water Features

-  Streams and Canals

Transportation

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

Background

-  Aerial Photography

MAP INFORMATION

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

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

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

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

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

Soil Survey Area: Orange County, Florida
Survey Area Data: Version 20, Aug 28, 2023

Soil Survey Area: Osceola County, Florida
Survey Area Data: Version 21, Sep 5, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Feb 2, 2020—Mar 21, 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.

Depth to Water Table

Orange County				
Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
1	Arents, nearly level	76	0.3	0.0%
3	Basinger fine sand, frequently ponded, 0 to 1 percent slopes	0	41.8	4.2%
20	Immokalee fine sand	20	16.9	1.7%
26	Ona fine sand, 0 to 2 percent slopes	31	53.8	5.4%
34	Pomello fine sand, 0 to 5 percent slopes	84	59.2	6.0%
37	St. Johns fine sand	20	7.9	0.8%
42	Sanibel muck	0	20.9	2.1%
44	Smyrna-Smyrna, wet, fine sand, 0 to 2 percent slopes	31	101.5	10.2%
54	Zolfo fine sand, 0 to 2 percent slopes	76	1.6	0.2%
99	Water	>200	4.0	0.4%
Subtotals for Soil Survey Area			308.1	31.1%
Totals for Area of Interest			991.5	100.0%
Osceola County				
Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
1	Adamsville sand, 0 to 2 percent slopes	86	1.2	0.1%
5	Basinger fine sand, 0 to 2 percent slopes	15	1.4	0.1%
6	Basinger fine sand, depressionnal, 0 to 1 percent slopes	0	90.1	9.1%
15	Hontoon muck, frequently ponded, 0 to 1 percent slopes	0	27.6	2.8%
16	Immokalee fine sand, 0 to 2 percent slopes	31	4.4	0.4%
22	Myakka fine sand, 0 to 2 percent slopes	31	379.4	38.3%
24	Narcoossee fine sand, 0 to 2 percent slopes	84	53.9	5.4%
27	Ona fine sand, 0 to 2 percent slopes	31	15.8	1.6%
32	Placid fine sand, frequently ponded, 0 to 1 percent slopes	0	50.1	5.1%

Map unit symbol	Map unit name	Rating (centimeters)	Acres in AOI	Percent of AOI
34	Pomello fine sand, 0 to 5 percent slopes	84	6.1	0.6%
39	Riviera fine sand, frequently ponded, 0 to 1 percent slopes	0	1.3	0.1%
40	Samsula muck, frequently ponded, 0 to 1 percent slopes	0	4.9	0.5%
44	Tavares fine sand, 0 to 5 percent slopes	76	20.2	2.0%
45	Wabasso fine sand, 0 to 2 percent slopes	31	0.0	0.0%
99	Water	>200	26.8	2.7%
Subtotals for Soil Survey Area			683.5	68.9%
Totals for Area of Interest			991.5	100.0%

Description

"Water table" refers to a saturated zone in the soil. It occurs during specified months. Estimates of the upper limit are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

This attribute is actually recorded as three separate values in the database. A low value and a high value indicate the range of this attribute for the soil component. A "representative" value indicates the expected value of this attribute for the component. For this soil property, only the representative value is used.

Rating Options

Units of Measure: centimeters

Aggregation Method: Dominant Component

Component Percent Cutoff: None Specified

Tie-break Rule: Lower

Interpret Nulls as Zero: No

Beginning Month: January

Ending Month: December

Geotechnical Investigation for Pond & FPC Site Alternatives

TABLE 2
Summary of Seasonal High Groundwater Table Estimates
S.R. 535 PD&E Study from U.S. 192 to North of World Center Drive (S.R. 536)
Orange and Osceola Counties, Florida
FPN: 437174-2-22-01
Tierra Project No: 5511-19-052

Boring Number	Boring Location ⁽¹⁾ C/L SR 535		Boring Depth ⁽²⁾ (feet)	Ground Surface Elevation (feet)	Measured GWT		Date Groundwater Table Recorded	USDA Soil Survey		Estimated SHGWT ⁽⁴⁾	
	Station (feet)	Offset (feet)			Depth Below Ground Surface (feet)	Elevation NAVD 88 (feet)		Soil Map Unit	SHGWT Depth ⁽³⁾ (feet)	Depth Below Ground Surface (feet)	Elevation NAVD 88 (feet)
Osceola County											
AB - 1	491+26	97 LT	5.0	81.7	4.0	77.7	8/17/2021	22	0.5-1.5	3.0	78.7
AB - 2	494+41	100 RT	5.5	81.6	4.0	77.6	8/12/2021	22	0.5-1.5	2.5	79.1
AB - 3	497+28	73 LT	6.0	84.7	5.0	79.7	8/17/2021	22/27	0.5-1.5	4.5	80.2
AB - 4	500+19	95 RT	6.0	82.1	4.0	78.1	8/12/2021	22	0.5-1.5	3.0	79.1
AB - 5	503+26	81 LT	4.5	81.8	3.2	78.6	8/17/2021	22/24	0.5-1.5/2.0-3.5	2.0	79.8
AB - 6	506+26	88 RT	6.0	81.7	4.5	77.2	8/12/2021	22/24	0.5-1.5/2.0-3.5	3.5	78.2
AB - 7	509+34	76 LT	4.5	81.0	2.5	78.5	8/17/2021	22	0.5-1.5	1.5	79.5
AB - 8	512+35	56 RT	10.0	86.3	8.0	78.3	8/12/2021	22	0.5-1.5	7.0	79.3
AB - 9	515+26	76 LT	4.5	83.7	4.0	79.7	8/17/2021	22	0.5-1.5	3.0	80.7
AB - 10	517+60	84 RT	7.5	83.5	6.5	77.0	8/12/2021	22	0.5-1.5	4.0	79.5
AB - 11	521+22	102 LT	4.0	82.4	2.5	79.9	8/17/2021	22	0.5-1.5	1.5	80.9
AB - 12	524+41	88 RT	5.5	82.4	3.0	79.4	8/12/2021	22	0.5-1.5	2.0	80.4
AB - 13	527+44	80 LT	4.5	82.7	1.2	81.5	8/17/2021	22	0.5-1.5	0.0	82.7
AB - 14	530+08	68 RT	3.5	83.6	1.5	82.1	8/12/2021	22	0.5-1.5	0.5	83.1
AB - 15	533+41	83 LT	4.0	83.6	1.2	82.4	8/17/2021	22	0.5-1.5	0.5	83.1
AB - 16	536+17	116 RT	8.0	86.8	5.0	81.8	8/12/2021	22	0.5-1.5	4.0	82.8
AB - 17	539+42	85 LT	4.5	85.9	2.5	83.4	8/17/2021	22	0.5-1.5	1.5	84.4
AB - 18	542+35	79 RT	4.0	83.9	1.5	82.4	8/12/2021	22	0.5-1.5	0.0	83.9
AB - 19	544+62	94 LT	3.5	85.3	1.8	83.5	8/17/2021	22	0.5-1.5	1.0	84.3
AB - 20	548+35	66 RT	4.0	86.0	1.5	84.5	8/12/2021	22	0.5-1.5	0.5	85.5

TABLE 2
Summary of Seasonal High Groundwater Table Estimates
S.R. 535 PD&E Study from U.S. 192 to North of World Center Drive (S.R. 536)
Orange and Osceola Counties, Florida
FPN: 437174-2-22-01
Tierra Project No: 5511-19-052

Boring Number	Boring Location ⁽¹⁾ C/L SR 535		Boring Depth ⁽²⁾ (feet)	Ground Surface Elevation ⁽¹⁾ (feet)	Measured GWT		Date Groundwater Table Recorded	USDA Soil Survey		Estimated SHGWT ⁽⁴⁾	
	Station (feet)	Offset (feet)			Depth Below Ground Surface (feet)	Elevation NAVD 88 (feet)		Soil Map Unit	SHGWT Depth ⁽³⁾ (feet)	Depth Below Ground Surface (feet)	Elevation NAVD 88 (feet)
Orange County											
AB - 21	551+36	81 LT	3.5	86.3	1.5	84.8	8/17/2021	44	0.0-3.5	0.5	85.8
AB - 22	554+28	90 RT	4.0	89.2	3.0	86.2	8/13/2021	44	0.0-3.5	2.5	86.7
AB - 23	557+27	77 LT	5.0	87.3	2.5	84.8	8/17/2021	26	0.5-1.5	1.5	85.8
AB - 24	560+20	85 RT	4.5	87.4	3.2	84.2	8/13/2021	44	0.0-3.5	2.0	85.4
AB - 25	563+51	113 LT	4.5	89.3	3.2	86.1	8/16/2021	44	0.0-3.5	2.0	87.3
SH - 26	566+56	70 RT	4.0	90.3	2.5	87.8	8/13/2021	34	2.0-3.5	1.5	88.8
SH - 27	569+80	97 LT	5.0	91.0	2.0	89.0	8/16/2021	34/44	2.0-3.5/0.0-3.5	1.0	90.0
SH - 28	572+29	81 RT	4.0	90.4	1.2	89.2	8/13/2021	34	2.0-3.5	0.0	90.4
SH - 29	575+26	85 LT	4.0	89.6	1.3	88.3	8/16/2021	44	0.0-3.5	0.0	89.6
AB - 30	579+30	120 RT	5.0	91.6	3.0	88.6	8/13/2021	44	0.0-3.5	2.0	89.6
AB - 31	581+30	68 LT	10.0	94.9	7.5	87.4	8/16/2021	44	0.0-3.5	6.5	88.4
AB - 32	584+26	95 RT	4.5	91.3	3.3	88.0	8/16/2021	44	0.0-3.5	2.5	88.8
AB - 33	587+05	84 LT	4.0	93.9	3.5	90.4	8/16/2021	3/44	+2.0-0.0/0.0-3.5	2.5	91.4
AB - 34	590+10	78 RT	3.5	92.2	3.0	89.2	8/16/2021	3/44	+2.0-0.0/0.0-3.5	1.5	90.7
AB - 35	593+29	80 LT	3.0	94.0	2.0	92.0	8/16/2021	3	+2.0-0.0	1.0	93.0
AB - 36	595+49	83 LT	4.0	94.5	3.5	91.0	8/16/2021	3	+2.0-0.0	2.5	92.0
AB - 37	599+35	109 RT	3.5	95.6	1.0	94.6	8/16/2021	34	2.0-3.5	0.0	95.6
AB - 38	602+32	87 RT	3.5	96.5	2.7	93.8	8/16/2021	34	2.0-3.5	1.5	95.0
AB - 39	605+67	111 LT	4.0	97.9	2.7	95.2	8/16/2021	26	0.5-1.5	1.5	96.4

⁽¹⁾ Boring locations and ground surface elevations were provided by WBQ Design & Engineering, Inc.

⁽²⁾ Depth below existing grades at time of field services.

⁽³⁾ Seasonal high groundwater table depth reported in the Soil Survey of Orange and Osceola Counties, Florida published by the USDA/NRCS.

⁽⁴⁾ Seasonal high groundwater table depth estimated based on soil stratigraphy, measured groundwater levels from the borings, the USDA NRCS Soil Survey information, and surrounding topography.

TABLE 3
Summary of Seasonal High Groundwater Table Estimates for Ponds and FPC Sites
SR 535 PD&E Study from US 192 to North of World Center Drive
Orange and Osceola Counties, Florida
FPN: 437174-2-22-01
Tierra Project No: 5511-19-052

Boring Number	Boring Location ⁽¹⁾ C/L Construction		Boring Depth ⁽²⁾ (feet)	Ground Surface Elevation NAVD88 ⁽¹⁾ (feet)	Measured GWT		Date Groundwater Table Recorded	USDA Soil Survey		Estimated SHGWT ⁽⁴⁾	
	Station	Offset			Depth Below Ground Surface (feet)	Elevation NAVD88 (feet)		Soil Map Unit	SHGWT Depth ⁽³⁾ (feet)	Depth Below Ground Surface (feet)	Elevation NAVD88 (feet)
OSCEOLA COUNTY											
Pond 2-3											
PBS - 2-3-1	1506+51	165' RT.	8.5	85.0	7.7	77.3	9/11/2023	24	2.0-3.5	7.0	78.0
PBS - 2-3-2	1503+49	356' RT.	7.0	82.2	6.0	76.2	9/11/2023	22	0.5-1.5	4.2	78.0
PBS - 2-3-3	1500+65	173' RT.	5.5	82.4	5.2	77.2	9/11/2023	22	0.5-1.5	3.5	78.9
ORANGE COUNTY											
Pond 3-2											
PBS - 3-2-1	1600+37	622' LT.	5.0	95.7	4.4	91.3	9/18/2023	26	0.5-1.5	3.5	92.2
PBS - 3-2-2	1597+58	327' LT.	5.0	94.7	4.6	90.1	9/18/2023	44	0.0-3.5	2.8	91.9
Pond 3-3											
PBS - 3-3-1	1593+91	239' RT.	9.0	97.7	8.3	89.4	9/11/2023	44	0.0-3.5	7.0	90.7
PBS - 3-3-2	1589+39	536' RT.	Boring was not performed due to underground utilities								
Pond 4-2											
PBS - 4-2-1	1585+38	198' LT.	5.0	92.4	3.3	89.1	9/11/2023	44	0.0-3.5	1.2	91.2
FPC-1											
FPC - 1-1	1586+69	637' RT.	4.0	92.2	1.7	90.5	9/18/2023	44	0.0-3.5	1.3	90.9
FPC - 1-2	1584+92	622' RT.	4.0	91.9	1.5	90.4	9/18/2023	44	0.0-3.5	1.2	90.7
FPC - 1-3	1584+51	886' RT.	3.0	91.6	1.0	90.6	9/15/2023	42	+1.0-2.0	0.5	91.1
FPC-2											
FPC - 2-1	1579+45	569' RT.	4.0	91.1	1.7	89.4	9/18/2023	44	0.0-3.5	1.4	89.7
FPC - 2-2	1577+08	780' RT.	4.0	90.6	1.0	89.6	9/15/2023	44	0.0-3.5	0.7	89.9
FPC - 2-3	1580+65	841' RT.	4.0	91.2	1.8	89.4	9/15/2023	3	+2.0-0.0	1.3	89.9

TABLE 3
Summary of Seasonal High Groundwater Table Estimates for Ponds and FPC Sites
SR 535 PD&E Study from US 192 to North of World Center Drive
Orange and Osceola Counties, Florida
FPN: 437174-2-22-01
Tierra Project No: 5511-19-052

Boring Number	Boring Location ⁽¹⁾ C/L Construction		Boring Depth ⁽²⁾ (feet)	Ground Surface Elevation NAVD88 ⁽¹⁾ (feet)	Measured GWT		Date Groundwater Table Recorded	USDA Soil Survey		Estimated SHGWT ⁽⁴⁾	
	Station	Offset			Depth Below Ground Surface (feet)	Elevation NAVD88 (feet)		Soil Map Unit	SHGWT Depth ⁽³⁾ (feet)	Depth Below Ground Surface (feet)	Elevation NAVD88 (feet)
FPC-3											
FPC - 3-1	1576+41	537' RT.	4.0	90.6	1.4	89.2	9/18/2023	44	0.0-3.5	1.2	89.4
FPC - 3-2	1572+38	504' RT.	4.0	90.6	2.1	88.5	9/18/2023	34/44	2.0-3.5/0.0-3.5	1.7	88.9
FPC - 3-3	1574+07	680' RT.	5.0	90.6	1.7	88.9	9/18/2023	44	0.0-3.5	1.3	89.3
FPC-4											
FPC - 4-1	1574+84	192' LT.	4.0	87.0	2.2	84.8	9/11/2023	44	0.0-3.5	0.0	87.0
FPC - 4-2	1571+52	488' LT.	5.5	89.4	3.5	85.9	9/11/2023	3	+2.0-0.0	1.0	88.4
FPC-5											
FPC - 5-1	1567+49	834' RT.	5.0	89.6	3.8	85.8	9/18/2023	34/44	2.0-3.5/0.0-3.5	2.5	87.1
FPC - 5-2	1567+06	498' RT.	5.0	89.6	4.3	85.3	9/18/2023	34	2.0-3.5	2.0	87.6
FPC - 5-3	1564+51	684' RT.	5.0	88.7	4.3	84.4	9/18/2023	44	0.0-3.5	2.0	86.7

⁽¹⁾ Station, offset, and elevation of the borings were based on design files and LiDAR data provided by BCC Engineering, Inc. and GPS coordinates obtained by Tierra, Inc. at the time of fieldwork.

⁽²⁾ Depth below existing grades at time of field services.

⁽³⁾ Seasonal high groundwater table depth reported in the Soil Survey of Orange and Osceola Counties, Florida published by the USDA/NRCS.

⁽⁴⁾ Seasonal high groundwater table depth estimated based on soil stratigraphy, measured groundwater levels from the borings, the USDA NRCS Soil Survey information, and surrounding topography.

TABLE 4
SUMMARY OF HYDRAULIC CONDUCTIVITY TEST RESULTS
S.R. 535 PD&E Study from U.S. 192 to North of World Center Drive (S.R. 536)
Orange and Osceola Counties, Florida
FPN: 437174-2-22-01
Tierra Project No.: 5511-19-052

Pond ID.	Boring No./Test Location	Boring/Test Location ⁽¹⁾		Ground Surface Elevation ⁽¹⁾ (feet, NAVD 88)	Test Elevation (feet, NAVD 88)	Estimated SHGW Elevation (feet, NAVD 88)	Vertical Hydraulic Conductivity ⁽²⁾ (feet/day)	Horizontal Hydraulic Conductivity (feet/day)	Confining Layer Elevation (feet, NAVD 88)	Effective Porosity (%)
		Station	Offset							
2-3	PBS-2-3-1	1506+51	165' RT.	85.0	82.0	78.0	33	50	< 76.5	25
	PBS-2-3-2	1503+49	356' RT.	82.2	79.2	78.0	13	20	< 75.2	20
	PBS-2-3-3	1500+65	173' RT.	82.4	79.4	78.9	12	18	< 76.9	20

Notes:

⁽¹⁾ Station, offset, and elevation of the borings were based on design files and LiDAR data provided by BCC Engineering, Inc. and GPS coordinates obtained by Tierra, Inc. at the time of fieldwork.

⁽²⁾ Measured hydraulic conductivity rates of soils encountered at the time of testing. No reduction or safety factors have been applied to the values. We recommend the pond designer apply the appropriate safety factors to these values.

Appendix E
Correspondence and Excerpts from
Previous Studies and Permits

FW: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>

Fri 3/18/2022 12:51 PM

To: Alex George <ageorge@bcceng.com>

Alex,

Per your request.

Thank you,

From: Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>

Sent: Tuesday, March 15, 2022 9:23 AM

To: Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>

Cc: Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>

Subject: RE: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Spoke with the inspectors. The only flooding they noticed was around Poinciana, but it was related to construction activities in the area. No other flooding issues have been observed within the section in question.

Please let me know if you have any questions.

Thank you.

Assaad Saliba
Orlando Operations
420 W. Landstreet Rd.
Orlando, FL 32824
(321)319-8113
assaad.saliba@dot.state.fl.us



From: Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>

Sent: Monday, March 14, 2022 2:57 PM

To: Alex George <ageorge@bcceng.com>; Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>

Cc: Sebastian Honigfort <shonigfort@bcceng.com>; Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>

Subject: RE: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Alex,

Any time on Friday after 10am to review drainage connection permit.

Thank you,

From: Alex George <ageorge@bcceng.com>
Sent: Monday, March 14, 2022 1:30 PM
To: Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>; Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>
Cc: Sebastian Honigfort <shonigfort@bcceng.com>; Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>
Subject: RE: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Assaad & Sal-

I am available to stop by to discuss any historical drainage issues and review the Drainage Connection permits on Friday (instead of Sebastian), but wouldn't be able to be there until about 10A. I am available all day Friday – please let me know what time works best for you to meet.

Also – I was wondering if I would be able to copy any of the connection permit docs that I review, or if taking a picture of them is my only option.

I'll wait to hear from you.

Thanks,
Alex

Alex George, PE

Senior Drainage Engineer



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From: Sebastian Honigfort <shonigfort@bcceng.com>
Sent: Monday, March 14, 2022 12:59 PM
To: Alex George <ageorge@bcceng.com>
Subject: FW: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Hi Alex,

As you will note below, drainage connection permits can be reviewed at their office but are not allowed to be taken out. I'm trying to schedule a time for a visit and was wondering if you would like me to go, or if it would be easier for you to attend.

Please let me know and I'll coordinate accordingly.

Thanks,

Sebastian Honigfort, PE, ENV SP

Water Resources Engineer



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From: Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>
Sent: Monday, March 14, 2022 12:16 PM
To: Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>; Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>; Sebastian Honigfort <shonigfort@bcceng.com>
Subject: RE: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Please do not release any of our drainage permits out of the office. They can be reviewed here.

Assaad – Please get with the inspectors team(especially Trish) and Samir regarding drainage issues. The one I remember is the flooding issues we had in the median between Poinciana Blvd. and Polynesian Blvd.

Thanks,

Seta Koroitamudu, P.E.
Florida Department of Transportation
Orlando Operations Administrator
(321) 319-8100 (Main)
(321) 319-8102 (Office)
(407) 558-8168 (C)
seta.koroitamudu@dot.state.fl.us

From: Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>
Sent: Monday, March 14, 2022 11:00 AM
To: Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>; shonigfort@bcceng.com
Cc: Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>
Subject: RE: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Sebastian,

Since we have a lot of drainage connection permits package you need to come to our office and review them or you can take and copy them then bring them back.

If you wants to come to our office on Friday at 8:00 am, or pickup the day and let you know if I am available.

Thank you,

From: Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>
Sent: Thursday, March 10, 2022 2:27 PM
To: Saidallah, Sal <Sal.Saidallah@dot.state.fl.us>
Cc: Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>
Subject: FW: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Sal,

Could you please forward me any permits you can find for this section of roadway (both Osceola and Orange Counties). Thanks.

Thank you.

Assaad Saliba

Orlando Operations
 420 W. Landstreet Rd.
 Orlando, FL 32824
 (321)319-8113
assaad.saliba@dot.state.fl.us



From: Meade, Ron <Ron.Meade@dot.state.fl.us>
Sent: Thursday, March 10, 2022 2:05 PM
To: Sebastian Honigfort <shonigfort@bcceng.com>
Cc: Koroitamudu, Seta <seta.koroitamudu@dot.state.fl.us>; Saliba, Assaad <Assaad.Saliba@dot.state.fl.us>
Subject: RE: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

Sebastian,

I will ask our field unit – Orlando Operations to provide this information. They are in this area and know the history and permitting information.

Thanks,
 Ron

Ron J. Meade P.E.
 District Five Maintenance Engineer
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From: Sebastian Honigfort <shonigfort@bcceng.com>
Sent: Thursday, March 10, 2022 1:48 PM
To: Meade, Ron <Ron.Meade@dot.state.fl.us>
Subject: SR-535 PD&E - Historical Maintenance Issues & Drainage Connection Permits

EXTERNAL SENDER: Use caution with links and attachments.

Good afternoon Ron,

Apologies that I missed your call last Friday. I left another voicemail on your phone earlier but figured it might be easier to just follow up with an email.

As I mentioned, we are part of the team that's currently conducting a PD&E study for the SR-535 corridor, extending from US-192 in Osceola County to just north of SR-536 (World Center Drive) in Orange County.

To get a better understanding of the existing drainage conditions and to facilitate the study, I was wondering if you could help me with the following:

- Are there any historical or recurring maintenance issues that have been documented within the corridor?
- Does the department have any drainage connection permits on file for this area?

Appreciate any help or input you can provide.

Thank you,

Sebastian Honigfort, PE, ENV SP

Water Resources Engineer

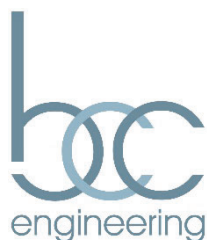


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MEETING MINUTES

PROJECT	FPID 437174-2: SR 535 PD&E Study from US 192 to just N of World Center Dr (SR 536)
SUBJECT	Drainage Kickoff Meeting
DATE	May 19, 2021
TIME	9:00 AM

Attendee list provided on attached call-in sheet.

1. General Information –

- a. The project involves the widening of SR 535 from 4 to 6 lanes between US 192 to just N of World Center Dr (SR 536), a length of approximately 2.2 miles in Osceola and Orange Counties.
- b. Ms. Windom provided introductions and a brief background of the project. Mr. Rodriguez from Metric Engineering, Inc. (Metric) who introduced the project team and noted that BCC Engineering had recently joined the team as a sub-consultant to lead the drainage for the project. Mr. George will manage the drainage efforts, and Mr. Honigfort will serve as EOR for the Pond Siting Report (PSR) and Location Hydraulic Report (LHR).

2. Existing Drainage Overview –

- a. The project corridor falls within South Florida Water Management District (SFWMD) jurisdiction and is located within the Shingle Creek watershed [within Shingle Creek (WBID 3169A) and Reedy Canal (WBID 3169B) WBIDs], which is part of the larger Upper Kissimmee River Basin. The project is also within the Lake Okeechobee Basin Management Action Plan (BMAP) limits.
- b. Mr. George noted that there is partial stormwater treatment along the corridor, and 3 minor cross drains under SR 535 (2-30" near Osceola Parkway, 2-24" pipes in the vicinity of Polynesian Isle Boulevard, and a 1-24" pipe near SR 417 based on the Straight Line Diagrams).
- c. There are Zone A floodplains and conservation easements (CEs) located on the west side of SR 535 in Orange County (see attached exhibit). Ms. Windom stated that any CE release effort would be different if the CEs were for Orange County or SFWMD. The CE information will be investigated. Mr. Hickson stated that the conservation easements should be considered a "soft" constraint for pond siting.

3. Site Conditions –

- a. The Osceola County section is highly developed, while the Orange County section is currently relatively undeveloped.

- b. There is a lot of current and future development proposed along the corridor based on a review of recent SFWMD Environmental Resource Permit (ERP) activity, so the number of undeveloped parcels will significantly decrease in the future (see attached exhibit).
- c. Based on a review of the NRCS Web Soil survey, the soils are poorly drained (hydrologic soil groups A/D and B/D), with high SHGWT anticipated.
- d. Florida Gas Transmission (FGT) lines are located across SR 535 just north of Osceola Parkway crossing and along the east side of SR 535 north of Osceola Parkway. The FGT line has been surveyed for this project. FGT status and setback criteria are still being investigated, and will be confirmed with the utility coordinator for this project.

4. Roadway Typical Sections/Drainage Analysis -

- a. The existing roadway is a 4-lane divided rural section.
- b. There was a planning study prepared for this project, and the typical sections developed for the planning study served as the starting point for the analysis of the proposed roadway typical sections. The proposed typical sections to be evaluated include 6-lane rural and high-speed suburban sections.
- c. The typical sections are still being evaluated (including buffered bike lanes and shared use paths), and refined. The location of the FGT line on the east side of SR 535 may eliminate a shared use path on the east side of the roadway. The typical sections, as well as intersection improvements, are being coordinated with George Borchik.
- d. The drainage evaluation of the typical sections will consist of a general discussion of the typical sections to assist with the evaluation and selection of a preferred typical section(s).
- e. Mr. Hickson inquired whether there were any water table issues within the corridor. No current issues have been identified, but will be investigated. Mr. Hickson stated that base clearance issues on a recent SR 40 project required the addition of underdrain.
- f. Mr. McConaghy stated that the integrity of the existing cross drains should be investigated to determine if extension is a viable option. BCC will review the available plans/information to determine when the cross drains were constructed, and coordinate with District Maintenance.

5. Regulatory Criteria –

- a. Improvements will require water quality and attenuation to meet SFWMD criteria.
- b. Mr. George noted that Shingle Creek is an impaired waterbody, and that nutrient loading will have to be evaluated as part of this study. In turn, he inquired if there are any additional elements that need to be considered for the BMAP. Mr. Hickson responded by stating that SFWMD will likely only be interested in phosphorous loading. He suggested investigating the Daryl Carter Parkway improvements by Horizon Engineering to see what was done for that project.
- c. Mr. Hickson noted that FDEP is in the process of implementing the Statewide Stormwater Rule, which may come into effect within a year. Dry detention facilities (e.g., linear treatment swales) may not even be a viable option when this project reaches the design phase, so should not be

- used as a primary alternative for stormwater treatment. Mr. Vazquez noted that SFWMD does not currently allow any nutrient load reductions for dry detention.
- d. An early coordination meeting will be scheduled with SFWMD to identify/confirm criteria.

6. Environmental Look Around (ELA) –

- a. An ELA meeting will be scheduled with the counties and SFWMD to identify potential stormwater pond locations/opportunities (or identifying constraints), including alternatives within the Osceola Parkway interchange footprint.
- b. In addition, there appears to be multiple locations where joint-use pond opportunities exist with private development. There is both existing and proposed private development located adjacent to SR 535 that should be investigated.
- c. Potential joint-use alternatives were discussed briefly, and included (see attached exhibit):
- The developments and existing stormwater ponds southeast of the SR 535/Osceola Parkway interchange;
 - The developments and existing stormwater ponds west of SR 535 and south of Polynesian Isle Blvd (Indian Wells);
 - In the vicinity of the Sunrise City Plaza, east of SR 535;
 - The future extension of International Parkway, and associated development; and
 - The LBV Factory Stores, east of SR 535 and south of SR 417.
- d. The goal of the ELA would be to have the joint-use coordination completed prior to design, and documented in the Pond Siting Report. Ms. Snyder noted that ELA options would be vetted first to determine viable alternatives, and then the level of further coordination required can be assessed (along with any work currently not in the scope).
- e. Mr. George asked if there are any other considerations for joint-use sites, other than verifying that the sites have sufficient capacity to accept additional runoff. Mr. Hickson stated that an easement would be required to convey runoff to the pond, as well as for the pond itself. The timing of future development (where a project might be in terms of design and permitting) will also factor into the analysis.

7. Pond Siting Alternatives –

- a. As-built plans and existing permits still are being reviewed to identify and determine existing drainage patterns and contributing off-site flows. All basins appear to be open basins.
- b. There are few undeveloped parcels within the Osceola section of the project. Mr. Hickson noted that since the project is not currently funded for construction (and on tentative 5-year work program for design), the undeveloped parcels will not likely be available at the time of design. Therefore, the evaluation should also include developed parcels. BCC will schedule a meeting with District Right-of-Way to identify potential developed parcels for offsite pond locations.

- c. Existing stormwater facilities for Osceola Parkway will be investigated as part of the coordination with Osceola County. There is a relic sinkhole located east of SR 535 which may have previously been evaluated for a pond expansion for the Osceola Convention Center which was not constructed. The FGT line also bisects the ponds within the interchanges infield area, which may limit the potential use of these ponds.
- d. The FGT crossing of SR 535 at Osceola Parkway will most likely be used as a basin divide.
- e. The pond alternatives will include joint-use facilities determined from the ELA (if found); undeveloped parcels and developed parcels. Swales (if found to be feasible) will be included as an additional option, not a primary alternative.
- f. There was a brief discussion about the feasibility of utilizing the rapid infiltration basins (RIBs) located to the east of SR 535 in Orange County. Ms. Windom stated that the Department has previously met with Orange County regarding the RIBs, and that the County stated there was no additional capacity.

8. Floodplains -

- a. Mr. George stated that there should only be minimal floodplain encroachment (if any) from the proposed roadway typical sections within the Orange County section. This will also be dependent on what is found regarding the FGT easement requirements.
- b. Mr. Hickson suggested to discuss any potential floodplain encroachment early with the SFWMD. He added that even minimal impacts could cause issues. Mr. George concurred and stated that BCC will discuss this with SFWMD at the early coordination meeting.

The meeting adjourned at 10:00 am.

******* END OF MEETING*******

Note: The above reflects the writer's understanding of the contents of the meeting. If any misinterpretations or inaccuracies are included, please contact the author within five (5) days of the submittal date.

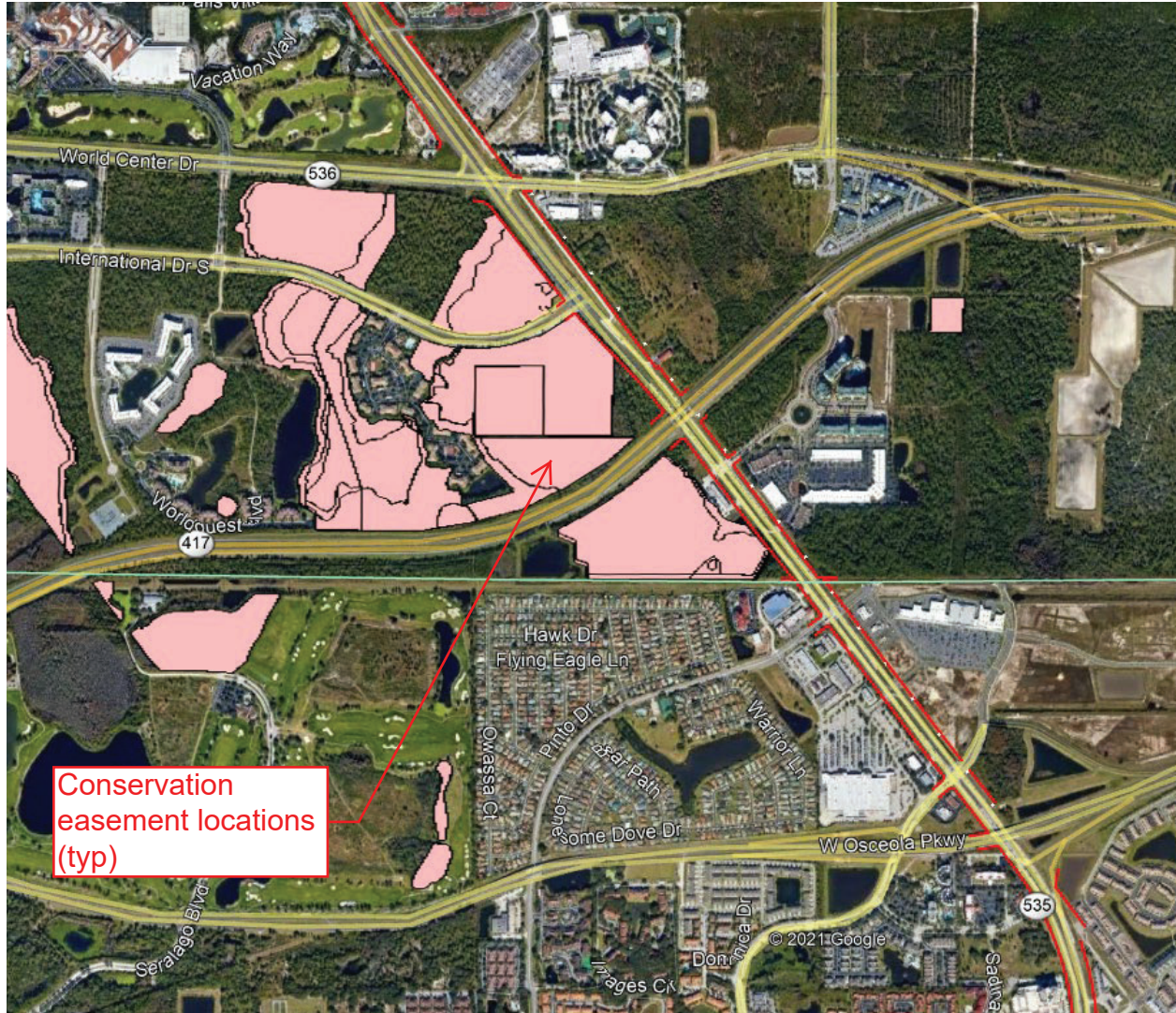
MEETING CALL-IN SHEET

Project:	FPID 437174-2: SR 535 PD&E Study from US 192 to just N of World Center Dr (SR 536)	Meeting Date:	5/19/2021
Facilitator:	Amy Windom (FDOT)	Place/Room:	Virtual Conference Call

Name	Title	Organization	Phone	E-Mail
Ferrell Hickson	District Drainage Design Engineer	FDOT	(386) 943-5433	ferrell.hickson@dot.state.fl.us
Patrick McConaghy	Drainage Design Engineer	FDOT	(386) 943-5437	patrick.mcconaghy@dot.state.fl.us
Karen Snyder	Project Development Manager	FDOT	(386) 943-5404	karen.snyder@dot.state.fl.us
Amy Windom	Project Manager	FDOT	(386) 943-5074	amy.windom@dot.state.fl.us
Carlos Rodriguez	Project Manager	Metric Engineering	(305) 968-2546	carlos.rodriguez@metriceng.com
Paul Carballo	Project Engineer	Metric Engineering	(305)235-5098	paul.carballo@metriceng.com
Alex George	Senior Drainage Engineer	BCC Engineering	(407)951-6444	ageorge@bcceng.com
Alex Vazquez	Water Resources Director	BCC Engineering	(305)670-2350	avazquez@bcceng.com
Sebastian Honigfort	Water Resources Engineer	BCC Engineering	(813)637-0000	shonigfort@bcceng.com

FPID 437174-2: SR 535 PD&E Study from US 192 to just N of World Center Dr (SR 536)

CONSERVATION EASEMENTS IN THE VICINITY OF THE SR 535 CORRIDOR



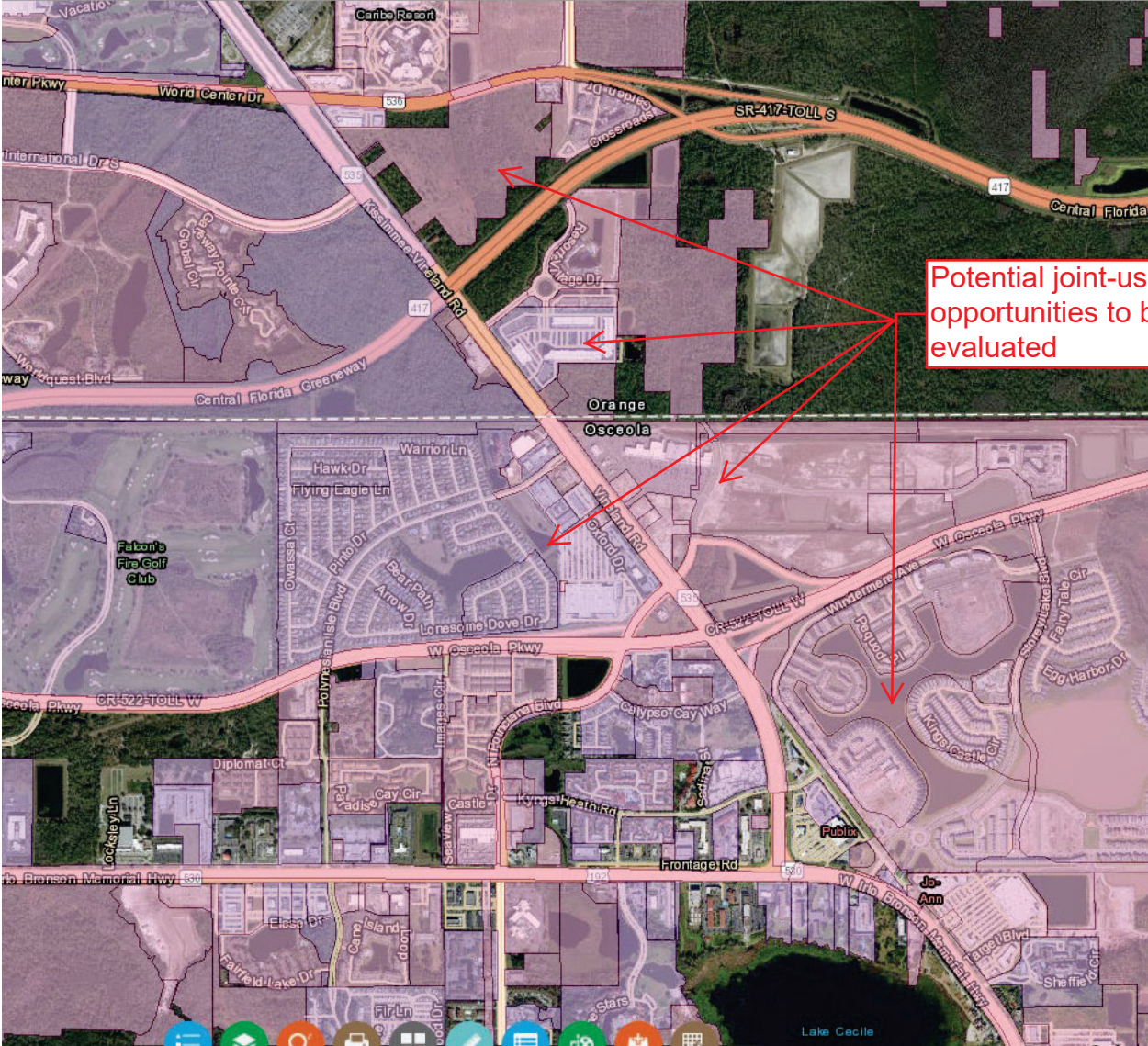
Source: Google Earth™

ZONE A FLOODPLAINS IN THE VICINITY OF THE SR 535 CORRIDOR

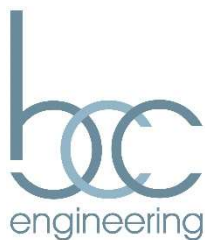


Source: Google Earth™ with FEMA NFHL layer

ERP APPLICATIONS IN THE VICINITY OF THE SR 535 CORRIDOR



Source: SFWMD (<https://apps.sfwmd.gov/WAB/SFWMDMapping/index.html>)



MEETING MINUTES

PROJECT	FPID 437174-2: SR 535 PD&E Study from SR 530 (US 192) to just N of SR 536 (World Center Dr)
SUBJECT	Pond Siting Meeting
DATE	July 29, 2022
TIME	10:00 AM

Attendee list is provided on attached call-in sheet. In addition, a kmz showing the pond site alternatives presented is included with these minutes.

1. General Information

The project involves the widening of SR 535 from 4 to 6 lanes between SR 530 to just north of SR 536, a length of approximately 2.2 miles in Osceola and Orange Counties.

2. Roadway Typical Sections and Intersection Improvements

- a. The existing roadway is a 4-lane divided rural section within the project limits, with the exception of the southernmost section of roadway between US 192 and Kings Heath Road. This section is an urban roadway with curb and gutter.
- b. Mr. Rodriguez discussed the 3 proposed typical sections still under evaluation. All 3 typical sections are for a 6-lane divided urban roadway (inside widening, outside widening and outside widening with bike lanes).
- c. In addition to the proposed widening of SR 535, various intersection improvements are proposed within the project limits. Intersection improvements are being considered at the following locations:
 - i. Poinciana Boulevard
 - ii. Polynesian Isle Boulevard
 - iii. International Drive
 - iv. World Center Drive (SR 536)
- d. It was noted that there is a high groundwater table in the corridor. Mr. Hickson asked if the existing road is exhibiting any pavement failures due to the high groundwater table. Mr. George responded by stating that the Orlando Operations office was contacted to inquire about any historical pavement issues, and no pavement or base failure issues were noted. Inside widening would be preferable to outside widening to maximize the base clearance in the corridor.

3. Project Drainage Basins

The project has been broken into 5 basins for the purpose of evaluating pond site alternatives. The basins are broken out as follows:

- i. Basin 1 - SR 535 from US 192 (begin project) to Kyngs Heath Road
- ii. Basin 2 - SR 535 from Kyngs Heath Road to SR 536
- iii. Basin 3 - SR 535 from SR 536 to north of SR 536 (end project)
- iv. Basin 4 – World Center Drive (SR 536) quadrant road
- v. Basin 5 – International Drive quadrant road

A discussion of the pond alternatives within each basin ensued.

4. Basin 1 Pond Site Alternatives

- a. Basin 1 was improved as part of the SR 530 widening (SFWMD ERP No. 49-00883-P, App. No. 971113-1), and discharges to an existing wet detention pond located on the south side of SR 530 west of Sr 536.
- b. Mr. George noted that there is limited change in the hydrologic characteristics, and only a minor increase in impervious area, from existing to proposed conditions. Based on existing permit information, there is some treatment volume available in the existing offsite ponds.
- c. Two (2) alternatives were developed for Basin 1:
 - i. modify the existing FDOT pond as needed to accommodate minor increase in impervious area; and
 - ii. adjust the northern basin boundary at Kyngs Heath Road to reduce the contributing drainage area to the existing pond in order to utilize the existing pond without modification
- d. Mr. Hickson asked if the nutrient loading perspective has been considered, and stated that the existing SR 530 likely was not designed to provide net improvement for nutrient loading. Mr. Hickson noted that this was an issue for the I-4 widening projects, given that the projects are within the Okeechobee River Basin BMAP. Mr. George stated that net improvement for nutrient loading would be evaluated. Mr. Hickson suggested that the design team review the nutrient loading calculations performed for the I-4 Ultimate project by AECOM to address this issue. A pre vs. post nutrient loading analysis may not be required for a retrofit of an existing pond, but will likely be required for all new ponds.
- e. Mr. Hickson inquired if the project team had initiated discussions yet with SFWMD. He suggested that the project team reach out to SFWMD to discuss and clarify. Mr. George concurred and noted that the project team will set up an early coordination meeting with SFWMD staff to discuss.

5. Basin 2 Pond Site Alternatives

- a. Basin 2 extends from Kyngs Heath Road to SR 536. In the existing condition, runoff is conveyed by roadside ditches to an existing FDOT pond within the Osceola Parkway interchange. This pond discharges east along Osceola Parkway, ultimately outfalling to unnamed wetlands associated with Shingle Creek.

- b. Four (4) alternatives were developed for Basin 2:
- i. Pond 2-1 – this alternative is a proposed joint-use pond within the Storey Lake development east of SR 535 and south of Osceola Parkway. The Storey Lake development includes multiple wet detention ponds which discharge to Shingle Creek downstream of the existing SR 535 outfall. Based on a review of the existing permit documentation, there is an excess of approximately 11 ac-ft of treatment volume in the candelabra-shaped pond within the development. Mr. George noted that if this alternative becomes the recommended option for Basin 2, then a preliminary ICPR model would be developed to evaluate the extent of modifications needed to the pond control structures, as well as perform a check against the permitted finished floor elevations, in order to document no adverse impacts. Mr. Hickson noted that if this option was pursued, FDOT may require an easement over all interconnected ponds. Further discussion with FDOT R/W and Legal would be required for this option. Mr. George asked how far the coordination for a potential joint-use facility should be taken at this point, given that the project is not funded for design until FY 2026.
 - ii. Pond 2-2 – this alternative utilizes a wet detention pond owned by (but located outside of) the Storey Lake development adjacent to Osceola Parkway. This pond currently drains to the candelabra-shaped pond within the development. Mr. Hickson noted that as SFWMD does not have any restriction of co-mingling runoff, it may be a better option to purchase this pond (as it does not appear to provide water quality treatment or attenuation for the development, but may be a borrow pit), treat the new impervious area in Pond 2-2 and re-route the runoff to the existing pond outfall along Osceola Parkway (rather than maintaining the outfall to the Storey Lake development ponds). Mr. Truncone stated that this approach would be preferable from a R/W perspective.
 - iii. Pond 2-3 – this alternative consists of a new offsite wet detention pond located on the east side of SR 535, south of Osceola Parkway. This area is a developed site (strip mall and gas station), with potential contamination issues. This pond also includes the roadway R/W for Old Vineland Road, which dead-ends at the northern end of this pond.
 - iv. Pond 2-4 - this alternative consists of a new offsite wet detention pond located on the west side of SR 535, south of Osceola Parkway. The pond is located on currently undeveloped parcels, although permits were recently found which shows future development.
- c. Mr. Hickson asked about any other potential pond sites on developed sites located north of the Osceola Parkway interchange. Mr. George stated that he would discuss other potential pond site alternatives with Mr. Truncone.
- d. Mr. Hickson suggested that the design team evaluate treating SR 535 south of Osceola Parkway in a new pond, and allowing the existing FDOT pond to treat SR 535 north of Osceola Parkway (compensatory treatment approach).

6. Basin 3 Pond Site Alternatives

- a. Basin 3 currently drains to an existing wet detention pond located in the northwest quadrant of the SR 535/SR 536 intersection. There are also existing FDOT ponds located in the northwest and southwest quadrants of the intersection.
- b. Two (2) pond options were evaluated for Basin 3:
 - i. Pond 3-1 is an expansion of the existing pond in the northwest quadrant of the interchange.
 - ii. Pond 3-2 is an expansion of the existing pond in the southwest quadrant of the interchange.

7. Basins 4 and 5 Pond Alternatives

- a. Basins 4 and 5 were evaluated as separate basins because it is unknown at this time whether the quadrant road options will ultimately be included as a final alternative.
- b. The quadrant roads are located within environmentally sensitive areas that consist of wetlands, floodplains and conservation easements.
- c. Two (2) new offsite pond alternatives were identified for each basin. The ponds are located on either side of the quadrant road, and sited to minimize the potential environmental and floodplain impacts to the degree feasible.

8. Osceola Parkway Interchange Infield Area

- a. While not identified as a separate basin, the proposed intersection improvement at Poinciana Boulevard will impact an existing County pond in the interchange infield area. Therefore, a proposed option to expand this existing pond to the east was provided to provide compensatory storage volume for the portion of the pond impacted by the proposed roadway improvement.
- b. Mr. George noted that there is a relic sinkhole in the vicinity of the Poinciana Parkway intersection improvement, and the geotechnical aspects of a pond expansion in this area would have to be explored in final design. Mr. Graeber also noted that the County did not want to utilize the infield area for potential FDOT ponds in prior discussions. The County would prefer to keep this area for potential future stormwater needs for Osceola Parkway.

9. Floodplain Impacts and Compensation

- a. The west side of SR 535 within the Orange County section is designated as a FEMA Zone A floodplain.
- b. The floodplain elevation was estimated using the simplified method (overlaying the floodplain on LiDAR contours) to determine an approximate floodplain depth and impact volume.
- c. The proposed quadrant roads within Basins 4 and 5 will result in significant floodplain impacts.
- d. The NRCS soil survey indicates that the groundwater table depth west of SR 535 is generally at the existing ground elevation. Therefore, floodplain compensation sites to mitigate for the floodplain impacts have been located on the east side of SR 535. Proposed cross drains under SR 535 will be required to hydraulically connect the floodplain compensation sites to the Zone A floodplain.
- e. Mr. Hickson noted that it may be worthwhile to state in the reports that any ditches located on the west side of SR 535 may be able to provide some floodplain compensation, pending geotech analysis in final design.

- f. Three (3) floodplain compensation sites have been identified on the east side of SR 535 (FPC-1, FPC-2 and FPC-3).
- g. Given the size of the floodplain, there is the potential that floodplain impacts due to SR 535 improvements (excluding the quadrant roads) could be could be addressed with roadside ditches or hydraulic modeling during final design.

10. Environmental Discussion

- a. There are wetlands and existing conservation easements along the west side of SR 535 in the Orange County section.
 - b. The areas adjacent to SR 535 have also been identified as potential sand skink habitat.
- The meeting adjourned at 11:00 am.

11. Other Items

- a. Mr. Hickson suggested that the feasibility of the quadrant roads be established before performing any geotech for the ponds and FPC options in Basins 4 and 5 in order to avoid unnecessary geotechnical investigation. Mr. Rodriguez stated that the quadrant road evaluation should be complete with the next couple of months. Mr. George will hold off on requesting the geotech work in these basins until the determination on the quadrant roads has been made.
- b. Mr. Hickson suggested that FDOT Legal and R/W be consulted to determine the R/W required for Pond 2-1 (the joint-use alternative with the Storey Lake development).

******* END OF MEETING*******

Note: The above reflects the writer's understanding of the contents of the meeting. If any misinterpretations or inaccuracies are included, please contact the author within five (5) days of the submittal date.

MEETING CALL-IN SHEET				
Project:	FPID 437174-2: SR 535 PD&E Study from US 192 to just N of World Center Dr (SR 536)		Meeting Date:	7/29/2022
Facilitator:	Alex George (BCC)		Place/Room:	Virtual Conference Call
Name	Title	Organization	Phone	E-Mail
Ferrell Hickson	District Drainage Design Engineer	FDOT	(386) 943-5433	ferrell.hickson@dot.state.fl.us
Casey Lyon	Environmental Permits Coordinator	FDOT	(386)943-5436	casey.lyon@dot.state.fl.us
David Graeber	Project Manager	FDOT	(386)943-5392	david.graeber@dot.state.fl.us
Nick Truncone	R/W Project Manager	FPC Group	(850)906-9997	nick@fpc-group.com
Carlos Rodriguez	Project Manager	Metric Engineering	(305) 968-2546	carlos.rodriguez@metriceng.com
Paul Carballo	Project Engineer	Metric Engineering	(305)235-5098	paul.carballo@metriceng.com
Rob Myers	Senior Environmental Scientist	Metric Engineering	(512)517-5121	rob.myers@metriceng.com
Gabriela Garcia	Project Engineer	Metric Engineering	(305)235-5098 x1403	gabriela.garcia@metriceng.com
Alex George	Senior Drainage Engineer	BCC Engineering	(407)951-6444	ageorge@bcceng.com
Carlos Formoso	Drainage Project Engineer	BCC Engineering	(305)670-2350	cformoso@bcceng.com
Zhimin Li	Drainage Engineer	BCC Engineering	(407)951-6444	zli@bcceng.com



MEETING MINUTES

PROJECT	FPID 437174-2: SR 535 PD&E Study from SR 530 (US 192) to just N of SR 536 (World Center Dr)
SUBJECT	SFWMD Pre-application meeting
DATE	November 16, 2022
TIME	10:00 AM

Attendees

<u>Name</u>	<u>Agency/Firm</u>	<u>Email</u>
Richard Lott	SFWMD	rlott@sfwmd.gov
Patty Therrien	SFWMD	ptherrie@sfwmd.gov
Ferrell Hickson	FDOT	fhickson@dot.state.fl.us
Casey Lyon	FDOT	casey.lyon@dfot.state.fl.us
Carlos Rodriguez	Metric Engineering	carlos.rodriguez@metriceng.com
Paul Carballo	Metric Engineering	paul.carballo@metriceng.com
Alex George	BCC Engineering	ageorge@bcceng.com
Carlos Formoso	BCC Engineering	cformoso@bcceng.com
Zhimin Li	BCC Engineering	zli@bcceng.com

Ms. Therrien noted that any decisions/remarks made by SFWMD representatives during this meeting would not be binding at the time of permit submittal. The purpose of this meeting is to provide the PD&E team with guidelines to develop the stormwater and floodplain compensation area alternatives for the Pond Siting Report. A separate meeting to discuss potential environmental impacts will be held with Lisa Prather (SFWMD).

1. Project Overview

- a. The project involves the widening of SR 535 from 4 to 6 lanes between SR 530 to just north of SR 536, a length of approximately 2.2 miles in Osceola and Orange Counties.
- b. The existing roadway is a 4-lane divided rural section within the project limits, with the exception of the southernmost section of roadway between US 192 and Kings Heath Road. This section is an urban roadway with curb and gutter.
- c. Proposed typical sections are still being evaluated. All 3 typical sections under evaluation are for a 6-lane divided roadway (urban and rural sections) with sidewalks and/or a shared use path.

2. Existing Drainage Overview

- a. FDEP MapDirect shows northern portion of project in WBID 3169B (Reedy Canal) and remainder of project within WBID 3169A (Shingle Creek). The WBID boundary at the northern end of the project is generally located along SR 535. However, previous permits indicate that runoff from SR 535 within the project limits flows to Shingle Creek.
- b. Shingle Creek is impaired for nutrients (macrophytes).
- c. There are no OFWs in the vicinity of the project.
- d. The project is located within the Lake Okeechobee BMAP boundary.
- e. All basins within the project limits are open basins.
- f. In general, there is a high groundwater table in the vicinity of SR 535 within the project limits, especially within the Orange County section.

3. Permit History

- a. SR 535 original construction from US 192 to south of SR 536 was previously permitted under Permit No. 85-00118-S (dated 10/10/85). However, prior SR 535 improvements at either end of the project limits were permitted separately under the following permits:
 - Southern portion of project (SR 535 from US 192 to Kyngs Heath Rd) previously permitted under Permit No. 49-00883-P (dated 3/12/98) as part of US 192 reconstruction
 - Northern portion of project (SR 535 from north of International Dr to end project) previously permitted under Permit No. 48-00582-S (dated 11/20/90)
 - Also, the existing permitted stormwater system for SR 535 within the Osceola Parkway interchange was modified under Osceola Pkwy Permit No. 49-00653-S (modified 4/14/94)
- b. There are existing stormwater facilities (wet detention and dry detention) within each of the previously permitted sections of SR 535.
- c. Ms. Therrien stated that a new ERP would be issued for this project that references the previous permits.

4. Design Criteria

- a. Water quality criteria:
 - i. Water quality treatment: min. 2.5" over the new impervious area plus compensation for loss of existing treatment volume
 - ii. Ms. Therrien noted that impervious area subject to non-vehicular traffic (e.g., sidewalk and shared use paths) should be separated out from the total new impervious area. For the purposes of the PD&E analysis, the sidewalk and shared use path impervious area will be included in the treatment volume calculations.
 - iii. SFWMD requested 50% additional treatment volume due to location within Lake Okeechobee BMAP wherever feasible. If not feasible, provide SFWMD with a description of the site constraints/reasons that this cannot be provided
- b. Water quantity/attenuation criteria (open basin): 25yr/72hr pre-post peak discharge

- c. Nutrient loading requirements:
 - i. Project is located within the Lake Okeechobee BMAP boundary. Therefore, net improvement for total phosphorus (TP) is required.
 - ii. Mr. George asked if it is acceptable to perform a nutrient loading analysis for only the land use change for the new impervious area rather than for the basins as a whole (e.g., using an existing open space land use and proposed impervious (DCIA or non-DCIA as appropriate) land use for the new impervious area only, and utilize any new wet pool volume provided to document that net improvement criteria is being met). Ms. Therrien stated that this approach would be acceptable, pending SFWMD review.
 - iii. Shingle Creek is impaired for nutrients (macrophytes). Ms. Therrien stated that net improvement for nutrient loading is not required for discharges to Shingle Creek due to the type of nutrient impairment.
 - iv. Mr. George asked if net improvement calculations would be required for basins where only there were only minor changes to the hydrologic characteristics of the basin and retrofits of existing permitted stormwater facilities were proposed (given that these ponds were designed and permitted prior to nutrient loading requirements). Mr. Lott stated that net improvement calculations would be required for all basins, regardless of whether an existing pond was modified or a new pond was proposed.
 - v. Mr. George asked if nutrient load requirements could be evaluated on a project-wide basis rather than by individual basin, given that all existing SR 535 ponds discharge to Shingle Creek. Mr. Lott and Ms. Therrien stated that it may be acceptable in concept, but that additional information and discussion would need to take place at the time of permit application in order to formally approve the idea.
- d. Mr. Lott reminded everyone that dry detention facilities (existing or proposed) will not receive any credit for providing nutrient load reduction.

5. Project Drainage Basins

The project has been broken into 5 basins for the purpose of evaluating pond site alternatives. The basins are broken out as follows:

- i. Basin 1 - SR 535 from US 192 (begin project) to Kyngs Heath Road
- ii. Basin 2 - SR 535 from Kyngs Heath Road to SR 536
- iii. Basin 3 - SR 535 from SR 536 to north of SR 536 (end project)
- iv. Basin 4 – World Center Drive (SR 536) quadrant road
- v. Basin 5 – International Drive quadrant road

Basins 1-3 are located on the SR 535 mainline. Basins 4 and 5 have been identified as separate basins because it is unknown at this time whether the quadrant road alternatives would ultimately remain as feasible alternatives in the PD&E. A discussion of the pond alternatives within each basin ensued.

6. Basin 1 Pond Site Alternatives

- a. Basin 1 was improved as part of the SR 530 widening (SFWMD ERP No. 49-00883-P, App. No. 971113-1), and discharges to an existing wet detention pond located on the south side of SR 530 west of US 192.
- b. Mr. George noted that there is limited change in the hydrologic characteristics, and only a minor increase in impervious area, from existing to proposed conditions.
- c. Two (2) alternatives were developed for Basin 1:
 - i. modify the existing FDOT pond as needed to accommodate minor increase in impervious area; and
 - ii. adjust the northern basin boundary at Kyngs Heath Road to reduce the contributing drainage area to the existing pond in order to utilize the existing pond without modification
- d. No additional issues were discussed for these alternatives. Mr. Lott reiterated the need for net improvement calculations for all basins, as this may affect the recommended alternative.

7. Basin 2 Pond Site Alternatives

- a. Basin 2 extends from Kyngs Heath Road to SR 536 (SFWMD ERP No. 85-001118-S, App. No. X000008640), and discharges to an existing wet detention pond within the Osceola Parkway interchange. This pond was modified as part of the Osceola Parkway improvements (SFWMD ERP No. 49-00653-S, App. No. 930909-1). In the existing condition, runoff is conveyed to the pond via roadside ditches. The pond discharges east along Osceola Parkway, ultimately outfalling to unnamed wetlands associated with Shingle Creek.
- b. Four (4) alternatives were developed for Basin 2:
 - i. Pond 2-1 – this alternative is a proposed joint-use pond within the Storey Lake development east of SR 535 and south of Osceola Parkway. The Storey Lake development includes multiple wet detention ponds which discharge to Shingle Creek downstream of the existing SR 535 outfall. This alternative would also require analysis to meet flood protection requirements for building floors, parking lots and roads as outlined in Sections 3.4 and 3.5 of the Applicant's Handbook, Vol. II.
 - ii. Pond 2-2 – existing pond originally permitted as part of Storey Lake development, but now owned by Shingle Creek CDD. Based on review of permits, this pond does not provide water quality or attenuation for the development and may have been a borrow pond. Currently connected to Storey Lake stormwater system via DBI and pipe, but connection would be severed if pond is used for SR 535. Pond would be converted to wet pond and interconnected with existing wet pond at Osceola Pkwy interchange.
 - iii. Pond 2-3 – this alternative consists of a new offsite wet detention pond located on the east side of SR 535, south of Osceola Parkway. Construction of pond would necessitate removal of existing impervious and commercial area which may assist with meeting nutrient loading criteria.

- iv. Pond 2-4 - this alternative consists of a new offsite wet detention pond located on the west side of SR 535, south of Osceola Parkway. The pond is located on currently undeveloped parcels, although permits were recently found which shows future development. Therefore, this alternative may be dropped at a later date.
- c. Mr. George inquired about the use of compensatory treatment in this basin if the 2 ponds (the existing pond and a proposed pond) were used to provide treatment and attenuation for Basin 2 without being interconnected. Mr. George explained that it may not be feasible to expand the existing pond in Basin 2 due to site constraints. Therefore, the existing pond may not be able to provide adequate treatment to accommodate the new impervious area draining to it – but that the new pond could potentially be sized to provide overtreatment. Ms. Therrien requested some sample calculations in order to review and provide direction. Mr. George stated that he will prepare sample calculations for this approach, as well as the steps involved. Note that compensatory treatment would not be an issue if the Basin 2 ponds were interconnected.

8. Basin 3 Pond Site Alternatives

- a. Basin 3 currently drains to existing interconnected ponds located in the northwest and southwest quadrants of the SR 535/SR 536 intersection. Multiple ponds and multiple outfalls based on permit
- b. Two (2) pond options were evaluated for Basin 3:
 - i. Pond 3-1 is an expansion of the existing wet detention pond in the northwest quadrant of the interchange.
 - ii. Pond 3-2 is an expansion of existing dry detention pond or conversion to a wet pond in the southwest quadrant of the interchange.
- c. Mr. Lott reiterated SFWMD's desire to maximize nutrient load reduction along the corridor, and that dry detention will not receive any credit for nutrient load reduction.

9. Basins 4 and 5 Pond Site Alternatives

- a. Basins 4 and 5 were evaluated as separate basins because it is unknown at this time whether the quadrant road options will ultimately be included as a final alternative.
- b. The quadrant roads are located within environmentally sensitive areas that consist of wetlands, floodplains and conservation easements.
- c. Two (2) new offsite pond alternatives were identified for each basin. The ponds are located on either side of the quadrant road, and sited to minimize the potential environmental and floodplain impacts to the degree feasible.
- d. Ms. Therrien strongly suggested that the team discuss the feasibility of obtaining an ERP for the quadrant roads with Lisa Prather (SFWMD), as the roads themselves and some associated pond alternatives would require SFWMD conservation easement releases. The design team will set up a separate meeting with Ms. Prather to discuss the quadrant roads if the quadrant roads are deemed feasible alternatives.

10. Floodplain Impacts and Compensation

- a. Osceola County: FIRM panel no. 12097C0055G (2013) – no floodplains
- b. Orange County: FIRM panel no. 12095C0605F (2009) – Zone A floodplains west of SR 535
- c. SFWMD criteria - No net encroachment into the floodplain between the average wet season groundwater table and the 100-year floodplain elevation
- d. The west side of SR 535 within the Orange County section is designated as a FEMA Zone A floodplain.
- e. The proposed quadrant roads within Basins 4 and 5 will result in significant floodplain impacts.
- f. The NRCS soil survey indicates that the groundwater table depth west of SR 535 is generally at the existing ground elevation. Therefore, floodplain compensation sites to mitigate for the floodplain impacts have been located on the east side of SR 535. Proposed cross drains under SR 535 will be required to hydraulically connect the floodplain compensation sites to the Zone A floodplain.
- g. Ms. Therrien stated that volumetric compensation (cup for cup) is acceptable for floodplain compensation, but that hydraulic connectivity between the floodplain and any floodplain compensation site is documented.
- h. Ms. Therrien noted that SFWMD allows the use of the average wet season water table, not the seasonal high groundwater table (SHGWT) – this is typically 1' below the SHGWT
- i. Any ditches located on the west side of SR 535 may be able to provide some floodplain compensation, pending geotech analysis in final design.
- j. Three (3) floodplain compensation sites have been identified on the east side of SR 535 (FPC-1, FPC-2 and FPC-3).
- k. Given the size of the floodplain, there is the potential that floodplain impacts due to SR 535 improvements (excluding the quadrant roads) could be addressed with roadside ditches or hydraulic modeling during final design.

11. Action Items

- a. Mr. George will prepare sample calculations for a nutrient loading if 2 unconnected ponds are used to provide treatment for Basin 2, and email Ms. Therrien the steps that would be taken to document compensatory treatment.
- b. The PD&E team will contact Lisa Prather to discuss any impacts to the SFWMD conservation easements with the proposed alternatives, as well as any other environmental permitting issues for this project.

******* END OF MEETING*******

Note: The above reflects the writer's understanding of the contents of the meeting. If any misinterpretations or inaccuracies are included, please contact the author within five (5) days of the submittal date.