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LOCATION HYDRAULICS REPORT

Florida Department of Transportation

District Four

Interstate 95 (I-95) / State Road 9 (SR 9) Project Development and Environment Study

Limits of Project: From South of Hallandale Beach Boulevard (SR 858) to North of Hollywood Boulevard (SR 820)

Broward County, Florida

Financial Management Number: 436903-1-22-02

ETDM Number: 14254

Date: January 2025

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.



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EXECUTIVE SUMMARY

The Florida Department of Transportation (FDOT), District Four, is conducting a Project Development and Environment (PD&E) Study to increase capacity and evaluate arterial and ramp terminal improvements at the interchanges of I-95 and Hallandale Beach Boulevard (SR 858), Pembroke Road (SR 824), and Hollywood Boulevard (SR 820). **Figure 1.1** depicts the project location. The improvements will require upgrading and modifying the corresponding stormwater collection, treatment, and conveyance systems to meet applicable regulatory agency criteria within the project corridor.

In compliance with Presidential Executive Order 11988 Floodplain Management, USDOT Order 5650.2 Floodplain Management and Protection, and Federal-Aid Policy Guide 23 CFR 650A using assessment methodology, evaluation procedures and document preparation guidance found in Project Development and Environment Manual Part 2 Topics and Analysis Effective: July 1, 2020, Part 2, Chapter 13 of the FDOT's PD&E Manual, the project alternatives were designed to protect floodplains and floodways.

Five cross culverts along the project limits will require lengthening or other modifications as part of the proposed improvements. Existing cross-drains are summarized in **Table 3.1**. During the final design phase the exact nature of the modifications will be determined. It is anticipated that mainline roadway profile grades will not be changed. However, new ramps will be introduced with new profile grade lines which will be matching the existing roadway grades. The modifications are necessary for improved motorist and pedestrian connectivity, circulation, and safety. The roadway improvements will require acquisition of parcels comprised of existing businesses and residences. Therefore, future land use at certain areas along the project limits will change from commercial and residential to highway facility.

Floodplains were identified using the Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM), Panel 12011C0568H and 12011C731H, dated August 18, 2014; and preliminary floodplain information developed by the South Florida Water Management District (SFWMD).

The project is located within the flood zones AH, AE, and X. **Appendix A** shows an Aerial Project Location Map and **Appendix B** includes the FEMA Firmettes.

The modifications to drainage structures included in this project will result in an insignificant change in their capacity to carry floodwater. This change will cause



minimal increases in flood heights and flood limits. These minimal increases will not result in any significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. There will not be a significant change in the potential for interruption or termination of emergency services or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

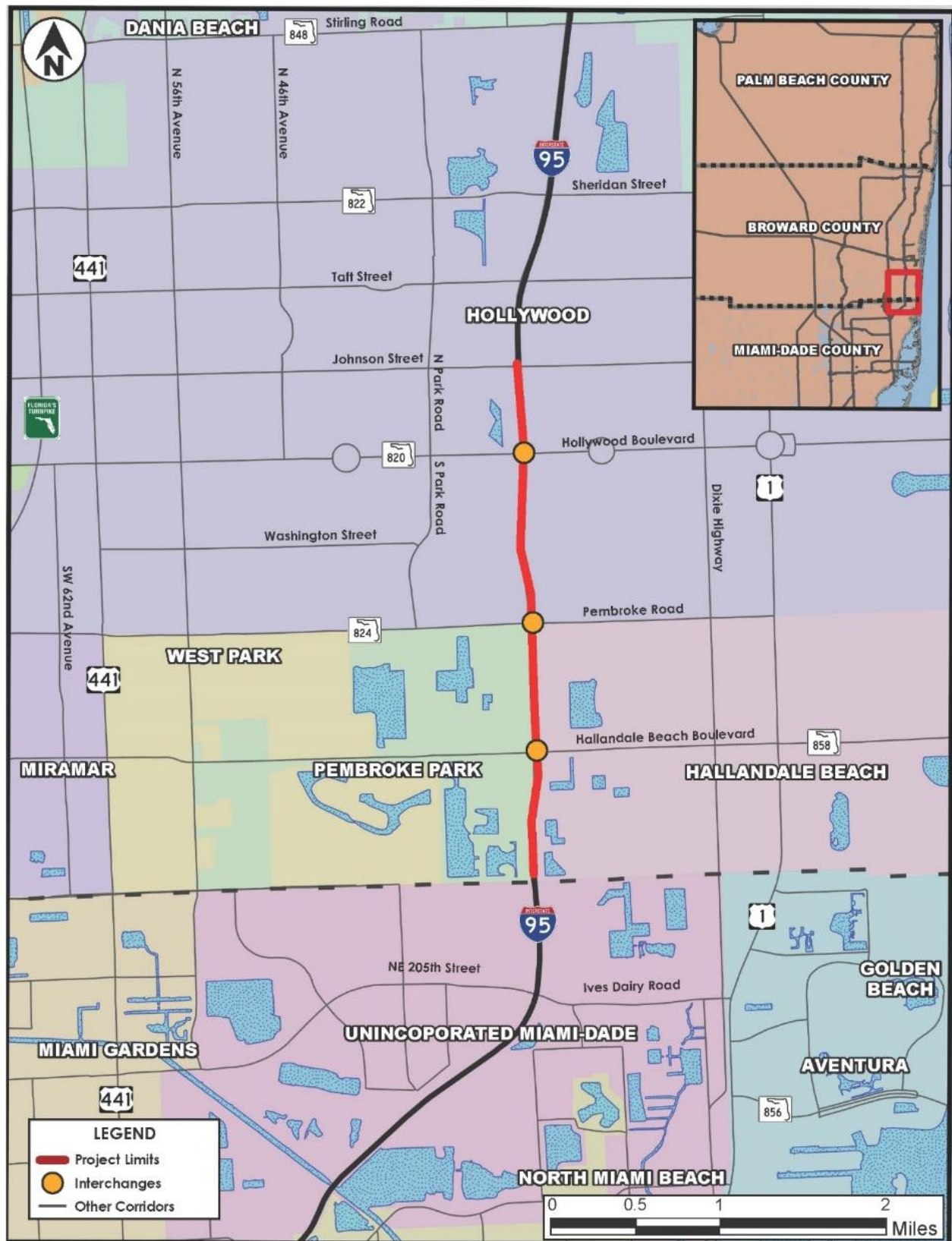


Figure 1.1 – Project Location Map



1.0 INTRODUCTION

FDOT District Four is conducting a PD&E Study for I-95 from south of Hallandale Beach Boulevard to north of Hollywood Boulevard, a distance of approximately three miles (see **Figure 1.1**). The PD&E Study is proposing improvements to the Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard interchanges. The project is located in Broward County, Florida and is contained within the municipalities of Hallandale Beach, Pembroke Park, and Hollywood.

The proposed project is located within Broward County, Florida, under Township 51S, Range 42E, and Sections 16, 17, 20, 21, 28 and 29.



2.0 PROJECT DESCRIPTION

The purpose of this study is to evaluate the potential modification of existing entrance and exit ramps serving the three interchanges within the project limits. Widening and turn lane modifications will be evaluated along Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard to facilitate the ramp modifications and improve the access and operation of the corridors upstream and downstream from the interchanges. The improvements will require upgrading and modifying the corresponding stormwater collection, treatment, and conveyance systems to meet applicable regulatory agency criteria within the project corridor.

3.0 EXISTING CONDITIONS

3.1 EXISTING TYPICAL SECTION

The existing I-95 mainline roadway section varies slightly. It consists primarily of four 11-foot wide express lanes (two in each direction) and eight 11-foot to 12-foot wide general use lanes (four in each direction) with 12-foot wide auxiliary lanes at select locations. A 3-foot wide buffer area with pavement markings and express lane markers separates the general use lanes from the express lanes with 5-foot to 12-foot wide inside shoulders, 12-foot wide outside shoulders, and a 2.5-foot wide center barrier wall. One express lane exists in each direction between Miami-Dade County and Hallandale Beach Boulevard in Broward County.

Three existing full interchanges within the project limits are located at Hallandale Beach Boulevard, Pembroke Road, and Hollywood Boulevard. Hallandale Beach Boulevard consists of four lanes west of I-95 and six lanes east of I-95. Pembroke Road and Hollywood Boulevard each have six lanes west of I-95 and four lanes east of I-95. All three interchanges are currently diamond interchanges.

3.2 EXISTING DRAINAGE

The existing drainage system is divided into three separate basins, typically divided by major east-west arterial crossings at Hallandale Beach Boulevard, Pembroke Road and Johnson Street. The basins have been identified in the latest I-95 improvement documents (FDOT project FPID 422796-1-52-01 and 422796-2-52-01) as System 4, 5 and 6 as described below:

- **System 4 (Basin 1):** This drainage basin encompasses I-95 from south of Miami Dade/Broward County Line to Hallandale Beach Boulevard (see **Appendix C** – Existing Drainage Maps). Runoff from I-95 sheet flows into roadside swales located along both sides of I-95. These dry detention roadside swales provide for water quality treatment and stormwater attenuation through the use of ditch block weirs. Basin 1 has a swale bottom elevation of 2.5 feet North American Vertical Datum of 1988 (NAVD 88) and a discharge elevation of 3.5 feet NAVD 88. The excess stormwater runoff overflows these weirs and discharges south into infield ponds at the I-95 and Ives Dairy Road interchange, which ultimately discharges to the C-9/Snake

Creek Canal. This basin is located within the South Florida Water Management District (SFWMD) C-9 East Basin.

- **System 5 (Basin 2):** This drainage basin encompasses I-95 from Hallandale Beach Boulevard to Pembroke Road. Runoff from I-95 sheet flows into roadside dry detention swales located along both sides of I-95 and a dry pond located at the corner of Hallandale Beach Boulevard and I-95 northbound on-ramp. These dry detention roadside swales provide water quality treatment and stormwater attenuation through the use of ditch block weirs. This system consists of swales with a bottom elevation of 1.5 feet NAVD 88 and discharge elevation of 4.0 feet NAVD 88. According to existing permit information this basin discharges into an FDOT borrow pit called Chaves Lake, which is located at the northeast quadrant of I-95 and Hallandale Beach Boulevard. However, no drainage connection was observed during our field investigation. Excess stormwater runoff from Chaves Lake overflows to the C-10 Canal through a pump station located within the west side of the I-95 right of way between Hallandale Beach Boulevard and Pembroke Road. This basin is located within the SFWMD's C-10 Basin.
- **System 6 (Basin 3 & 4):** This drainage basin encompasses I-95 from Pembroke Road to Johnson Street. Runoff from I-95 sheet flows into the roadside dry detention swales located along both sides of the I-95 and Hollywood Boulevard interchange infield areas. This system has a swale bottom elevation of 1.5 feet NAVD 88 and discharge elevation of 2.5 feet NAVD 88. These roadside swales and interchange infield areas provide water quality treatment and stormwater attenuation through the use of ditch block weirs. Excess stormwater runoff overflows these weirs and discharges into the C-10 Canal just north of Johnson Street. This basin is located within the SFWMD's C-10 Basin.

Side Street/Arterial Street Drainage: There are three arterial streets within the project limits of the I-95 corridor; Hallandale Beach Boulevard, Pembroke Road and Hollywood Boulevard. Each of those side streets, beyond the interchanges, has its own drainage system. Since the improvements are mostly at the interchanges, the impact to the existing drainage systems of the side streets beyond interchanges are considered minor.

Offsite System: An offsite storm-sewer system exists along the I-95 corridor within the project limits. The system is designed to alleviate the adverse flooding conditions for the City of Hallandale Beach and the Town of Pembroke Park as described in the SFWMD permit No. 06-02942-P, application 010601-42, dated October 2001. The permitted system includes the Chaves Lake, located within the City of Hallandale Beach, connected to the adjacent Hallandale Beach High School Lake via an open channel. The school lake is connected through an 84" pipe to a main pump station on the west side of I-95 just south of the CSX Railroad. From the pump station a 64" stormwater force main is installed along the west side of I-95 to discharge into the modified CSX western channel. A 42" force main from another pump station located on Behan Lake, within the Town of Pembroke Park, is connected to a 64" force main outfall of the I-95 Pump Station. At the end of the conveyance channel, along the CSX Railroad, a ditch bottom inlet with a 72" diameter pipe is located to discharge the flow to the C-10 canal. This system is not expected to be impacted by the proposed I-95 improvements.

3.3 SOILS

Based on the U.S. Department of Agriculture (USDA) Web Soil Survey, it was determined that the soil property within the project falls in hydrologic soil group A. Udorthents (shaped), the predominant soil in the corridor is with the depth to SHGWT ranging from 2.0 feet NAVD to 4.0 feet NAVD. The Soil Properties Map is included in the Custom Soil Resource Report in **Appendix D**.

3.4 EXISTING LAND USE

The project land use is primarily commerce and low medium residential. No future land use change is anticipated within the project corridor. **Figure 3.1** shows a copy of the Broward County Land Use Plan.

3.5 CROSS DRAINS

Existing cross drains were located based on existing construction plans and survey.

The existing cross drain locations are summarized in **Table 3.1** and shown in **Appendix E**. More information and analysis of existing cross drains is required during the design and permitting phase.

Table 3.1 – Summary of Cross Drains

CD No.	Approximate Location	Size and Material	Approximate Length	Description
CD-1	228+76	30" RCP	196.0 ft	Connected with median barrier wall inlet
CD-2	266+83	30" RCP	218.7 ft	Connected with median barrier wall inlet
CD-2A	274+91	84" UNKNOWN	UNKNOWN	Coming from Chaves Lakes Apartment crossing I-95
CD-3	302+65	30" RCP	202.7 ft	Connected with median barrier wall inlet
CD-4	319+87	24" RCP	219.0 ft	Connected with median barrier wall inlet
CD-5	325+35	24" RCP	219.8 ft	Connected with median barrier wall inlet
CD-6	341+10	36" RCP	220.1 ft	Under bridge middle of Hollywood Boulevard

The existing 84" pipe (CD-2A) crossing under I-95 connects the Chavez Lake to the pump station located along the I-95 southbound right of way between Pembroke Road and Hallandale Beach Boulevard. The pump station discharges to a conveyance channel next to the CSX Railroad Line, which ultimately discharges to the Hollywood/C-10 Canal.

In proposed conditions, all the existing cross-drains need to be extended to maintain functionality the cross drains. The end treatment of extended cross-drains will be decided during final design.

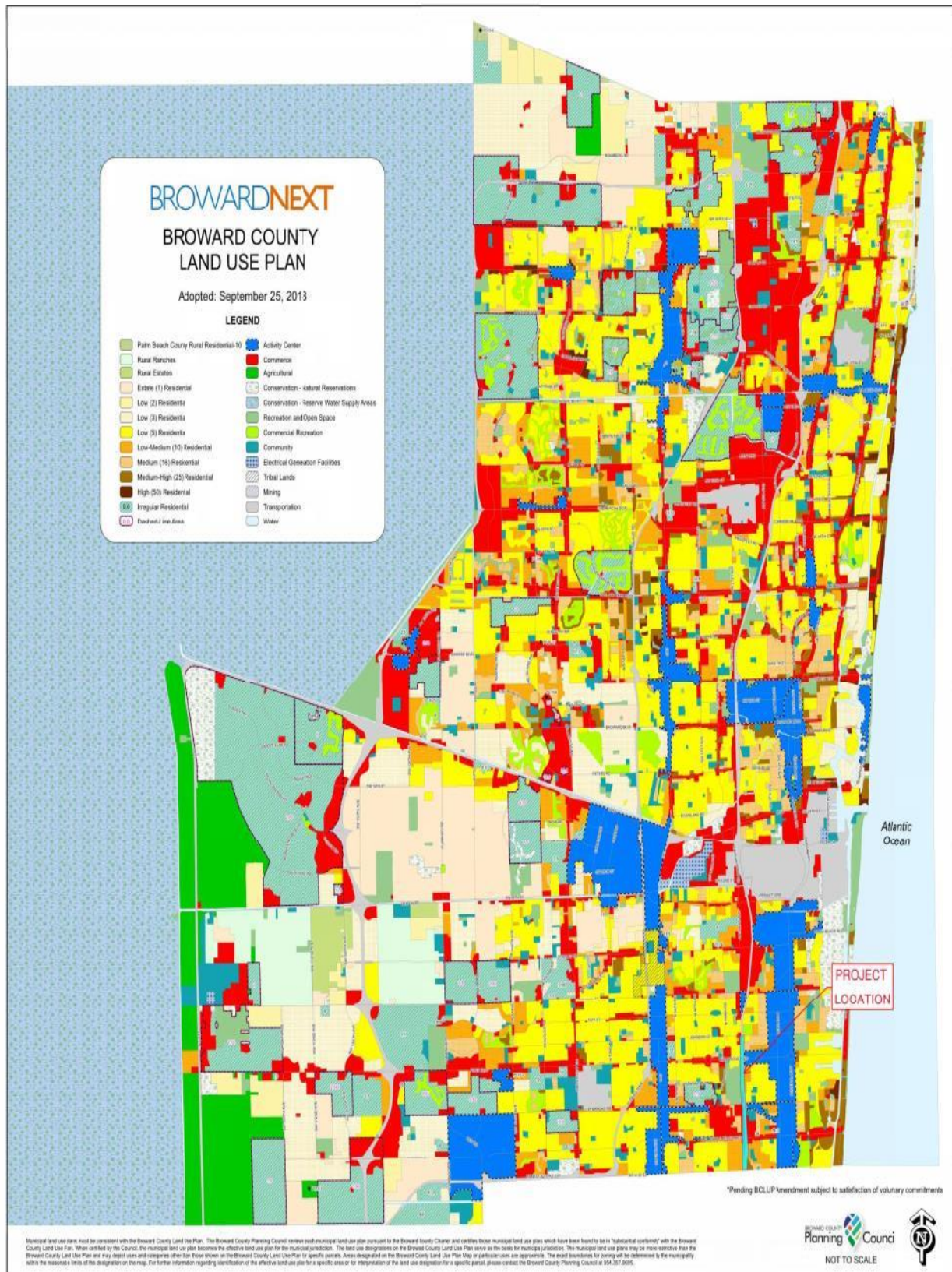


Figure 3.1 – Broward County Land Use Plan



3.6 FLOODPLAINS AND FLOODWAYS

The project falls within the limits of the Community Panel 12011C0568H and 12011C731H of the FEMA FIRM Maps of Broward County (see **Appendix B**). The project is located within the flood zone AH, AE, and X.

3.7 FLOODING HISTORY

To determine the flooding history in the project area, FDOT construction plans, United States Geological Survey (USGS) Quadrangle Maps, SFWMD information and FEMA Flood Insurance Rate Maps (FIRM) were used for areas within the corridor. A field inspection was conducted to identify obvious drainage problems. Additionally, FDOT District Four Operations Center staff members were contacted about any local drainage condition issues. No flooding problems within FDOT right of way have been identified and the existing cross drains appear to have adequate hydraulic capacity.

4.0 PROPOSED CONDITIONS

4.1 PROPOSED TYPICAL SECTION

The preferred alternative roadway typical section varies slightly. It consists primarily of four 11-foot wide express lanes (two in each direction), eight 11 to 12-foot wide general use lanes (four in each direction), a two to four-foot wide buffer area with pavement markings and express lane markers separating the general use lanes from the express lanes, eight to 12-foot wide inside shoulders, 12-foot wide outside shoulders, 12-foot wide auxiliary lanes at select locations, and a 2.5-foot wide center barrier wall.

Modifications along the mainline result from the FDOT District Six I-95 PD&E Study and FDOT District Four 95 Express 3C Construction project. The PD&E Study proposes a combination of ramp modifications and collector distributor roads adjacent to the I-95 mainline lanes.

Between Ives Dairy Road and Hallandale Beach Boulevard, the PD&E Study proposes relocating the Pembroke Road southbound on-ramp to enter south of Hallandale Beach Boulevard. This roadway section includes a one-lane 15-foot wide ramp/bridge with 6-foot wide inside and outside shoulders parallel to I-95.

Between Hallandale Beach Boulevard and Pembroke Road, the PD&E Study proposes relocating the Pembroke Road southbound on-ramp to enter south of Hallandale Beach Boulevard. This roadway section includes a one-lane 15-foot wide ramp/bridge with 6-foot wide inside and outside shoulders parallel to I-95 and grade separated over the Hallandale Beach Boulevard southbound off-ramp.

In the northbound direction, the PD&E Study proposes relocating the Pembroke Road northbound off-ramp to enter south of Hallandale Beach Boulevard. The off-ramp crosses over the on-ramp from Hallandale Beach Boulevard and stays elevated until reaching Pembroke Road. The preferred alternative is proposing a new local ramp connection between Hallandale Beach Boulevard and Pembroke Road. This connection will allow local traffic to travel northbound between the two crossing roadways without entering the I-95 mainline lanes. This roadway section includes a one-lane 15-foot wide ramp/bridge with 6-foot wide

inside and outside shoulders parallel to I-95 and grade separated over the local connection. The local connection has a one-lane 15-foot wide roadway with inside and outside shoulders varying from 0 – 6 foot wide, parallel to I-95.

Between Pembroke Road and Hollywood Boulevard, the PD&E Study proposes a northbound collector distributor road. The existing off-ramp to Hollywood Boulevard is relocated from south of Hollywood Boulevard to just north of the I-95/Pembroke Road bridge overpass. The on-ramp from Pembroke Road merges with the off-ramp to Hollywood Boulevard, becoming a two-lane collector distributor road. This roadway section includes two 12-foot wide lanes with an eight-foot wide inside shoulder and 12-foot wide outside shoulder.

In the southbound direction, the preferred alternative also proposes a collector distributor road between north of Hollywood Boulevard and Pembroke Road. This roadway section includes a one-lane 15-foot wide ramp/bridge with 6-foot wide inside and outside shoulders parallel to I-95.

Figures 4.1 – 4.3 shows the existing and proposed roadway cross sections between interchanges.

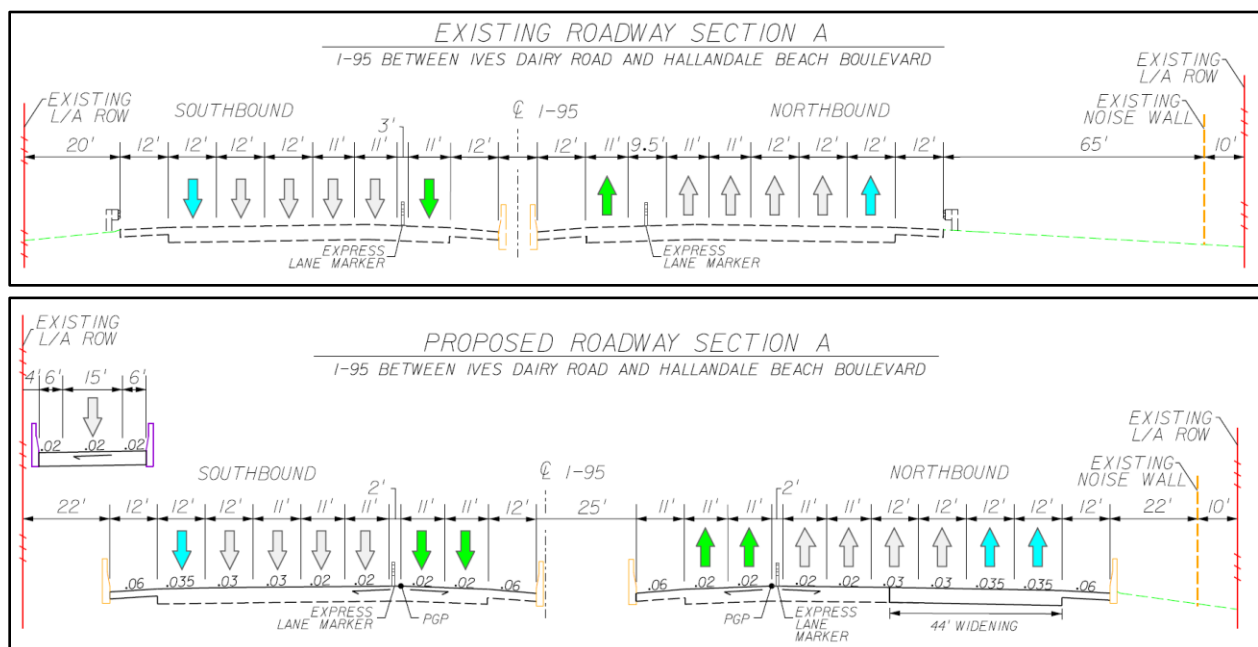


Figure 4.1 – Existing Conditions and Preferred Alternative Roadway Section between Ives Dairy Road and Hallandale Beach Boulevard

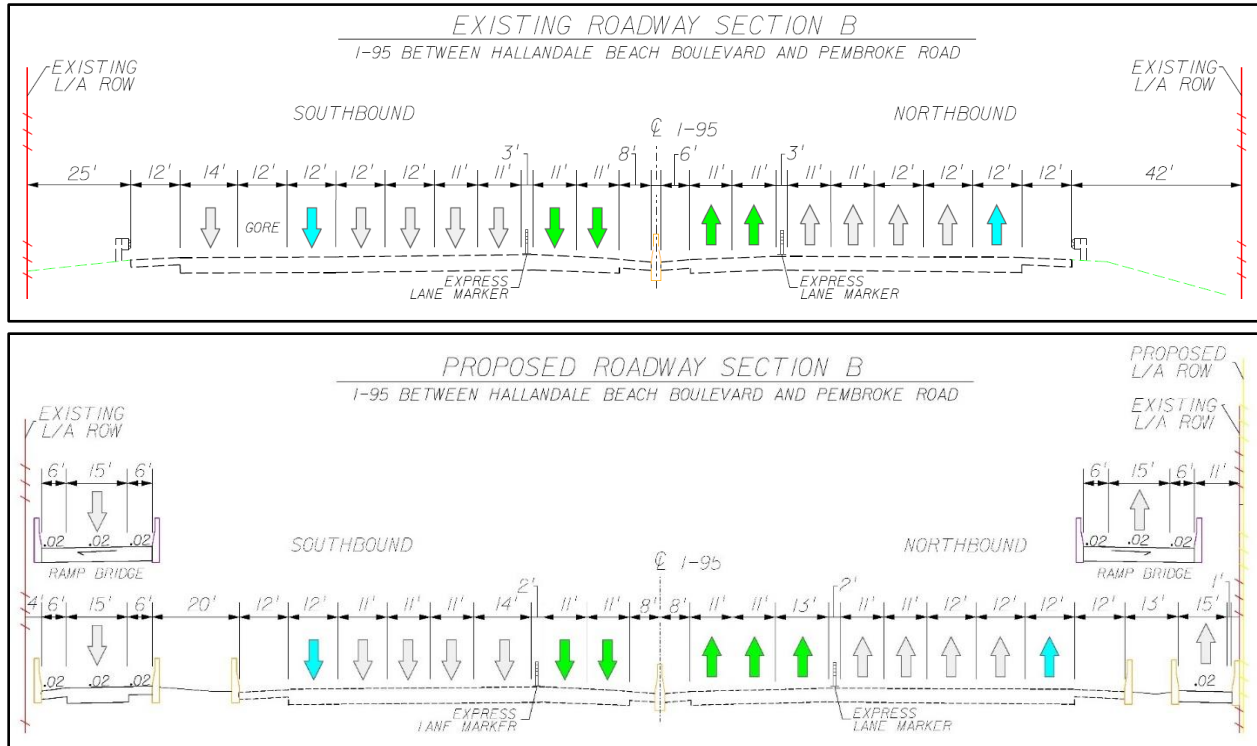


Figure 4.2 – Existing Conditions and Preferred Alternative Roadway Section between Hallandale Beach Boulevard and Pembroke Road

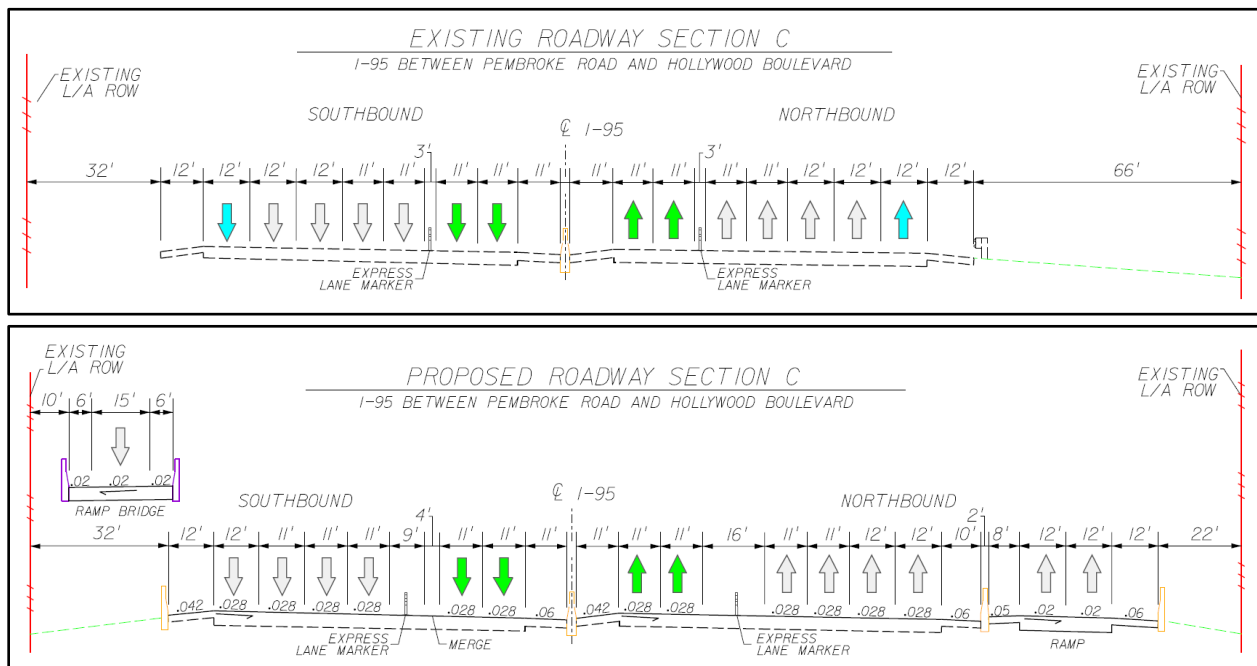


Figure 4.3 – Existing Conditions and Preferred Alternative Roadway Section between Pembroke Road and Hollywood Boulevard

4.2 PROPOSED DRAINAGE

The proposed drainage system is primarily divided into four separate basins following existing drainage basins as identified in the latest I-95 improvement documents (FDOT project FPID 422796-1-52-01 and 422796-2-52-01) as System 4, 5 and 6. However, with the improvement at the interchanges of I-95 and addition of new ramps, the proposed drainage systems will be altered significantly. Each of the proposed basins is subdivided into sub-basins and storage has been calculated accordingly. Proposed drainage systems are based on the preferred stormwater management sites after considering three alternatives and evaluating them with a matrix on the PD&E Study Pond Siting Report. **Appendix A** includes the preferred conceptual drainage design for each basin along the corridor within the study limits.

Due to limited availability of open space within right of way, providing required storage pond/swale is not enough capacity. Therefore, exfiltration trenches are used to provide the required deficit storage. Preliminary exfiltration trench length was estimated using average hydraulic conductivity “K” value; 8.67×10^{-5} cfs/ft²-ft. from preliminary geotechnical report. For more accurate French drainage length calculations during final design, “K” value at French drain location is required. **Appendix E** includes Geotechnical information consisting of “K” value.

The proposed drainage systems are described below:

- **Basin 1:** This drainage basin encompasses I-95 between station limits 172+00 and 247+38 between south of the limits of the Miami Dade/Broward County Line and Hallandale Beach Boulevard. The basin is subdivided into several sub-basins 1AL, 1BL, 1CL, 1DL, 1EL, 1AR, 1BR, 1CR and 1DR. Runoff from I-95 sheet flows into roadside swales and French drains located along both sides of I-95. These roadside swales are identified as S-L1A, S-L1B, S-L1C, S-L1D, S-L2, S-L1E, S-R1A, S-RA1-1, S-R1, S-R2, and S-R4. Dry detention pond S-L3 is in a new parcel. This system consists of dry swales with a bottom elevation of 2.0 feet NAVD 88. Weir control elevation is raised to 4.2 feet NAVD 88 to accommodate the required treatment and attenuation volume for this basin. The excess stormwater runoff overflows these weirs and discharges into infield ponds at

the I-95 and Ives Dairy Road interchange, which ultimately discharges to the C-9/Snake Creek Canal. This basin is located within the SFWMD's C-9 East Basin.

Peak stages in swales and ponds are to be compared for existing and proposed conditions. The stages for proposed conditions need to be lower or similar to stages for existing conditions.

Since there is deficit in provided storage within proposed swale/pond, French drain is proposed to provide additional storage.

- **Basin 2:** This drainage basin encompasses I-95 between station limits 247+38 and 287+92 between Hallandale Beach Boulevard and Pembroke Road. The basin is subdivided into sub-basins 2AL, 2BL, 2CL, 2DL, 2EL, 2FL, 2AR, 2BR, 2CR and 2DR. Runoff from this segment of I-95 sheet flows into the remaining roadside swales and pond located along both sides of I-95 identified as SL-4, S-R5, S-R6, S-R7, S-R7A and SR-8. Pond S-L5 is and swale S-R7 are in two (2) new parcels. These roadside swales will provide water quality treatment and stormwater attenuation using ditch block weirs. This system consists of dry swales with a bottom elevation of 1.5 feet NAVD 88 to provide partial treatment and attenuation for this basin and a weir control elevation raised to 4.0 feet NAVD 88. This basin is located within the SFWMD's C-10 Basin.

Additional required storage can be achieved using proposed French drain within existing right of way.

- **Basin 3:** This drainage basin encompasses I-95 between station limits 287+92 and 341+98, between Pembroke Road and Hollywood Boulevard. The basin is subdivided into 3AL, 3BL, 3CL, 3DL, 3EL, 3FL, 3AR, 3BR, 3CR, 3DR, and 3ER. Runoff from this segment of I-95 sheet flows into remaining roadside swales and French drains located along both sides of I-95 identified as SR-9, SR-10 & SR-11 at east side and SL-5A-1, SL-5A-2, SL-5B, SL-5C & SL-5D at I-95 west side. Modified roadside swales provide partial water quality treatment and stormwater attenuation using ditch block weirs. This system consists of dry detention swales with a bottom elevation of 1.5 feet NAVD 88 and a weir control elevation raised to 3.5 feet NAVD 88. The rest of the storage for treatment and attenuation will be discharged to Basin 4 and routed to the proposed stormwater pond within the Sunset Golf Course on the east side of the I-95

corridor and ultimately will be discharged to the SFWMD' C-10 Canal. This basin is located within the SFWMD's C-10 Basin. A pump may be required to overcome hydraulic gradients and ensure proper conveyance to the proposed pond within the Sunset Golf Course.

Additional required storage can be achieved using proposed French drain within existing right of way.

- **Basin 4:** This drainage basin encompasses I-95 between station limits 341+98 and 369+46, between Hollywood Boulevard and Johnson Street. The basin is subdivided into 4A-L, 4B-L, 4C-L & 4D-L on the west side, and 4A-R & 4B-R at east of I-95. Runoff from this segment of I-95 sheet flows into the remaining roadside swales located along both sides of I-95 identified as S-L6, S-R12, S-R13, S-R14 and S-R15. Among those, swale S-R13 is in two (2) new parcels. This system consists of dry swales with a bottom elevation of 1.5 feet NAVD 88 and a weir control elevation raised to 3.5 feet NAVD 88. These modified roadside swales provide water quality treatment and stormwater attenuation using ditch block weirs. The excess stormwater runoff will be discharged to the stormwater pond within the Sunset Golf Course on the east side of the I-95 corridor and ultimately discharged into the C-10 Canal just north of Johnson Street. This basin is located within the SFWMD's C-10 Basin.

Peak stages in swales are to be compared for existing and proposed conditions. The stages for proposed conditions need to be lower or similar to stages for existing conditions.

Additional required storage can be achieved using proposed French drain within existing right of way.

Basin 5: This drainage basin encompasses I-95 between Johnson Street and approximately 800 feet to the North, where the northbound widening is ending. Basically, the I-95 improvements north of Johnson Street are included in the Sheridan interchange project. The basin is subdivided into 5 AL basin on the west side and 5 AR on the east side. Since no improvements in the southbound direction are happening under this project, no analysis has been performed for the Basin 5 AL. The stormwater runoff from the 5 AR basin is being routed to a new proposed retention Pond located in the adjacent Sunset Golf

Course which will provide water quality and attenuation for this basin as well for basins 3 & 4. This basin is located within the SFWMD's C-10 Basin.

Please note that basins are reconfigured for proposed conditions and part of off-site area are part of onsite basins. Therefore, basin areas in proposed conditions are little more than areas in existing conditions.

4.3 FUTURE LAND USE

The Broward County Future Land Use Map is shown in **Figure 3.1**. It shows that the future land uses in the project area will mostly remain unaltered.

4.4 PROPOSED CROSS DRAINS

Five cross culverts along the project limits will require lengthening or other modifications as part of the proposed improvements. During the final design phase, the exact nature of the modifications will be determined.

4.5 FLOODPLAINS AND FLOODWAYS

Some parts of the project limits for I-95 lie within the 100-year base floodplain. Floodplain encroachment is estimated using as-built roadway cross-sections and the proposed roadway improvements. Preliminary flood encroachment calculations are shown in **Appendix F**. Approximately 25 ac-ft of floodplain encroachment was estimated due to the proposed improvements. Floodplain encroachment calculations need to be revisited once the roadway geometry and cross sections are finalized in the design and permitting phase. Required floodplain compensation will be mitigated in parcels located south of Hallandale Beach Boulevard for the C-9 Basin and in the Sunset Golf Course on the east side of I-95 corridor for the C-10 Basin as shown in **Appendix F**.

FEMA Flood Map elevation is used for preliminary flood encroachment calculations. Preliminary evaluation indicates that the volume of excavation proposed by the ponds will mitigate the expected encroachment.

No regulatory floodways are within project limits.

4.6 PROJECT CLASSIFICATION

In accordance with FDOT's PD&E Manual, Part 2, Chapter 13, Floodplains, the corridor has been evaluated to determine the impact of the proposed hydraulic modifications. Hydraulic improvements are grouped into seven categories based upon the type of hydraulic improvements and estimated floodplain impact. The proposed project can be best described as Project Activity Category 3 – "Projects Involving Modification to Existing Drainage Structures." This classification includes those projects that will not involve the replacement of any existing drainage structures or the construction of any new drainage structures.

Project Involving Modification to Existing Drainage Structures: The modifications to drainage structures included in this report will result in an insignificant change in their capacity to carry floodwater. This change will cause minimal increases in flood heights and flood limits. These minimal increases will not result in any significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. There will not be a significant change in the potential for interruption or termination of emergency services or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

4.7 RISK EVALUATION

Part 2, Chapter 13 - Floodplains of the FDOT's PD&E Manual, refers to Title 23 CFR Part 650A in conducting the risk evaluation. Because it has been determined that the floodplain encroachments are not significant, it can be concluded that the encroachments do not create:

- A significant potential for interruption or termination of a transportation facility which is needed for emergency vehicles or provides a community's only evacuation route
- A significant flood risk
- A significant adverse impact on natural and beneficial floodplain values

Therefore, the floodplain encroachments will not create a risk to highway users (loss of life, service disruption) or risks to property owners (damages, service disruption, property loss).

4.8 COORDINATION WITH LOCAL AGENCIES

Coordination with the SFWMD and Florida Department of Environment Protection (FDEP) has taken place during the PD&E Study. The project will require the following permits:

- SFWMD – General Environmental Resource Permit (ERP) modification and the Standard Right of Way Occupancy Permit
- FDEP – An NPDES (Erosion Control Plans, Stormwater Pollution Prevention Plan, Notice of Intent, and Notice of Termination) Permit is required due to disturbance of more than 1 acre of soil

The project was also coordinated with the FDOT Drainage Office and the City of Hollywood (see **Appendix G**).

4.9 PD&E MANUAL REQUIREMENT'S WITH MINIMAL ENCROACHMENT

Part 2, Chapter 13 - Floodplains of the FDOT's PD&E Manual, lists the report criteria for projects with floodplains within the project limits. The FDOT has different requirements based on the level of significance of the encroachment. This I-95 improvement project was determined to have minimal encroachment and, as a result, the requirements for this level of significance are listed below:

- The history of flooding of the existing facilities and/or measures to minimize any impacts due to the proposed improvements.
There is no history of flooding of the existing facilities. The proposed improvements will maintain the existing roadway profile as much as possible to minimize impacts.
- Determination of whether the encroachment is longitudinal or transverse, and if it is a longitudinal encroachment, an evaluation and discussion of possible avoidance of the encroachment.
The impact to the floodplain is a longitudinal encroachment. Because the floodplain covers both sides of the roadway along portions of the length of the proposed improvements, impacts to this floodplain are unavoidable.

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

This project involves improvements to an existing heavily-traveled roadway facility. Because of the high traffic volumes within the project limits and the need to reconstruct the intersections, avoidance is not practical.

- Impact of the proposed improvement on emergency services and evacuation.

The existing roadway profile will be preserved as much as possible along the entire project corridor. Considering existing FEMA Map Flood Elevations, the impacts to the base flood and likelihood of flood risk are minimal. No overtopping of the roadway is anticipated for the entire roadway corridor for current FEMA Flood Map. However entire roadway section at Stations 269+00, 305+00 316+00 will be under 100-year flood per Broward County Future Map 2060 year.

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

The floodplain encroachments due to the proposed improvements are minimal and will be mitigated as per the requirements of the SFWMD. The impacts to the base flood and likelihood of flood risk are minimal. No overtopping of the roadway is anticipated for the entire roadway corridor.

- 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.

No regulatory floodways exist within the project limits.

- The impacts on natural and beneficial floodplain values, and measures to restore and preserve these values.

Since the majority of the proposed improvements are located within the existing right of way, no adverse impact on natural and beneficial floodplain values are anticipated. Required Volumetric floodplain mitigation will be provided in accordance with SFWMD's requirements.

- Consistency of the proposed improvements with the local floodplain development plan or the land use elements in the Comprehensive Plan, and the potential of encouraging development in the base floodplain.
The proposed improvements are consistent with local plans and do not increase or encourage the potential of development in the base floodplain.
- A map showing project, location, and impacted floodplains. Copies of applicable FIRM maps should be included in the appendix.
*A project location map is included as Figure 1.1 of this report. The existing and FEMA FIRMs/Floodplain Location Maps are located in **Appendix H**.*
- Results of any risk assessments performed.
This Location Hydraulics Report (LHR) is in support of the I-95 PD&E Study proposed improvements and determines if any impacts to floodplains and floodways occur as a result of the proposed improvements to the roadway and associated drainage/conveyance systems. The results of the risk assessment performed indicate that the floodplain encroachment level will be minimal and is described as Category 3.

The project falls within the limits of the Community Panel 12011C0568H and 12011C731H of the FEMA FIRM Maps of Broward County. The project is located within the flood zones AH, AE, and X.

Broward County Future Flood elevation has been used to calculate preliminary flood encroachment. The encroachment calculations will be finalized when roadway geometry and cross sections are developed further. Our preliminary evaluation indicates that the volume of excavation proposed by the ponds will mitigate the expected encroachment.

5.0 RECOMMENDATIONS AND CONCLUSIONS

The encroachments to the floodplains along the project corridor are considered insignificant and are determined to have minimal encroachment. The flood encroachment will be mitigated by using the Sunset Golf Course.

Minimal Encroachments:

"The modifications to drainage structures included in this project will result in an insignificant change in their capacity to carry floodwater. This change will cause minimal increases in flood heights and flood limits. These minimal increases will not result in any significant adverse impacts on the natural and beneficial floodplain values or any significant change in flood risks or damage. There will not be a significant change in the potential for interruption or termination of emergency services or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant."



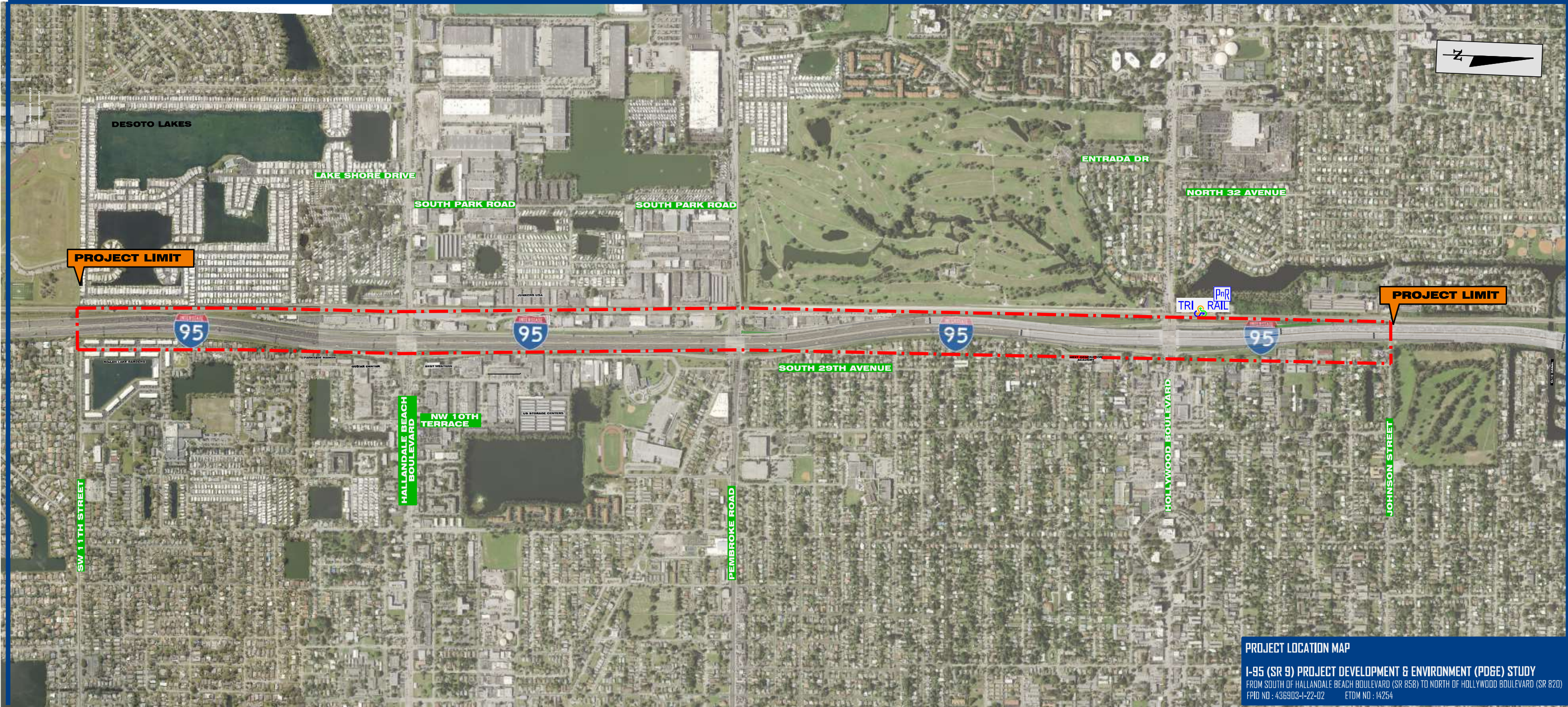
6.0 REFERENCES

- FDOT Drainage Manual dated January 2021
- FDOT PD&E Manual, 2020
- FDOT Drainage Design Guide dated January 2021
- FDOT District Four Drainage Practices & Guidance
- SFWMD Environmental Resource Permit Information Manual, 2014
- USDA-NRCS Soil Survey of Broward County, Florida
- FEMA Flood Insurance Rate Maps



APPENDIX A

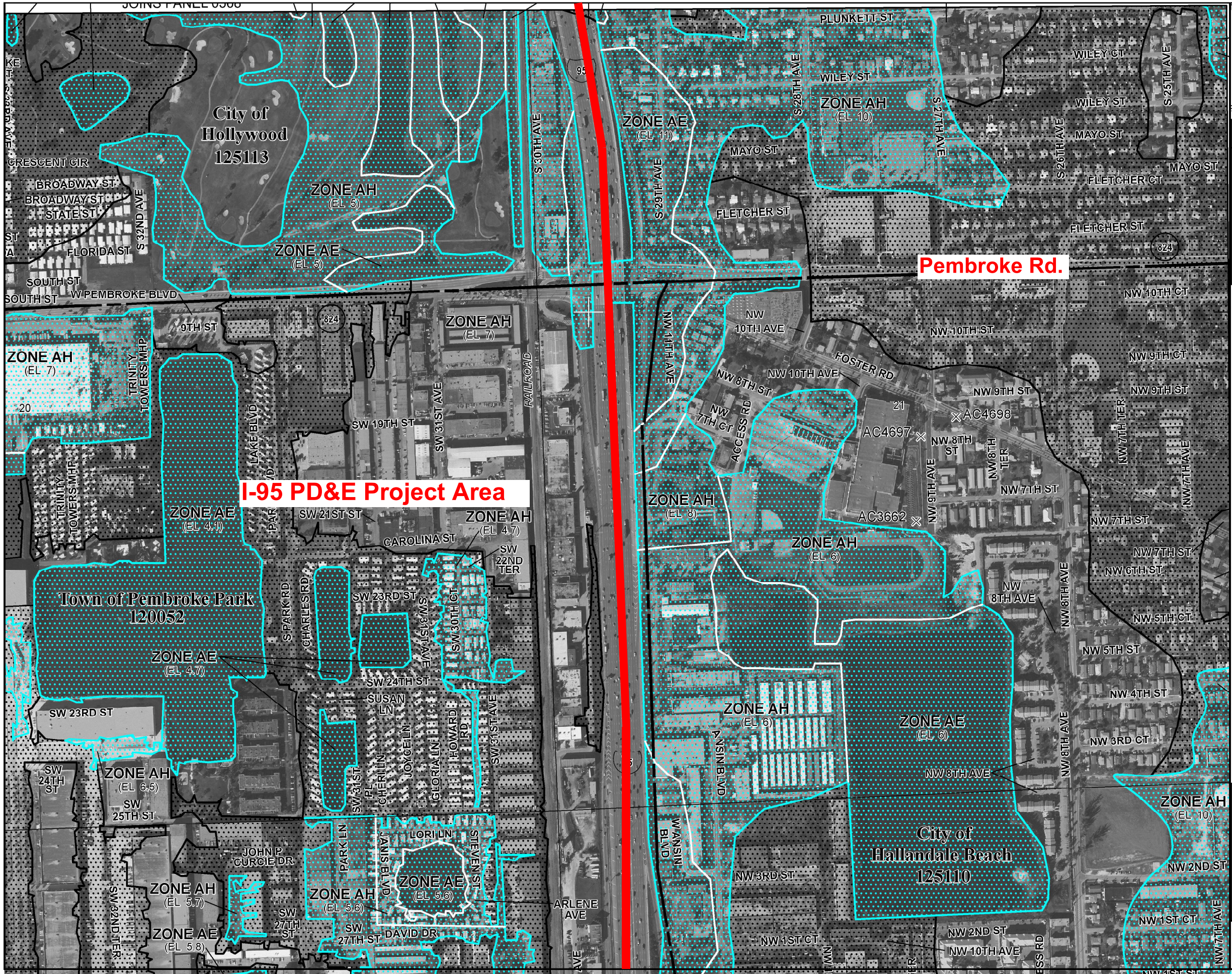
Aerial Project Location Maps





APPENDIX B

Federal Emergency Management Agency Firmette



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

0 250 500 750 1,000 FEET

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0731H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 731 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HALLANDALE BEACH, CITY OF	125110	0731	H
HOLLYWOOD, CITY OF	125113	0731	H
PEMBROKE PARK, TOWN OF	120052	0731	H
WEST PARK, CITY OF	120222	0731	H

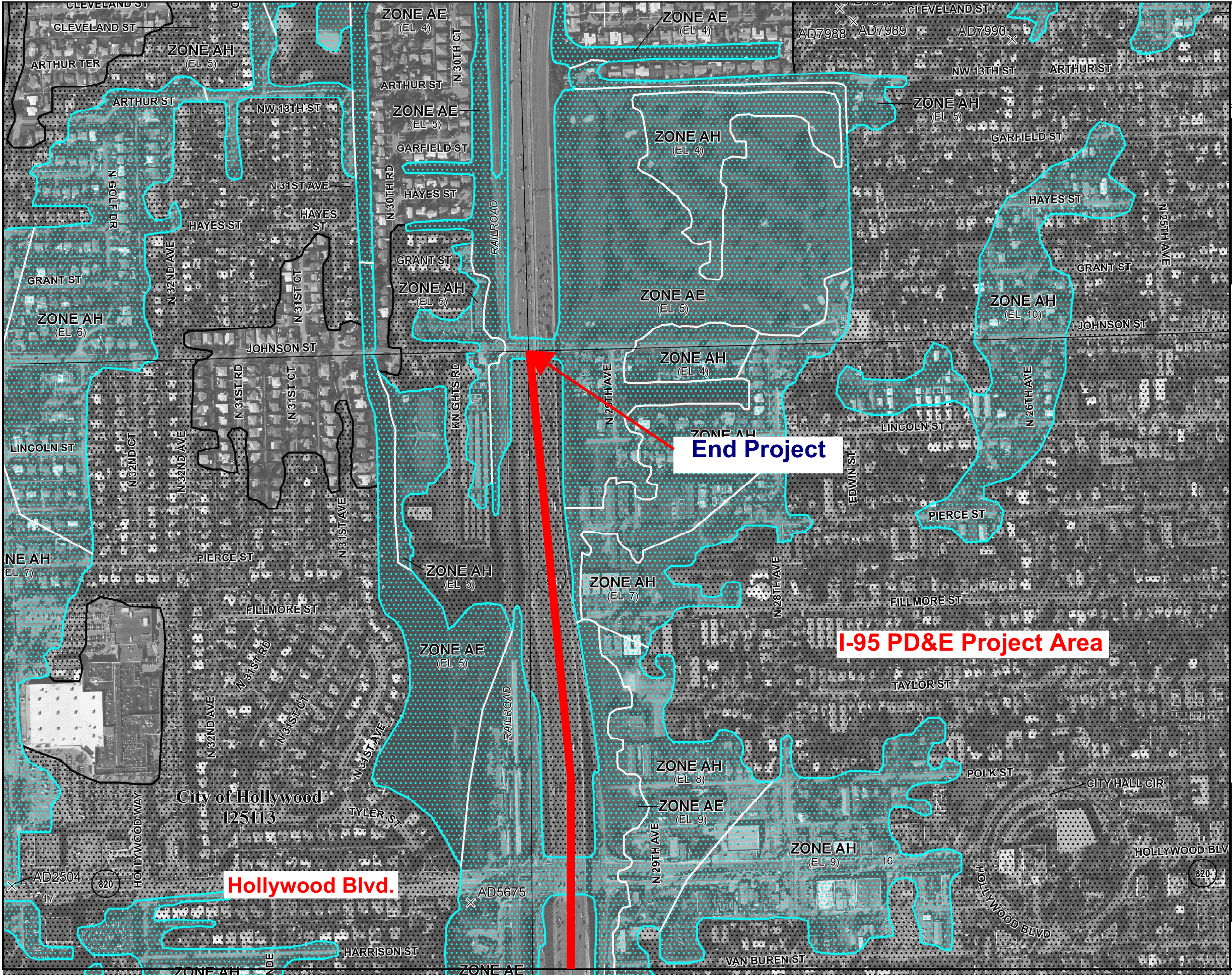
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER 12011C0731H

EFFECTIVE DATE AUGUST 18, 2014

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



ance Program at 1-800-638-6620.


MAP SCALE 1" = 500'
0 250 500 750 1,000 FEET

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0568H

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

PANEL 568 OF 751
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HOLLYWOOD, CITY OF	125113	0568	H

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
12011C0568H
EFFECTIVE DATE
AUGUST 18, 2014
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Summary of Floodplain Encroachment/Compensation Calculations

SFWMD BASIN	BASIN	FLOODPLAIN ENCROACHMENT (AC-FT)	PROVIDEE FLOODPLAIN COMPENSATION (AC-FT)
C-9	BASIN 1	5.90	22.18
C-10	BASIN 2	4.34	
	BASIN 3	9.47	
	BASIN 4	1.08	
		20.80	22.18

Summary of Floodplain Encroachment Calculations

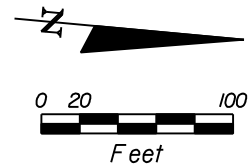
Basin	Roadway XS Station	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	Total (cf)	Total (ac-ft)
	LT					RT					
Basin 1	207+00	0	-	-	-	48		0			
	219+00	0	0	1200	0	104	76	1200	91200		
	229+00	0	0	1000	0	104	104	1000	104000		
	235+00	0	0	600	0	0	52	600	31200		
	236+00	0	0	100	0	0	0	100	0		
	243+00	0	0	700	0	40	20	700	14000		
	246+50	0	0	350	0	56	48	350	16800		
					0				257200	257200	5.90
Basin 2	248+20	0	0	-	-	0		0			
	252+00	0	0	380	0	0	0	380	0		
	254+00	0	0	200	0	8	4	200	800		
	258+00	0	0	400	0	40	24	400	9600		
	259+00	0	0	100	0	104	72	100	7200		
	270+00	0	0	1100	0	88	96	1100	105600		
	274+00	0	0	400	0	24	56	400	22400		
	278+00	0	0	400	0	24	24	400	9600		
	279+00	0	0	100	0	104	64	100	6400		
	280+00	0	0	100	0	48	76	100	7600		
	281+00	0	0	100	0	24	36	100	3600		
	283+00	0	0	200	0	32	28	200	5600		
	286+00	0	0	300	0	40	36	300	10800		
					0				189200	189200	4.34

Basin	Roadway XS Station	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	Total (cf)	Total (ac-ft)
Basin 3	LT					RT					
	290+00	8				24		0			
	295+00	8	8	500	4000	8	16	500	8000		
	300+00	0	4	500	2000	0	4	500	2000		
	305+00	0	0	500	0	176	88	500	44000		
	310+00	0	0	500	0	208	192	500	96000		
	317+00	0	0	700	0	264	236	700	165200		
	321+00	0	0	400	0	40	152	400	60800		
	336+00	0				0		0			
	340+00	152	76	400	30400	0	400	0			
					36400				376000	412400	9.47
Basin 4	344+00	16				0					
	347+00	0	8	300	2400	16	8	300	2400		
	350+00	16	8	300	2400	24	20	300	6000		
	352+00	32	24	200	4800	16	20	200	4000		
	353+00	0	16	100	1600	48	32	100	3200		
	355+00	0		200	0	24	36	200	7200		
	356+00	0		100	0	8	16	100	1600		
	357+00	0		100	0	16	12	100	1200		
	360+00	0		300	0	32	24	300	7200		
	362+00	0		200	0	0	16	200	3200		
						11200				36000	47200

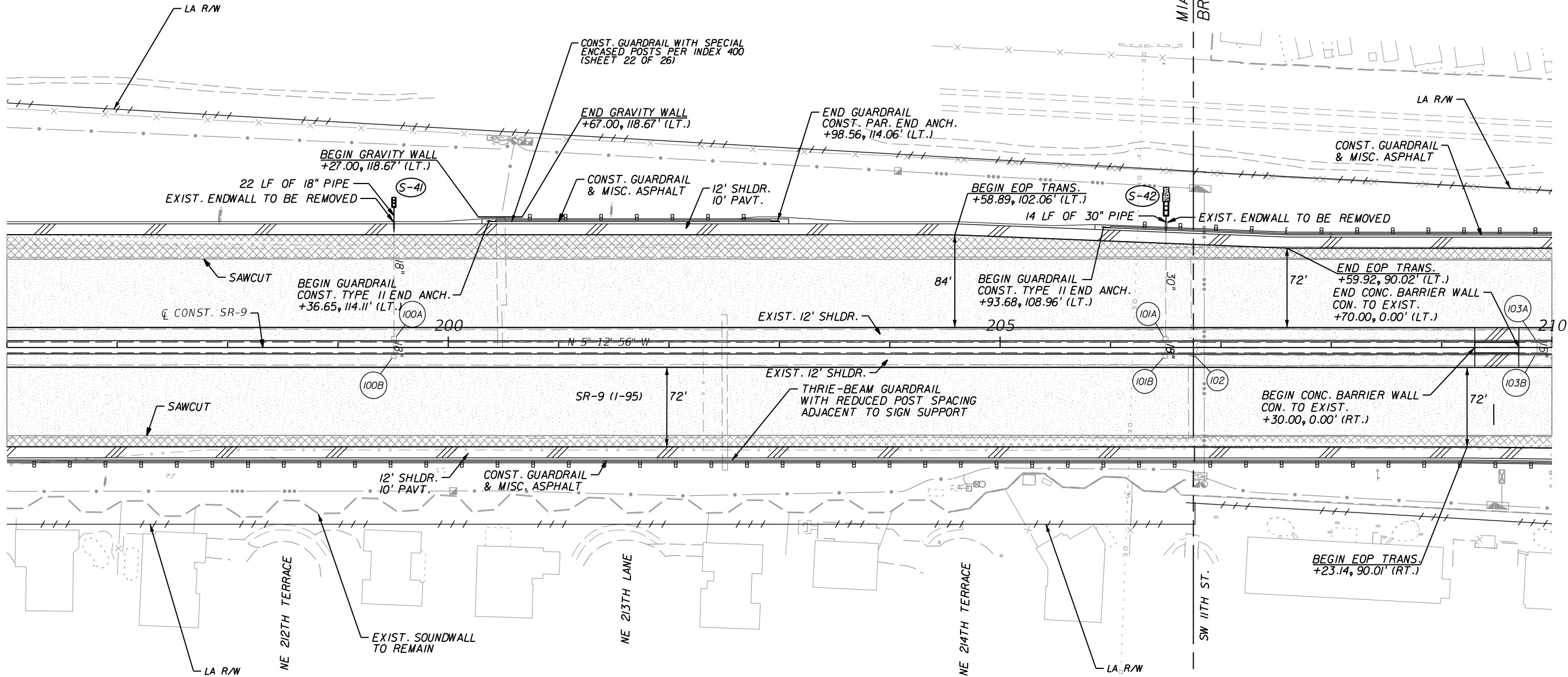


APPENDIX C

Existing Drainage Maps



MIAMI-DADE COUNTY
BROWARD COUNTY



LEGEND:

	WIDENING
	MILL & RESURFACE
	PROPOSED SHOULDER

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION



C. BRIAN FULLER, P.E. # 49524
METRIC ENGINEERING, INC.
615 CRESCENT EXECUTIVE CT
SUITE 524
LAKE MARY, FLORIDA 32746
TEL. (407) 644-1898
FAX. (407) 644-1921
CERTIFICATE OF AUTHORIZATION 2294

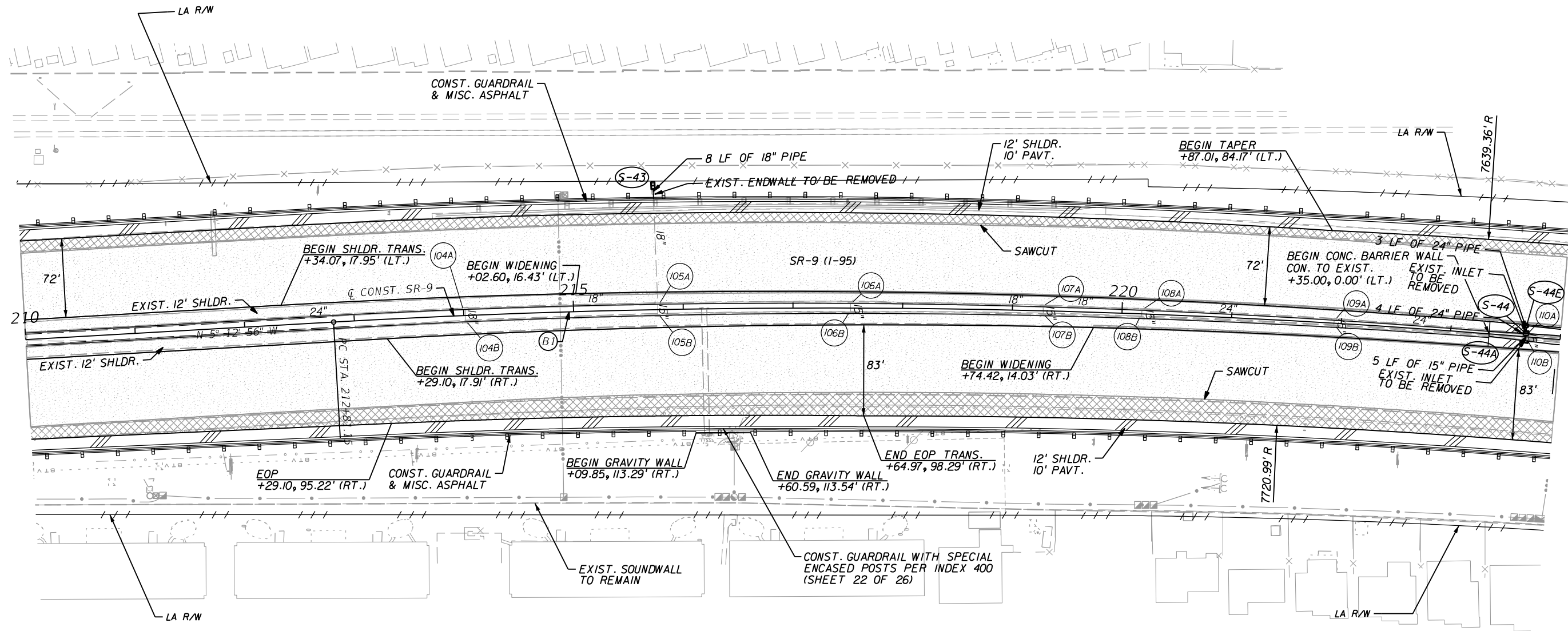
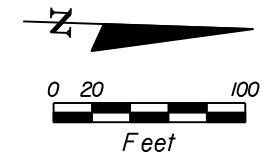
● ENGINEERS
● PLANNERS
● SURVEYORS

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01

PLAN SHEETS

41

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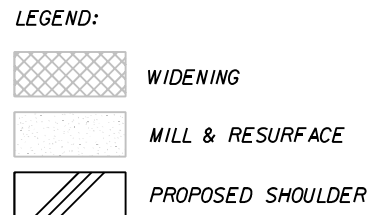
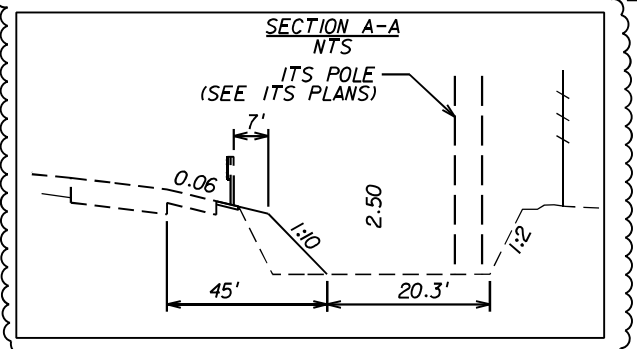
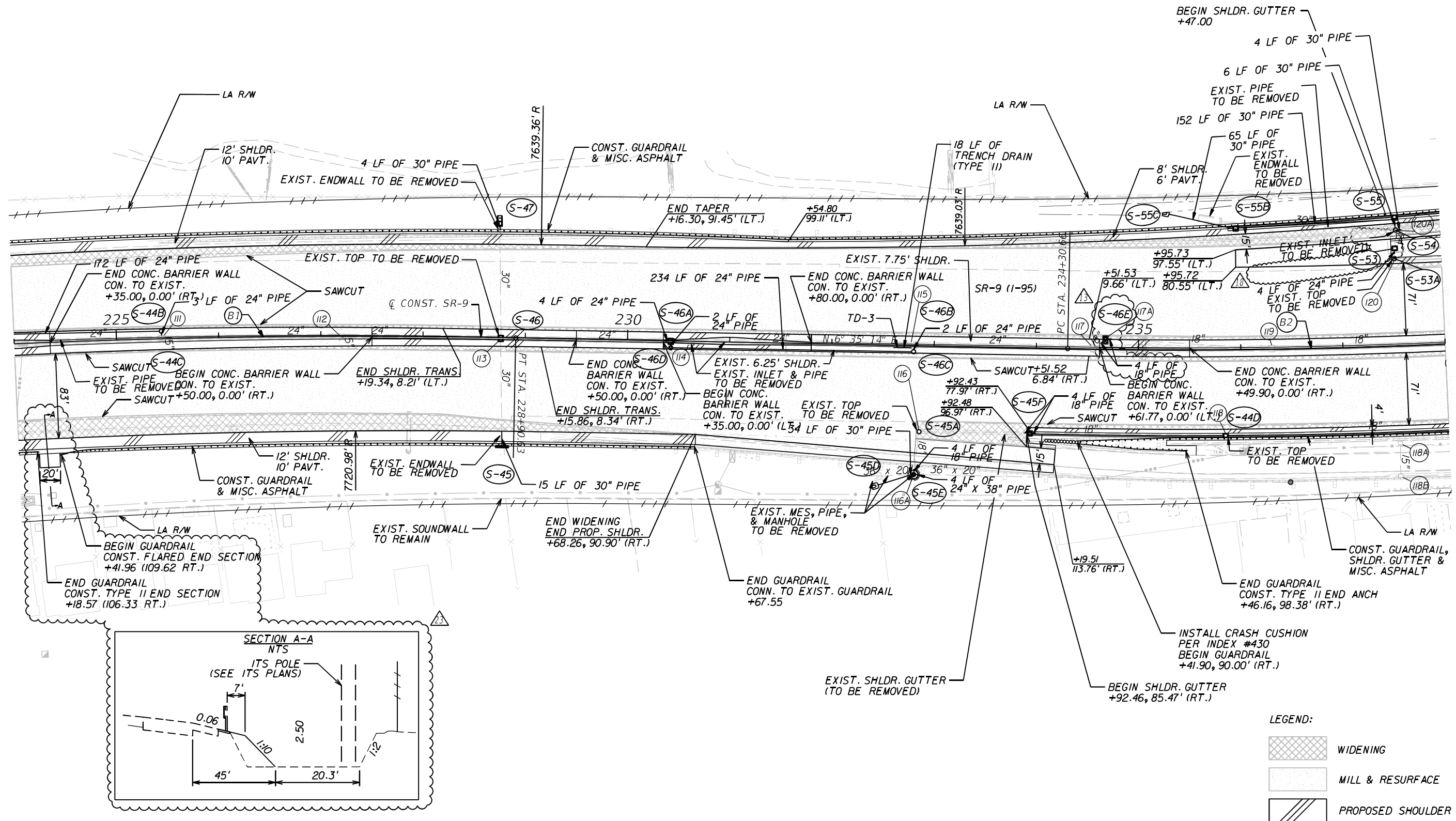


LEGEND:

- WIDENING
- MILL & RESURFACE
- PROPOSED SHOULDER

REVISIONS				 C. BRIAN FULLER, P.E. # 49524 METRIC ENGINEERING, INC. 615 CRESCENT EXECUTIVE CT SUITE 524 LAKE MARY, FLORIDA 32746 TEL. (407) 644-1898 FAX. (407) 644-1921 CERTIFICATE OF AUTHORIZATION 2294	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEETS		SHEET NO. 42
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID			
					SR 9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01			

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION
1/13/14	ADDED S-46E		
8/21/14	REVISED PIPE BETWEEN S-53 AND S-54 DUE TO AS-BUILT ELEVATIONS		
12/18/15	ITS ACCESS AS-BUILT		



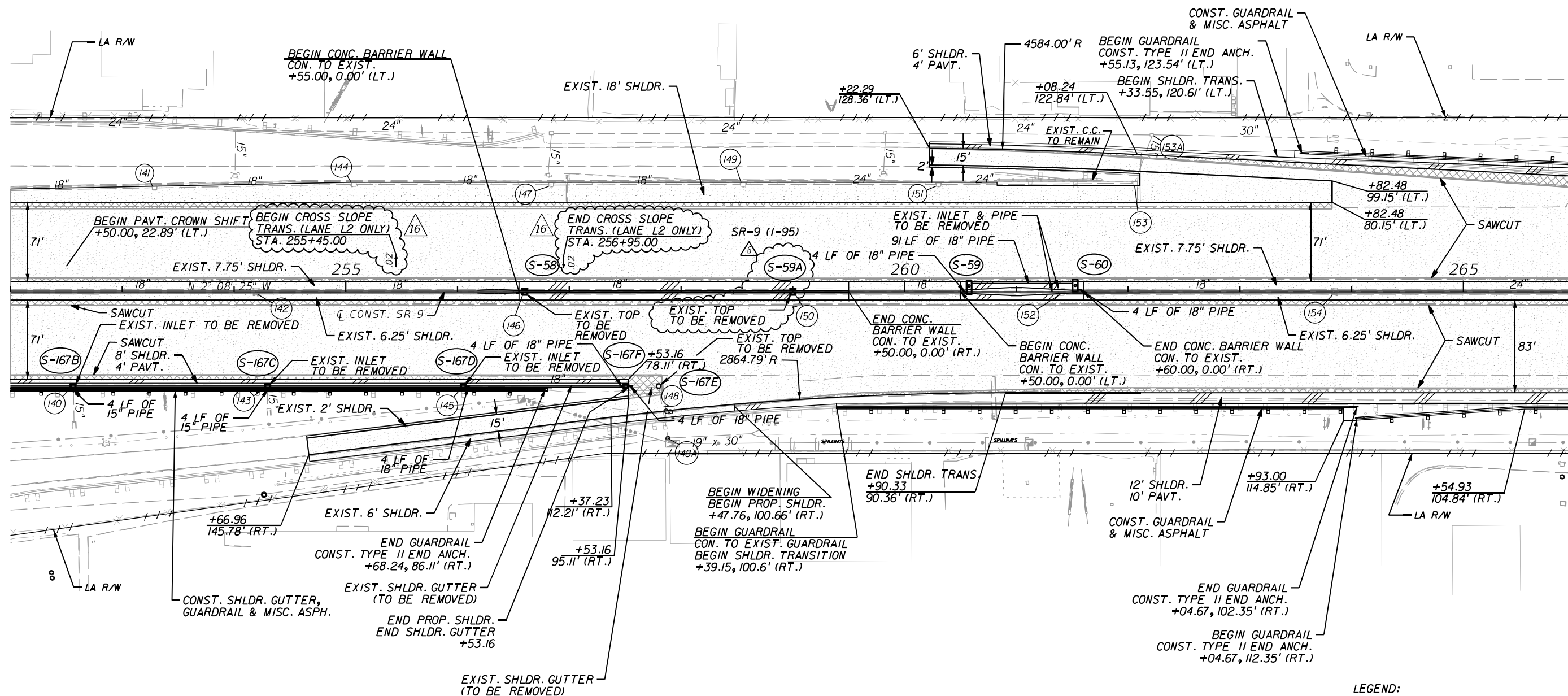
C. BRIAN FULLER, P.E. # 49524
 METRIC ENGINEERING, INC.
 615 CRESCENT EXECUTIVE CT
 SUITE 524
 LAKE MARY, FLORIDA 32746
 TEL. (407) 644-1898
 FAX. (407) 644-1921
 CERTIFICATE OF AUTHORIZATION 2294

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01

PLAN SHEETS

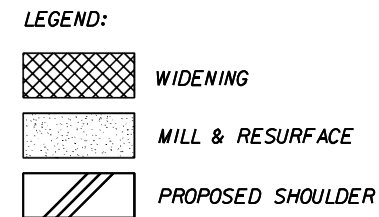
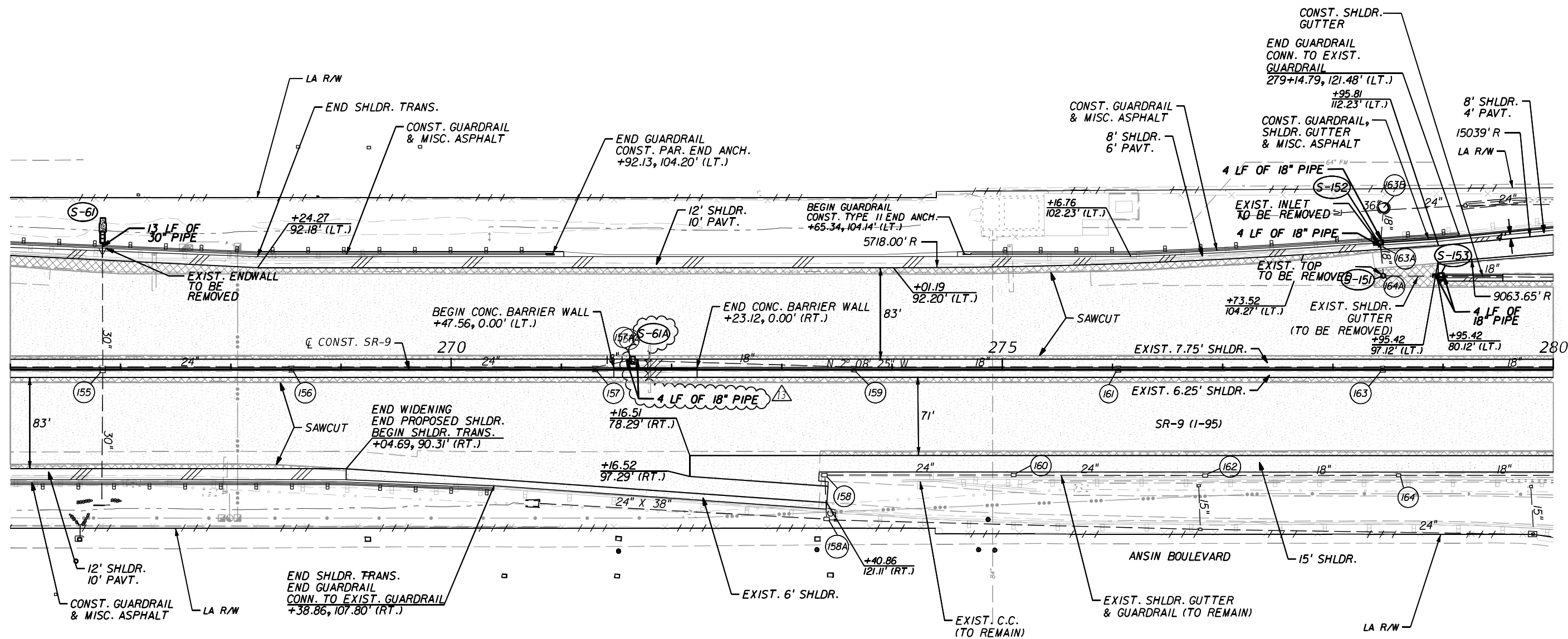
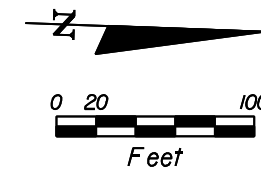
SHEET NO.
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NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.

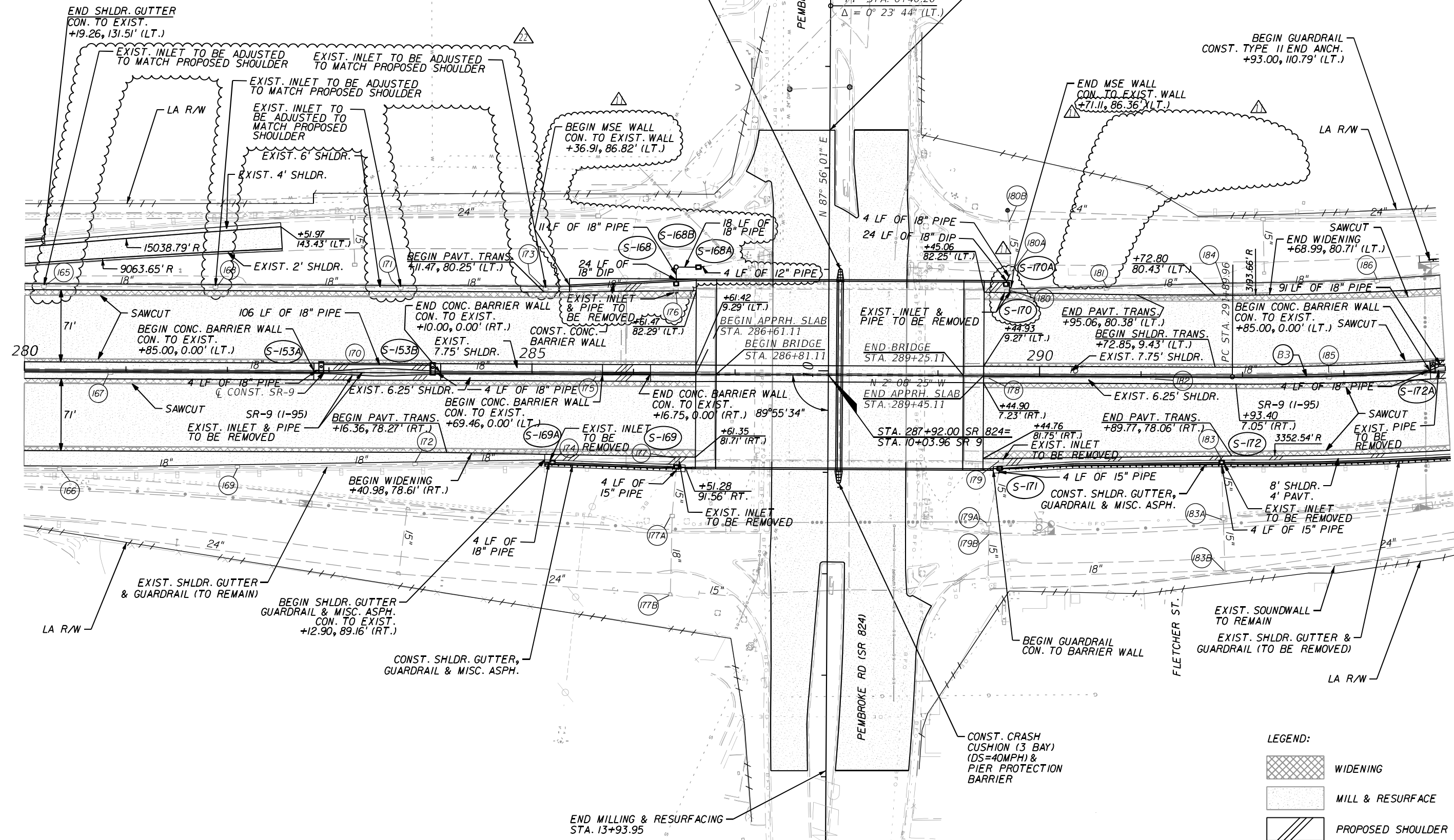


	<i>WIDENING</i>
	<i>MILL & RESURFACE</i>
	<i>PROPOSED SHOULDER</i>

45



REVISIONS				 C. BRIAN FULLER, P.E. # 49524 METRIC ENGINEERING, INC. 615 CRESCENT EXECUTIVE CT SUITE 524 LAKE MARY, FLORIDA 32746 TEL. (407) 644-1898 FAX. (407) 644-1921 CERTIFICATE OF AUTHORIZATION 2294	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEETS	SHEET NO. 46
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
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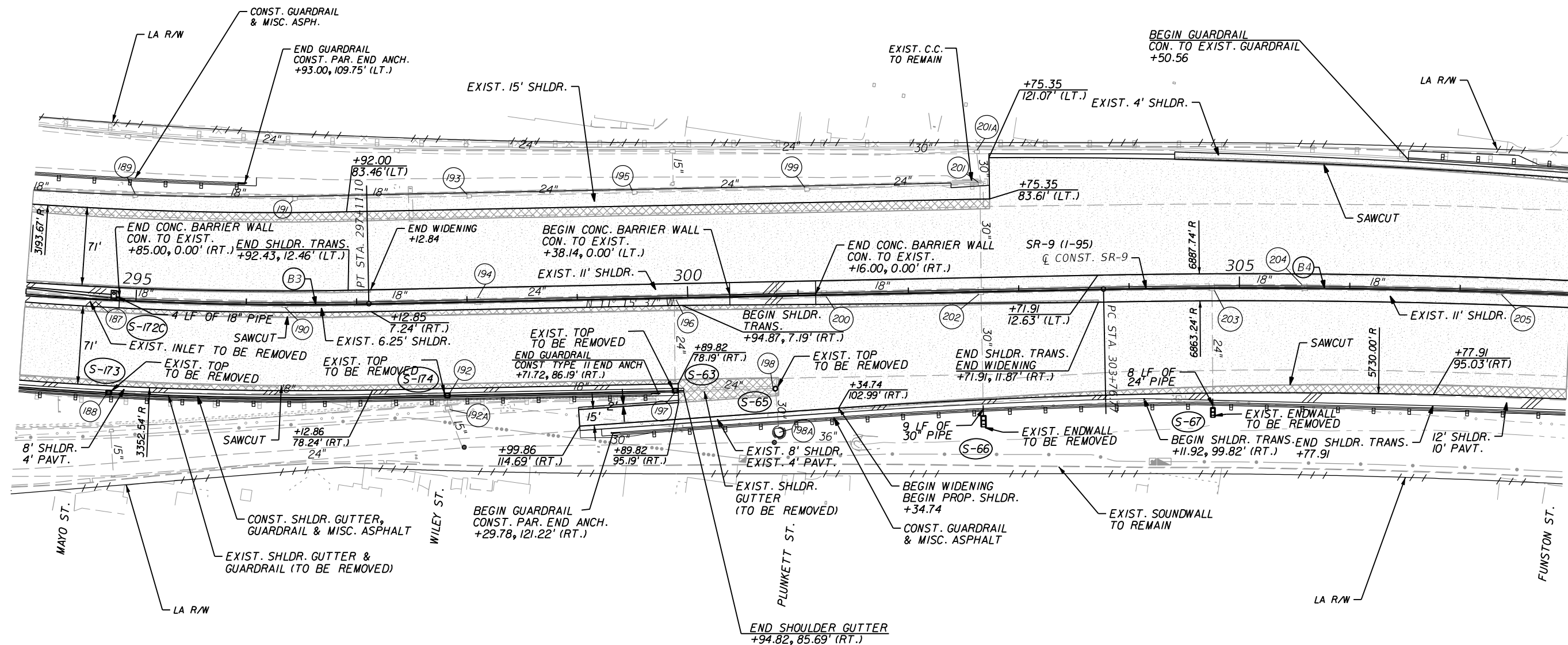
REVISIONS				DATE	DESCRIPTION	DATE	DESCRIPTION
DATE	DESCRIPTION	DATE	DESCRIPTION				
12/13/13	ADDED S-168A & S-168B; S-170 ADJUSTED; ADJUST MSE WALLS 7; REVISE MSE WALL 8 CALL OUT; EXTRA CALL OUTS REMOVED						
8/31/15	ADDED CALL OUTS FOR EXIST. INLETS TO BE ADJUSTED.						

C. BRIAN FULLER, P.E. # 49524
METRIC ENGINEERING, INC.
 615 CRESCENT EXECUTIVE CT
 SUITE 524
 LAKE MARY, FLORIDA 32746
 TEL. (407) 644-1898
 FAX. (407) 644-1921
 CERTIFICATE OF AUTHORIZATION 2294

ENGINEERS
 PLANNERS
 SURVEYORS

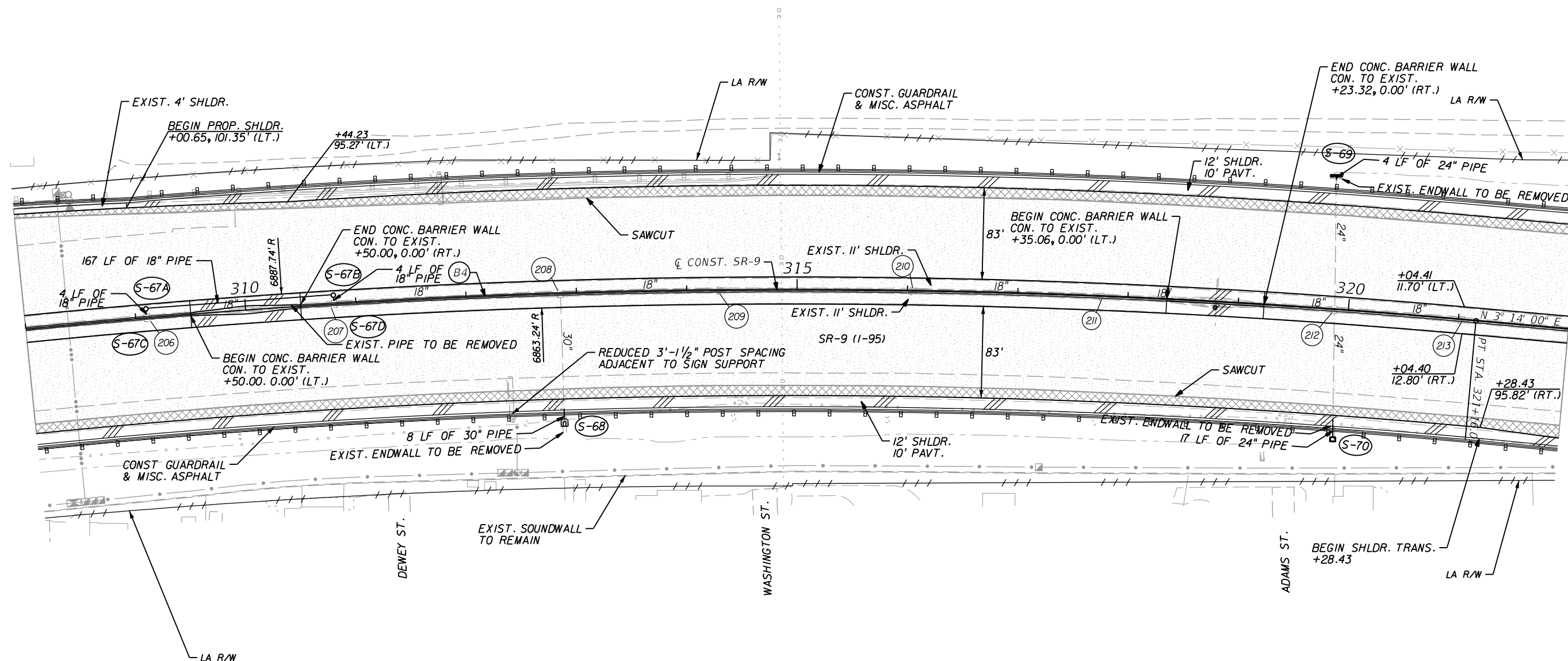
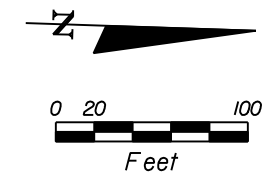
STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			FINANCIAL PROJECT ID	SHEET NO.
ROAD NO.	COUNTY			
SR 9	BROWARD MIAMI-DADE		422796-1-52-01 422796-2-52-01	47

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	<i>WIDENING</i>
	<i>MILL & RESURFACE</i>
	<i>PROPOSED SHOULDER</i>

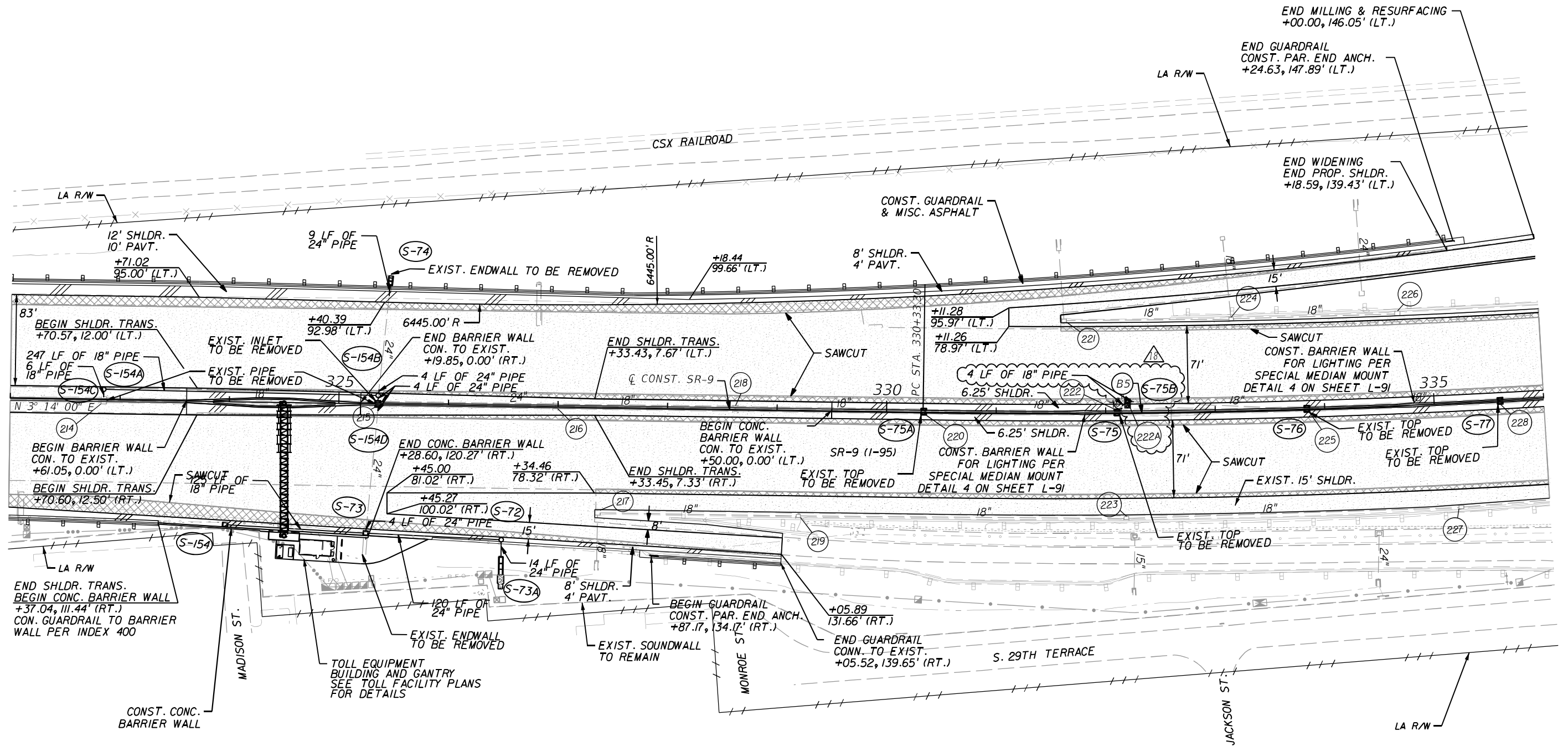
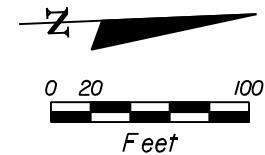
48



LEGEND:

- WIDENING
- MILL & RESURFACE
- PROPOSED SHOULDER

REVISIONS				 C. BRIAN FULLER, P.E. # 49524 METRIC ENGINEERING, INC. 615 CRESCENT EXECUTIVE CT SUITE 524 LAKE MARY, FLORIDA 32746 TEL. (407) 644-1898 FAX. (407) 644-1921 CERTIFICATE OF AUTHORIZATION 2294	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEETS		SHEET NO. 49
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID			
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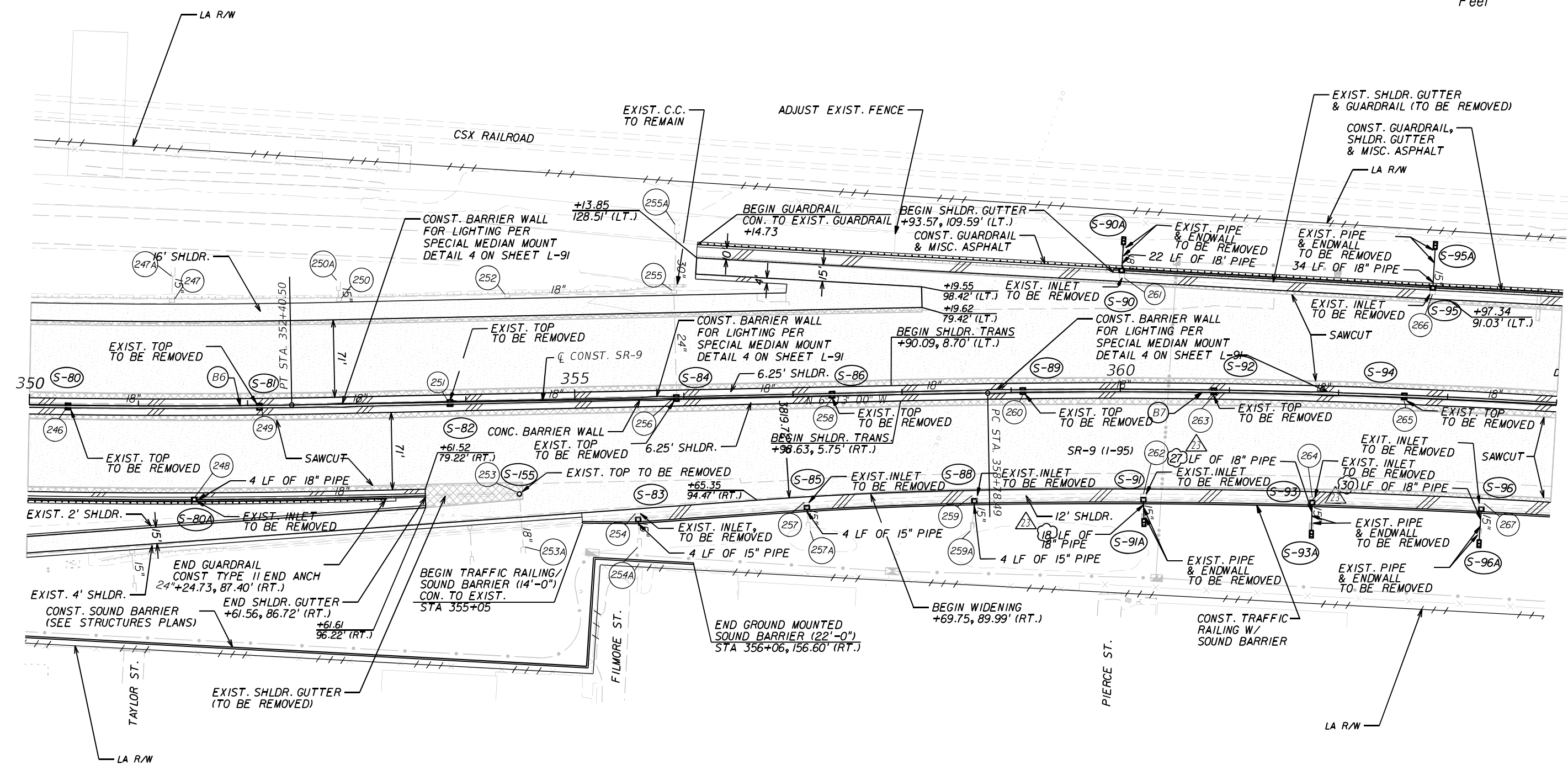
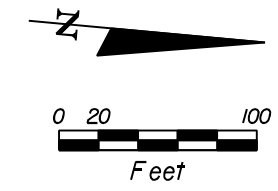


NOTE: NO RUMBLE STRIPS WITHIN
TOLL PLAZA SHLDR. PAVT. LIMITS

LEGEND:	
	WIDENING
	MILL & RESURFACE
	PROPOSED SHOULDER

REVISIONS					C. BRIAN FULLER, P.E. # 49524 METRIC ENGINEERING, INC. 615 CRESCENT EXECUTIVE CT SUITE 524 LAKE MARY, FLORIDA 32746 TEL. (407) 644-1898 FAX. (407) 644-1921 CERTIFICATE OF AUTHORIZATION 2294	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEETS	SHEET NO. 50
DATE	DESCRIPTION	DATE	DESCRIPTION			ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
5/5/14	18 ADDED S-75B			ENGINEERS PLANNERS SURVEYORS		SR 9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01		

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LEGEND:

- WIDENING
- MILL & RESURFACE
- PROPOSED SHOULDER

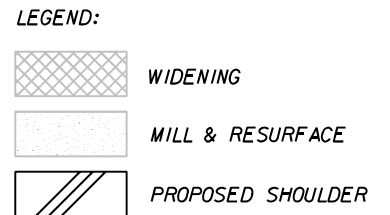
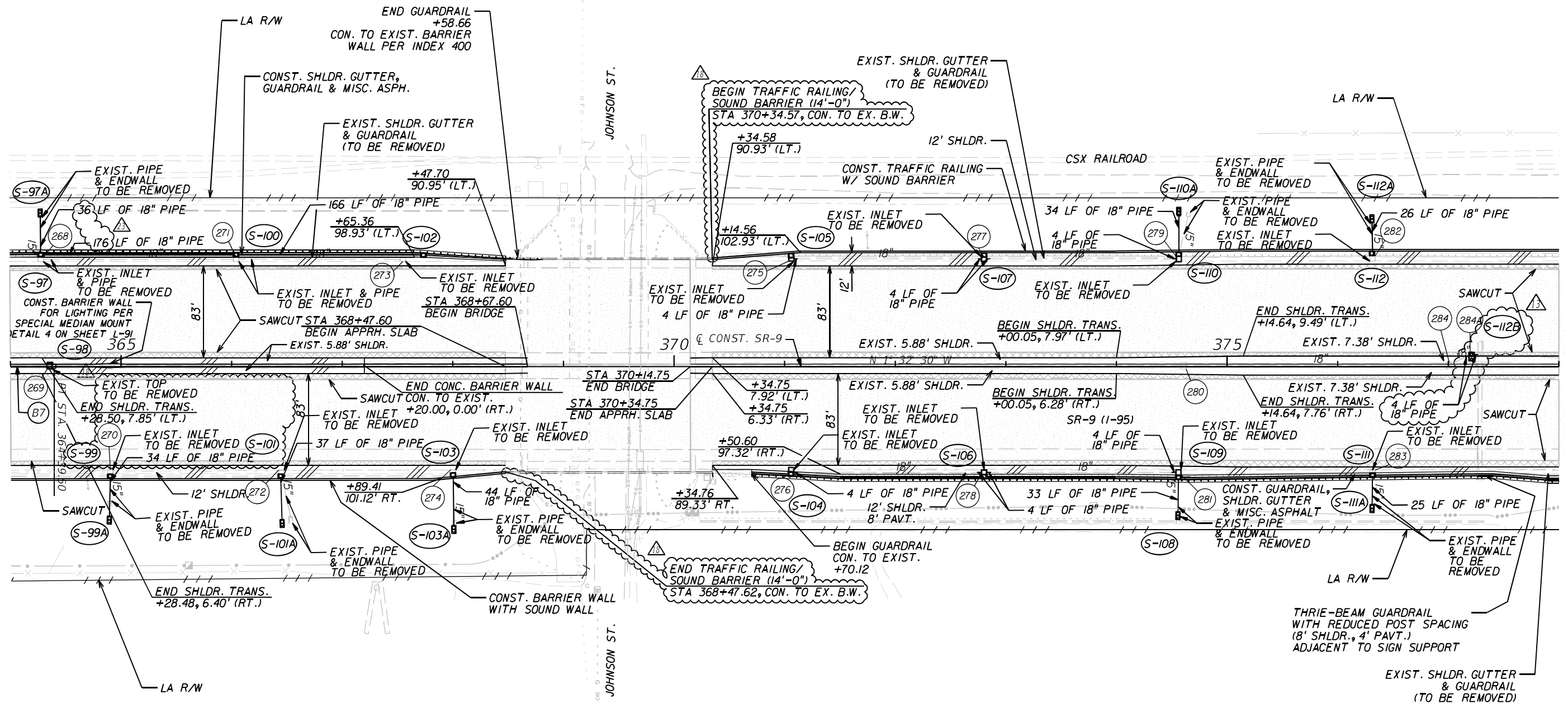
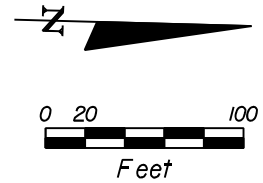
REVISIONS				 C. BRIAN FULLER, P.E. # 49524 METRIC ENGINEERING, INC. 615 CRESCENT EXECUTIVE CT SUITE 524 LAKE MARY, FLORIDA 32746 TEL. (407) 644-1898 FAX. (407) 644-1921 CERTIFICATE OF AUTHORIZATION 2294	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEETS	SHEET NO. 52
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
9/8/16	23 AS-BUILT				SR 9	BROWARD MIAMI-DADE	422796-1-52-01 422796-2-52-01		

9/14/2016

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F:\PROJECT\42279615201\roadway\PLANRD26.dgn

NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.



REVISIONS				 C. BRIAN FULLER, P.E. # 49524 METRIC ENGINEERING, INC. 615 CRESCENT EXECUTIVE CT SUITE 524 LAKE MARY, FLORIDA 32746 TEL. (407) 644-1898 FAX. (407) 644-1921 CERTIFICATE OF AUTHORIZATION 2294	STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PLAN SHEETS	SHEET NO. 53
DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
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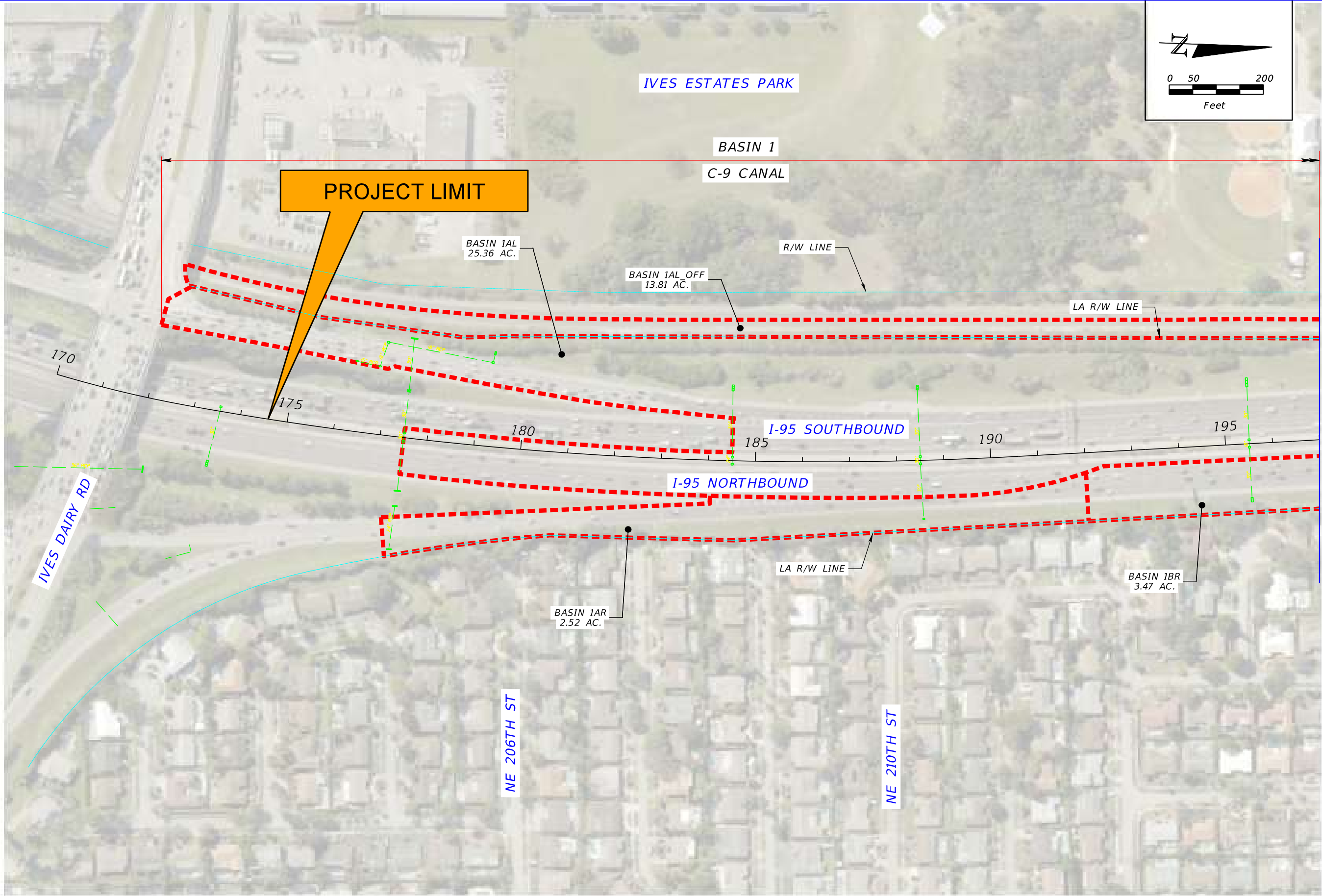
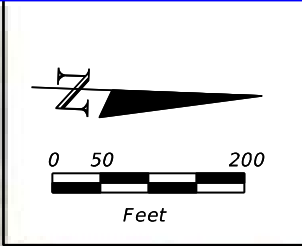
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8/25/14 TRAFFIC RAILING STA. UPDATE & CALLOUT CLEAN-UP

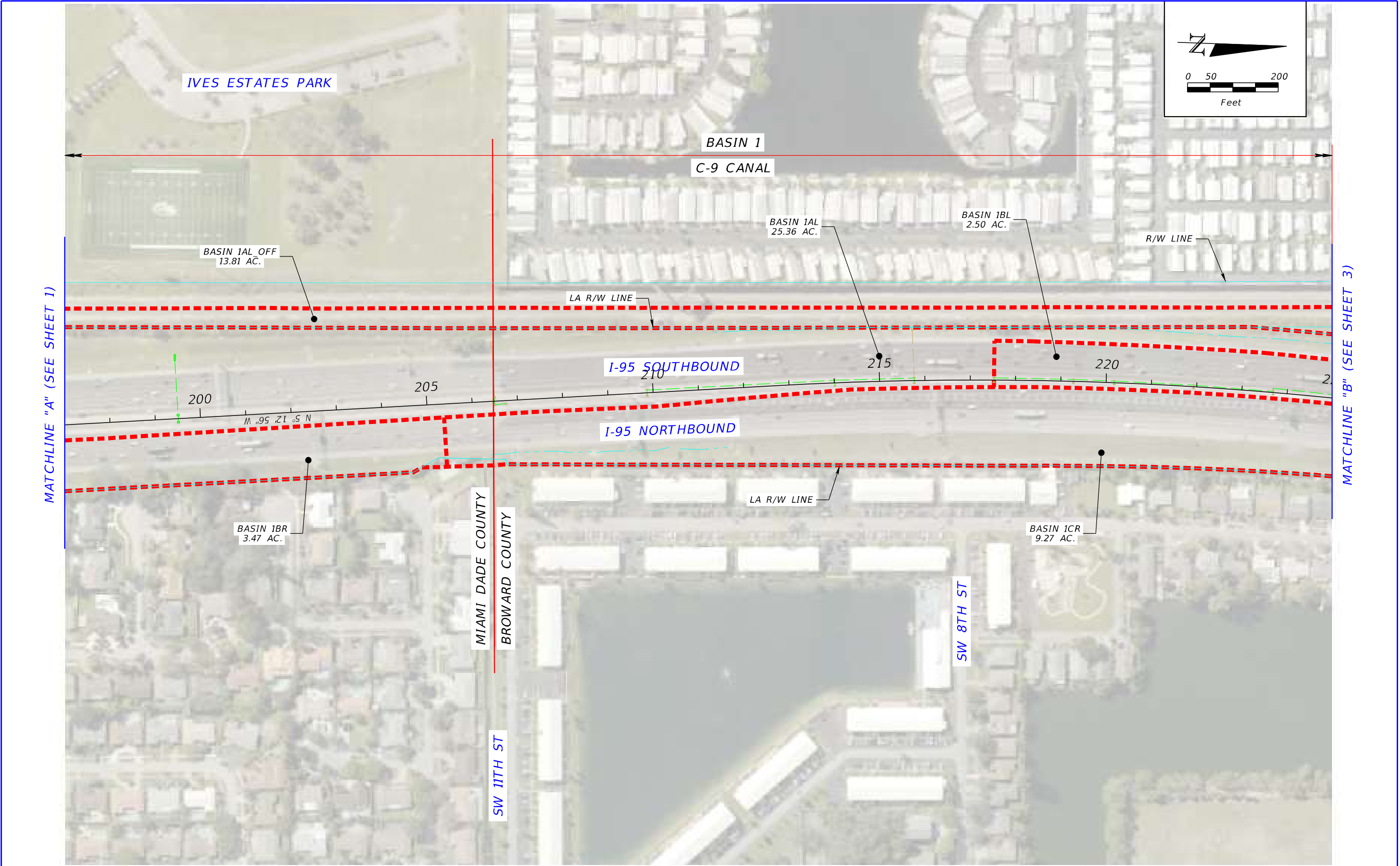
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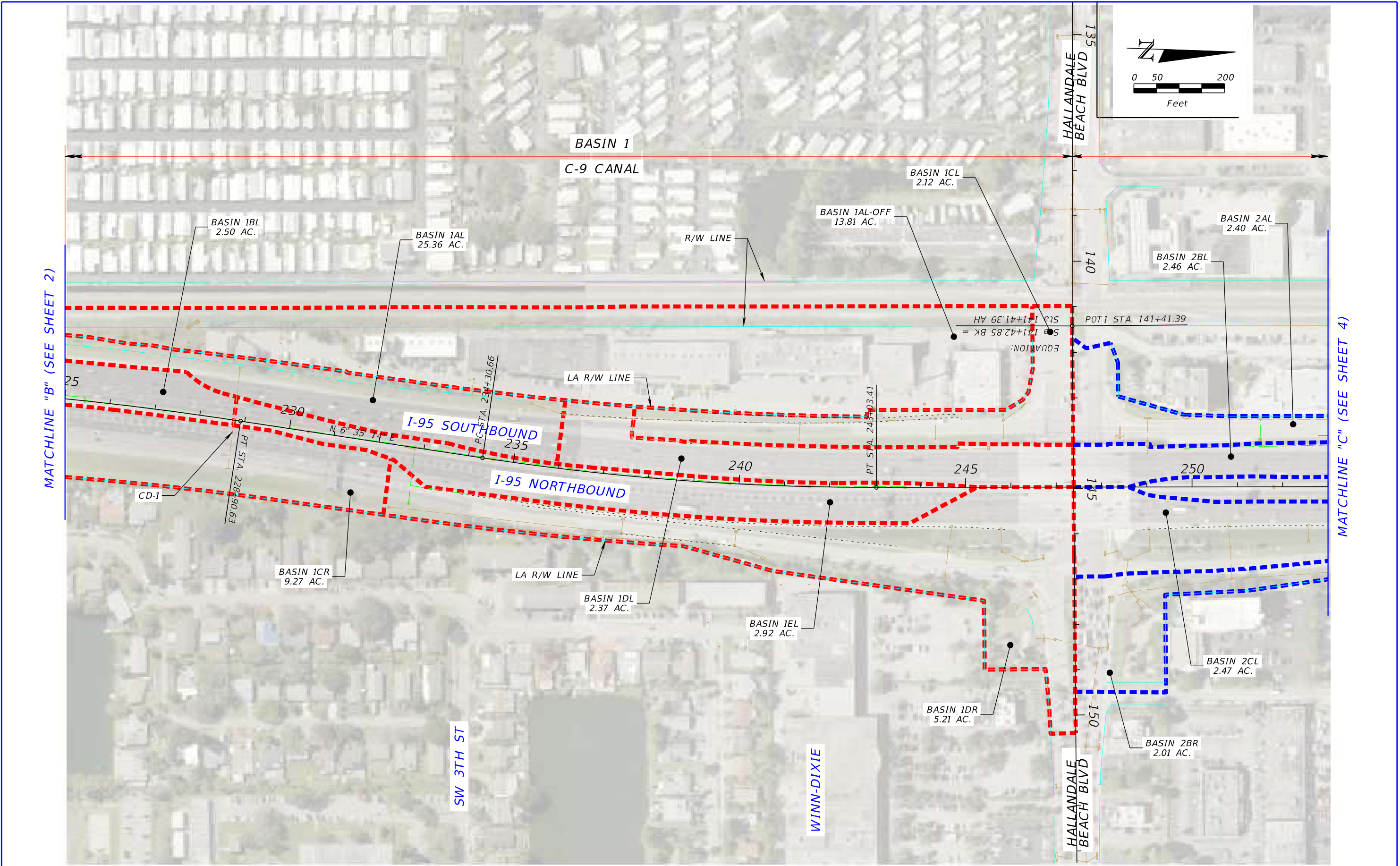
NOTICE: THE OFFICIAL RECORD OF THIS SHEET IS THE ELECTRONIC FILE SIGNED AND SEALED UNDER RULE 61G15-23.003, F.A.C.



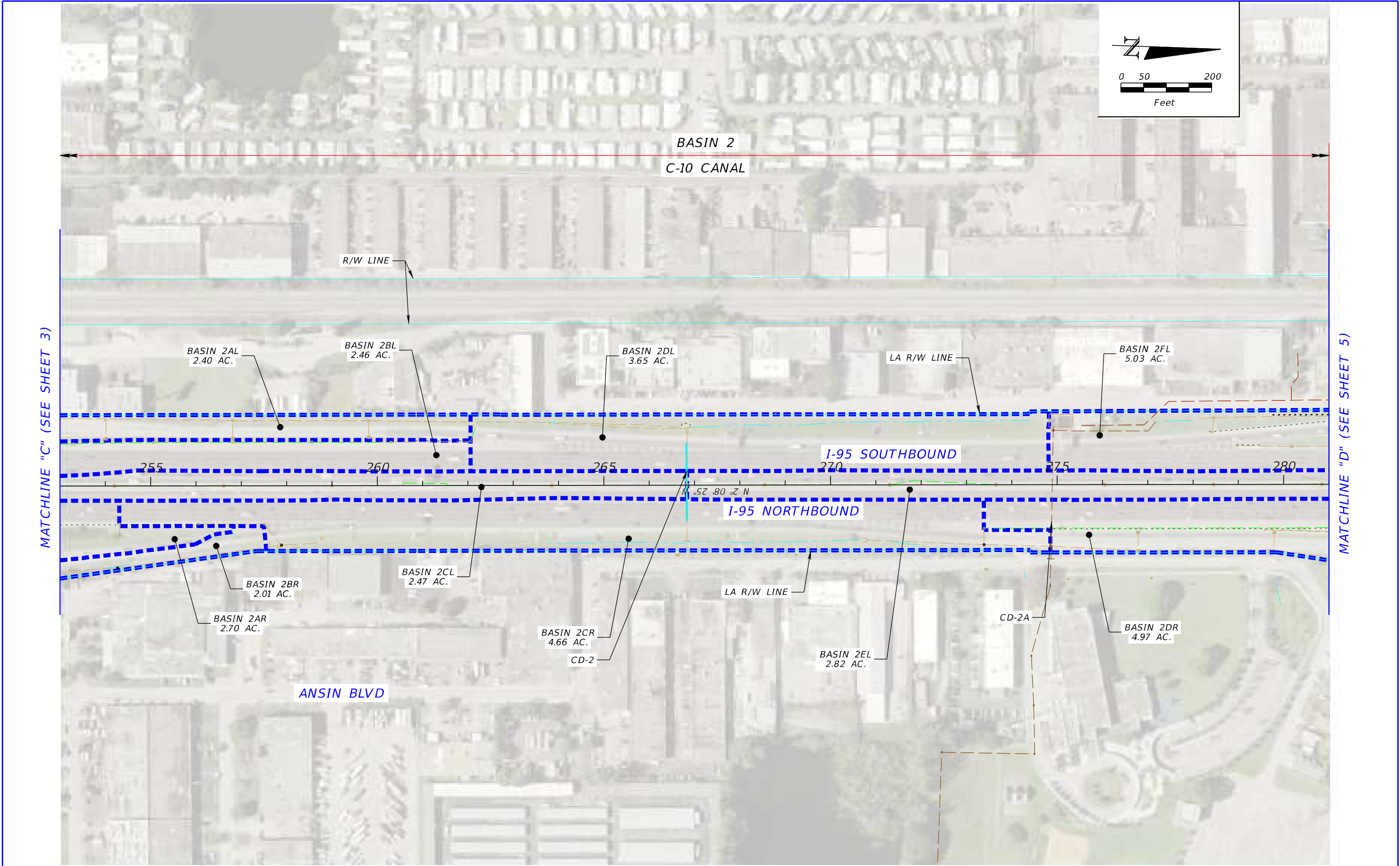
REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			PRE-DEVELOPMENT DRAINAGE MAP	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
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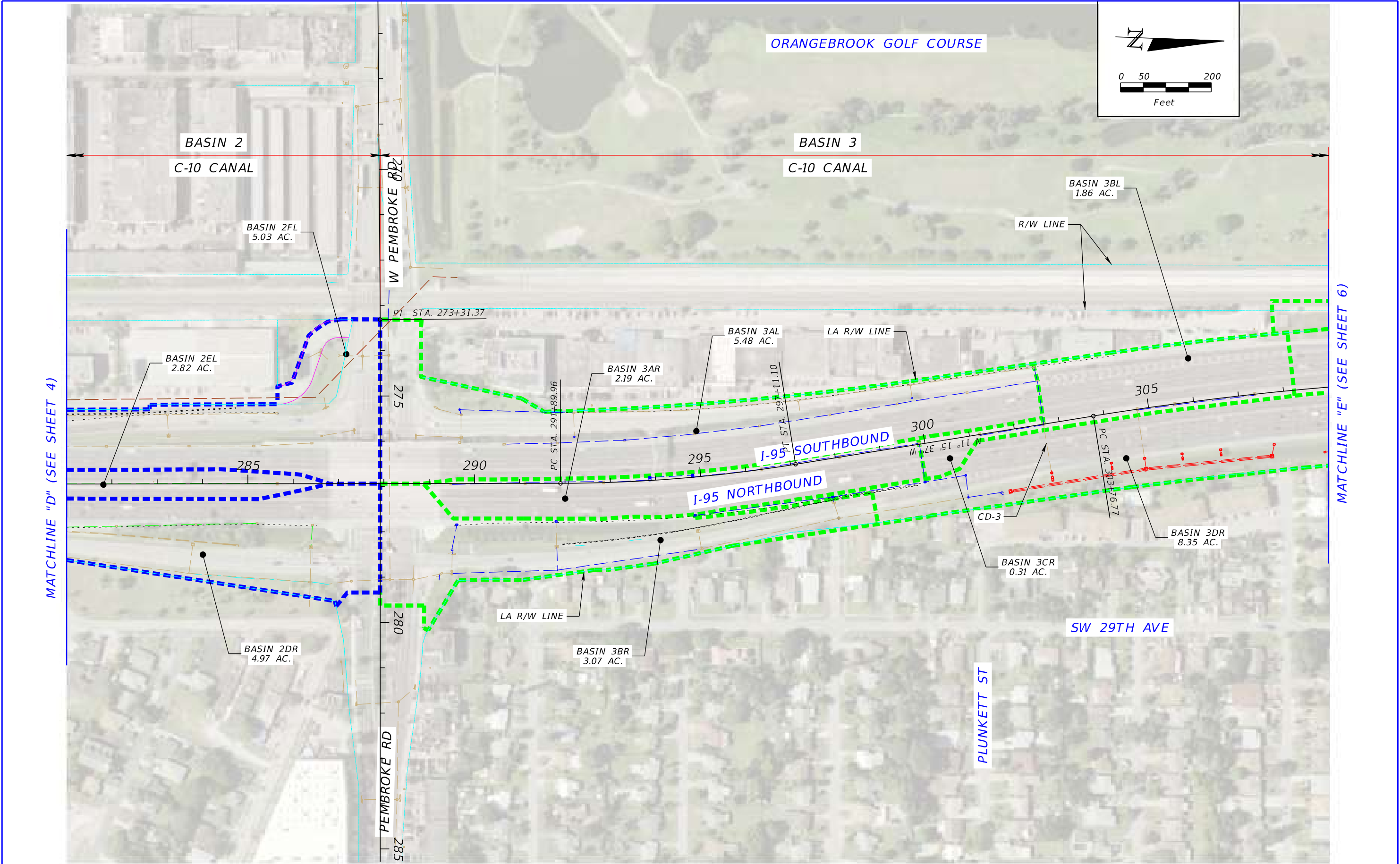
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DATE	DESCRIPTION	DATE	DESCRIPTION		ROAD NO.	COUNTY	FINANCIAL PROJECT ID		2
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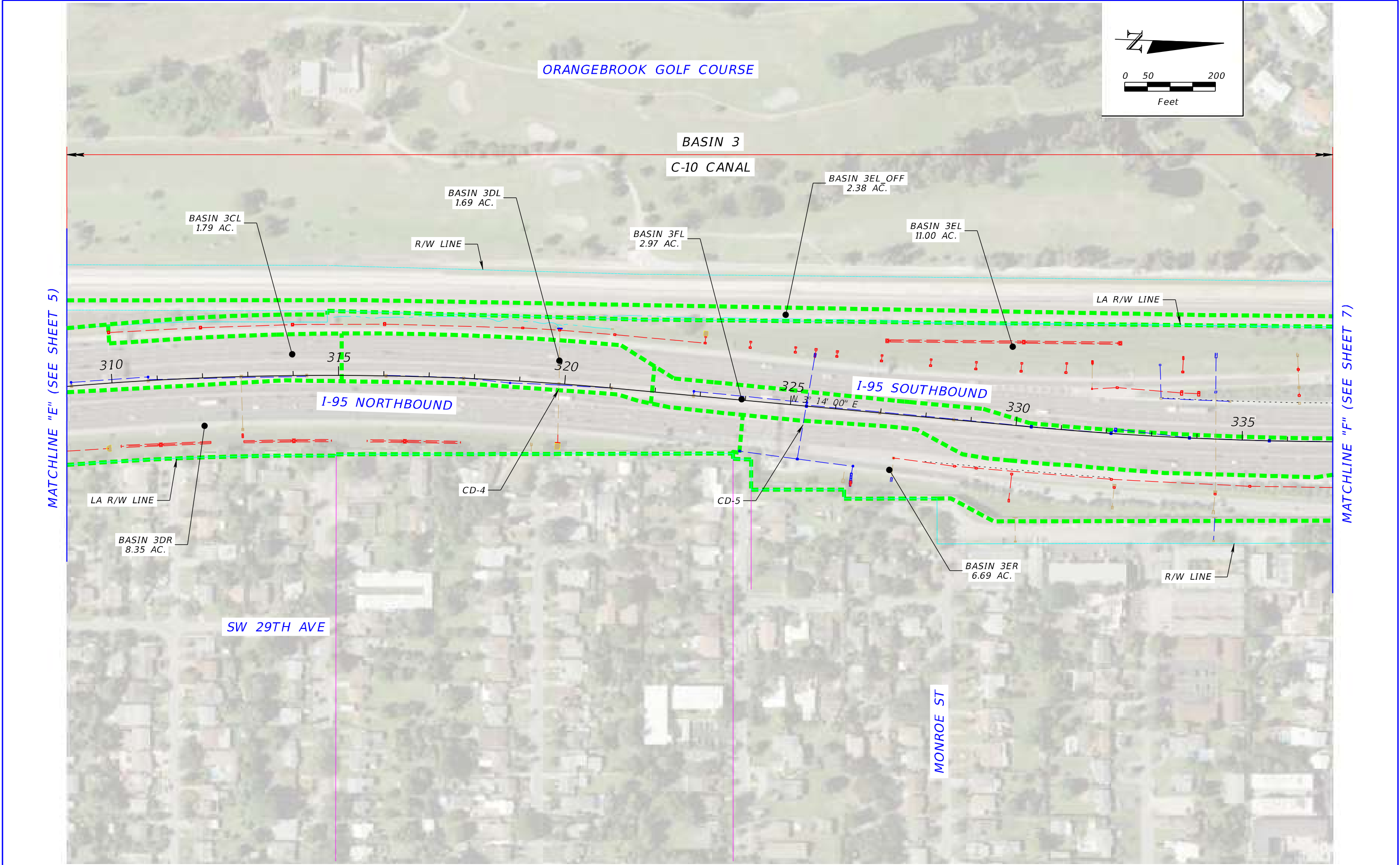
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DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				SR 9	BROWARD	436903-1-22-02		3



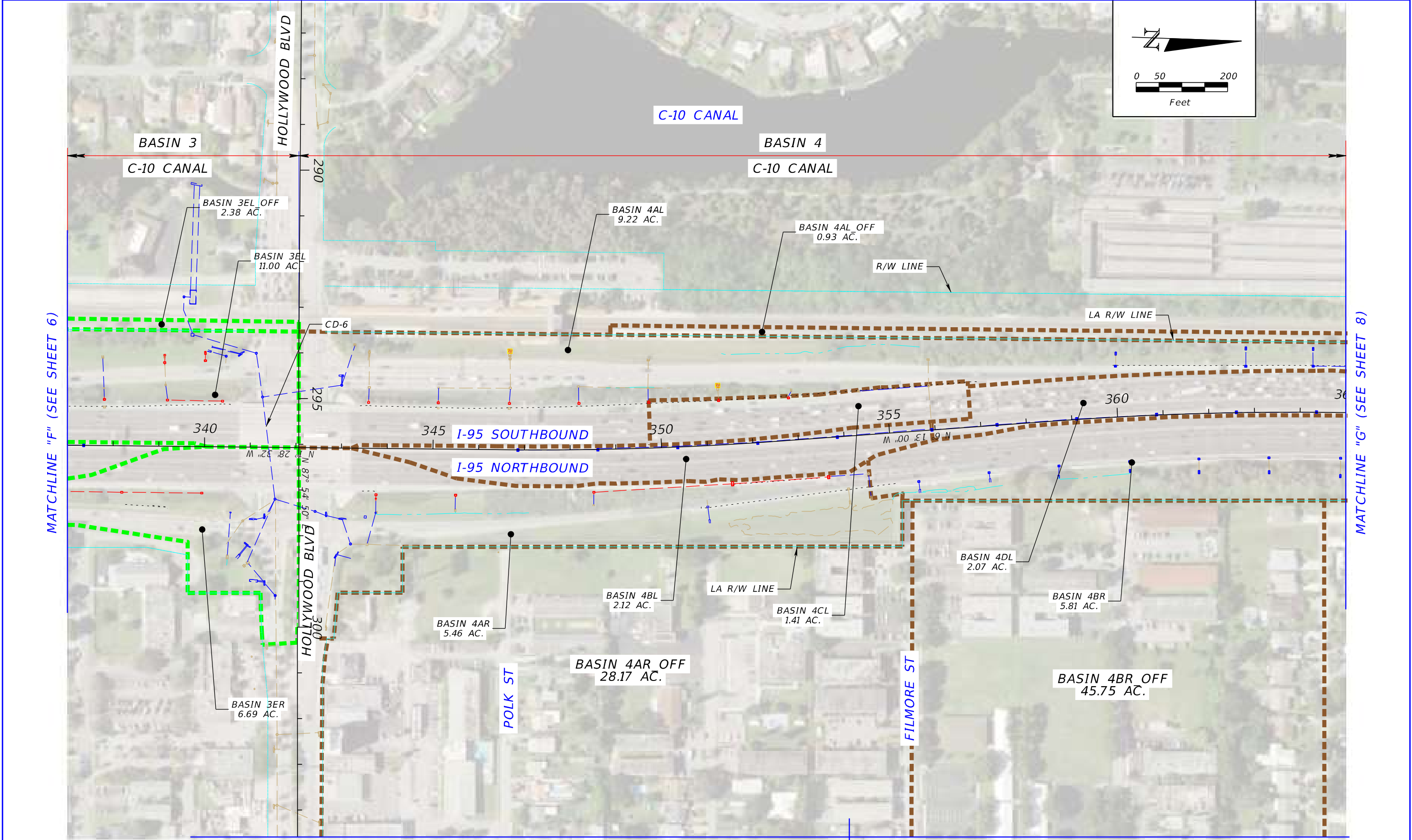
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DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				SR 9	BROWARD	436903-1-22-02		4



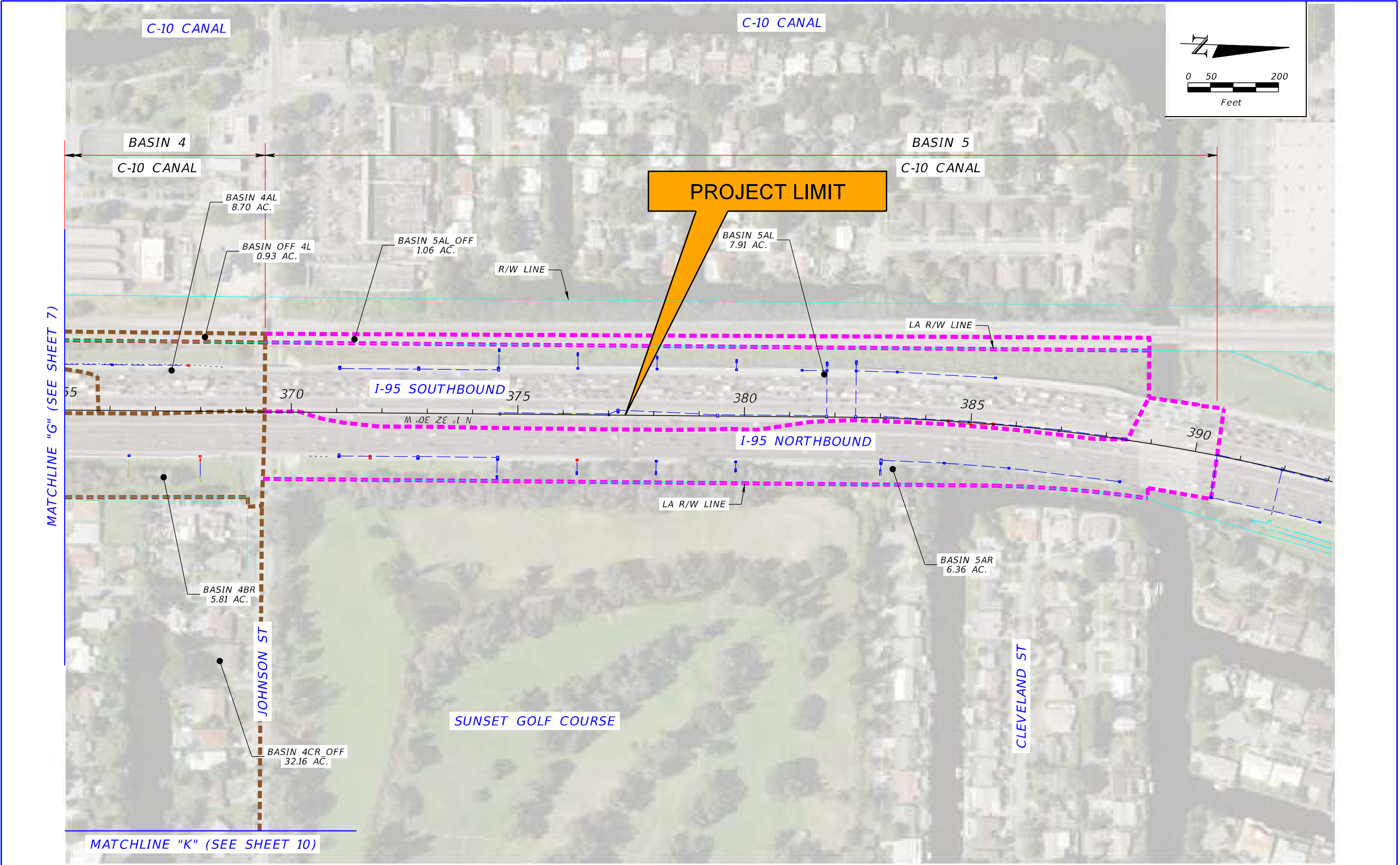
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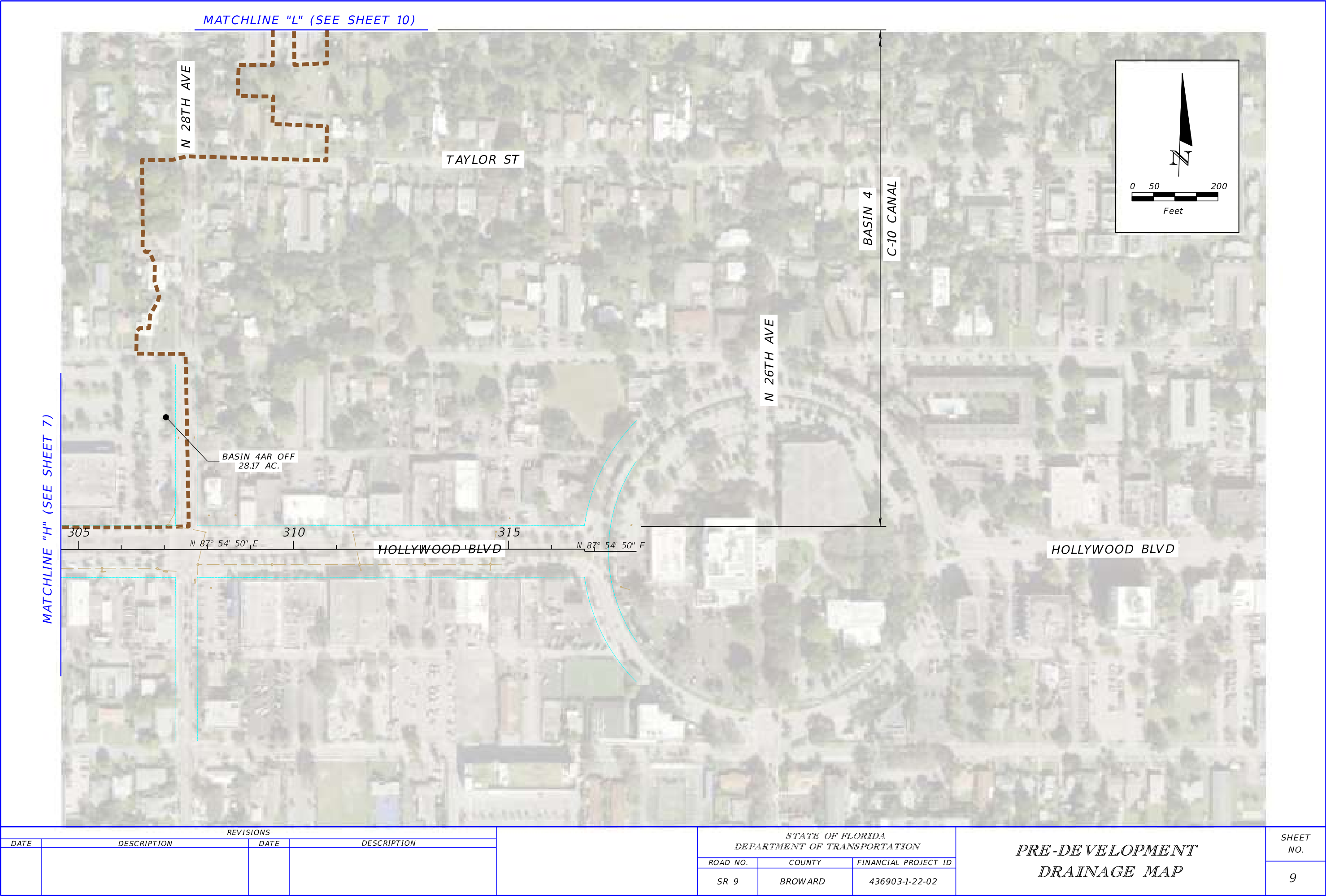
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DATE	DESCRIPTION	DATE	DESCRIPTION				
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID	6
				SR 9	BROWARD	436903-1-22-02	



REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	PRE-DEVELOPMENT DRAINAGE MAP		SHEET NO. 7
DATE	DESCRIPTION	DATE	DESCRIPTION				
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID	
				SR 9	BROWARD	436903-1-22-02	



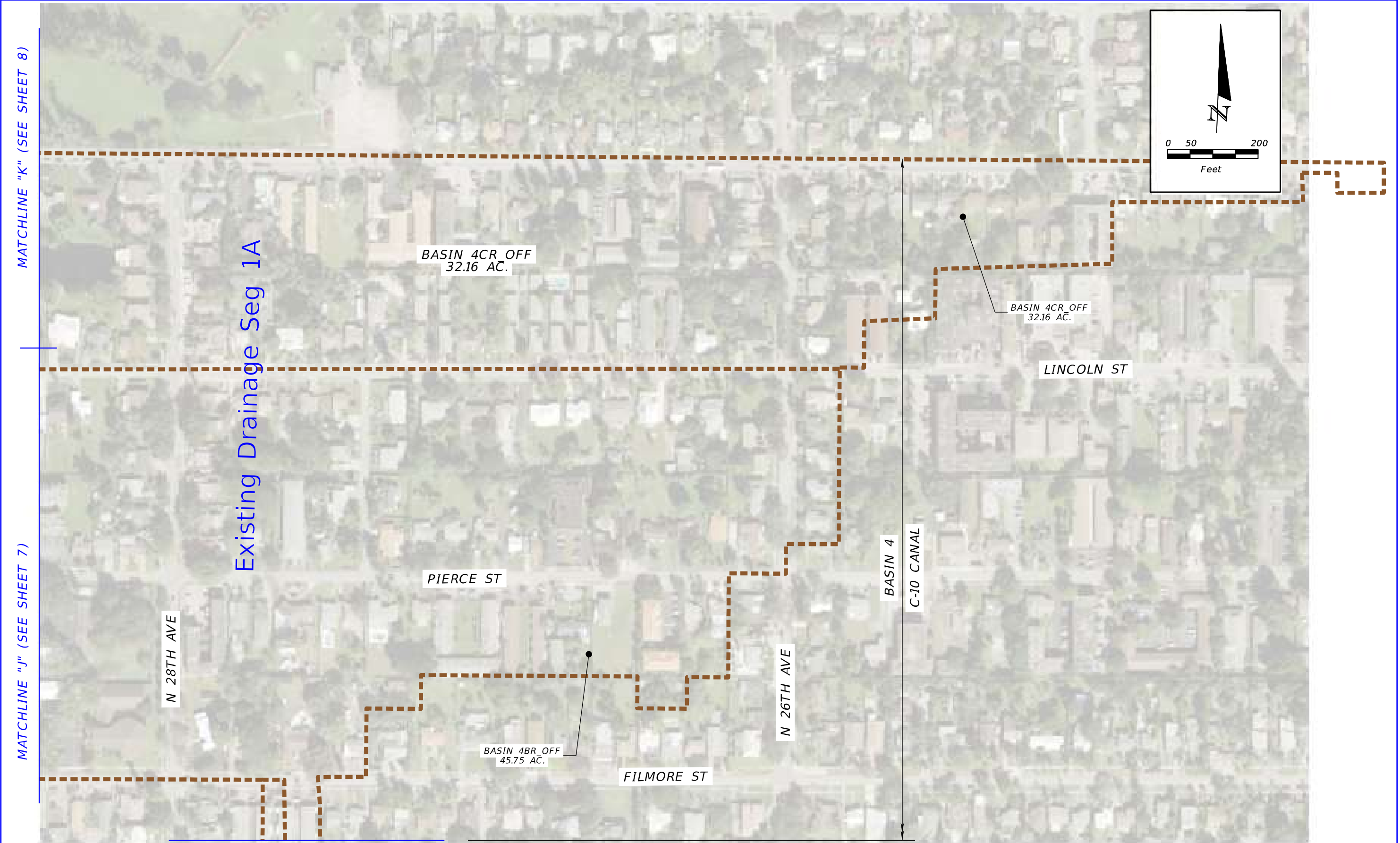
REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	PRE-DEVELOPMENT DRAINAGE MAP		SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION				
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID	8
				SR 9	BROWARD	436903-1-22-02	



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION		
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
SR 9	BROWARD	436903-1-22-02

PRE-DEVELOPMENT DRAINAGE MAP	SHEET NO.
	9



REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION	PRE-DEVELOPMENT DRAINAGE MAP		SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION				
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID	10
				SR 9	BROWARD	436903-1-22-02	



APPENDIX D

Natural Resource Conservative Service, Web Soil Map & Survey



United States
Department of
Agriculture

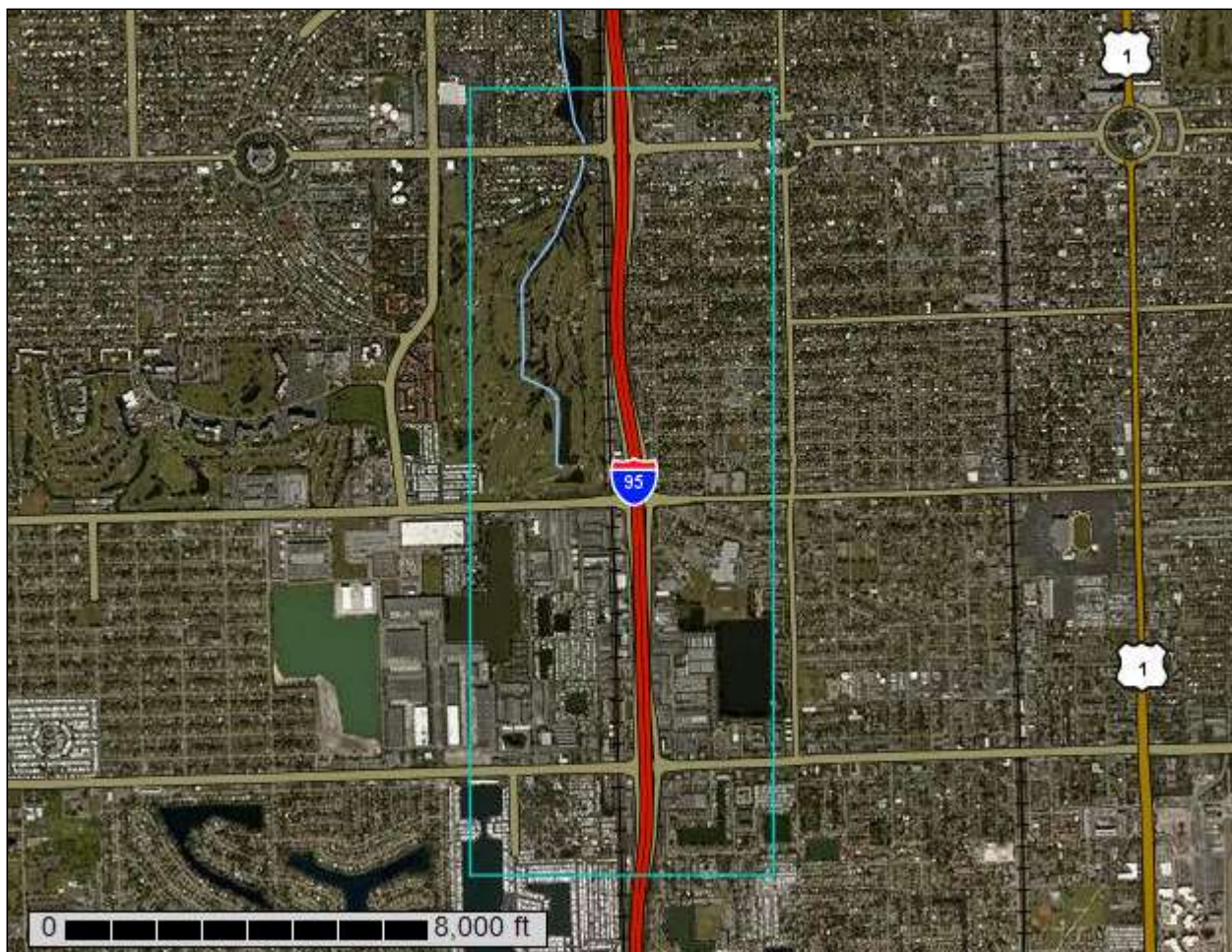
NRCS

Natural
Resources
Conservation
Service

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

Custom Soil Resource Report for **Broward County, Florida, East Part**

**I-95 PD&E Study from Hallandale
Blvd. to Hollywood Blvd.**



July 28, 2017

Preface

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

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

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

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

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

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

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How Soil Surveys Are Made

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

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

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

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

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

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

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

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

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

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

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

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

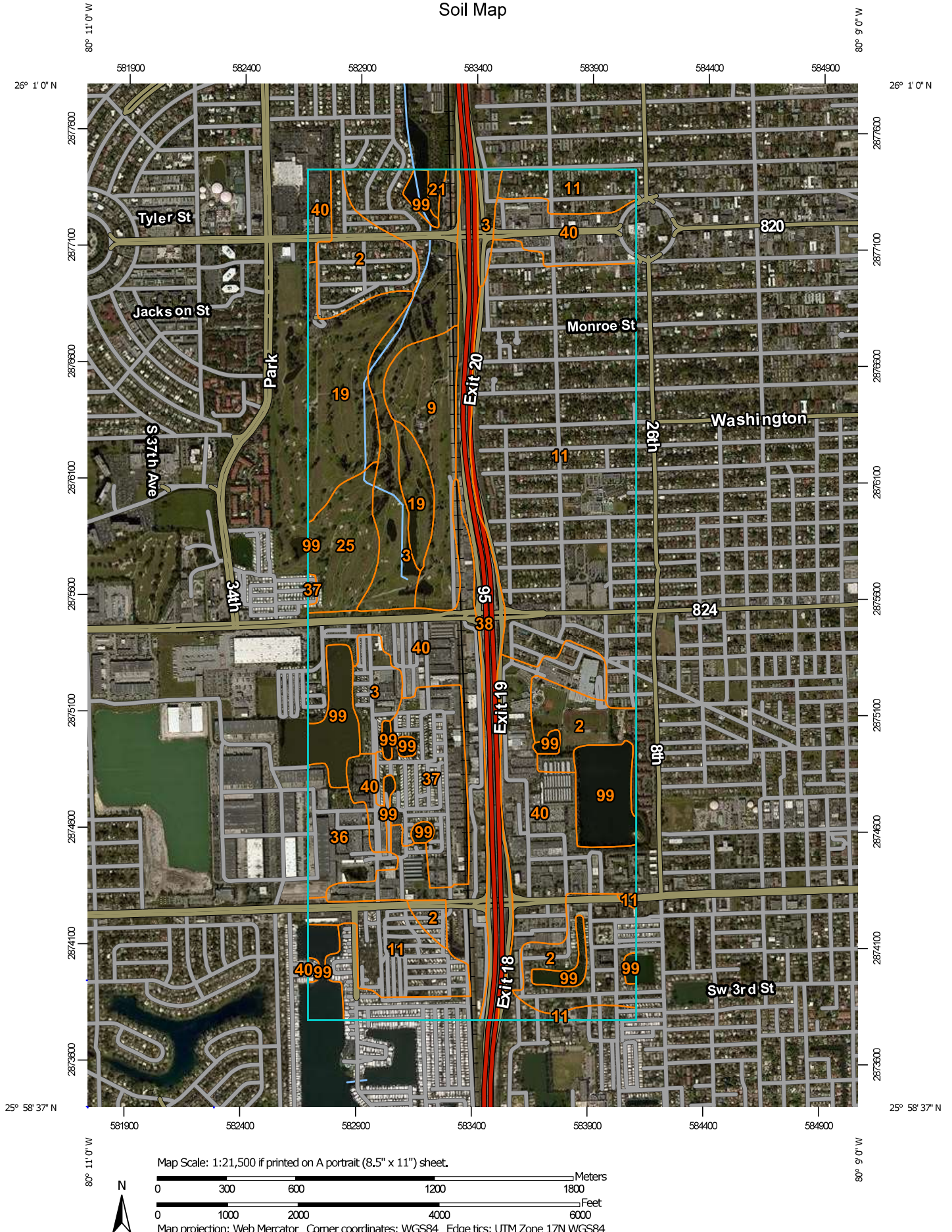
Custom Soil Resource Report

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

Soil Map

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

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

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

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

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

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

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

Soil Survey Area: Broward County, Florida, East Part

Survey Area Data: Version 12, Sep 14, 2016

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

Date(s) aerial images were photographed: Dec 11, 2010—Feb 11, 2015

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

Map Unit Legend

Broward County, Florida, East Part (FL606)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
2	Arents-Urban land complex	113.3	8.8%
3	Arents, organic substratum-Urban land complex	109.5	8.5%
9	Dade fine sand	53.0	4.1%
11	Dade-Urban land complex	363.6	28.3%
19	Margate fine sand	77.5	6.0%
21	Okeelanta muck, drained, 0 to 1 percent slopes	2.7	0.2%
25	Pennsuco silty clay loam	35.2	2.7%
36	Udorthents	31.6	2.5%
37	Udorthents, marly substratum-Urban land complex	59.4	4.6%
38	Udorthents, shaped	74.2	5.8%
40	Urban land	283.7	22.1%
99	Water	80.1	6.2%
Totals for Area of Interest		1,283.9	100.0%

Map Unit Descriptions

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

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

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the

scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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

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

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

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

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

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

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

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

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

Broward County, Florida, East Part

2—Arents-Urban land complex

Map Unit Setting

National map unit symbol: 1hn8f
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents and similar soils: 55 percent
Urban land: 40 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents

Setting

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

Typical profile

A - 0 to 4 inches: cobbly sand
C1 - 4 to 9 inches: cobbly sand
C2 - 9 to 32 inches: sand
2C - 32 to 60 inches: sand

Properties and qualities

Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 18 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A/D
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: No

Description of Urban Land

Setting

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

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: Unranked

Minor Components

Arents, organic substratum

Percent of map unit: 3 percent
Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: No

Udorthents, marly substratum

Percent of map unit: 2 percent
Landform: Marine terraces
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: No

3—Arents, organic substratum-Urban land complex

Map Unit Setting

National map unit symbol: 1hn8g
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Arents, organic substratum and similar soils: 55 percent
Urban land: 45 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arents, Organic Substratum

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy dredge spoils over organic material over sandy marine deposits

Typical profile

A - 0 to 12 inches: gravelly sand
C - 12 to 38 inches: sand
Oa - 38 to 52 inches: muck
2C - 52 to 72 inches: sand

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Somewhat poorly drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 24 to 36 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 8.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: No

Description of Urban Land

Setting

Landform: Marine terraces
Landform position (three-dimensional): Interfluvial
Down-slope shape: Linear
Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: Unranked

9—Dade fine sand

Map Unit Setting

National map unit symbol: 1hn8n
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Dade and similar soils: 94 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dade

Setting

Landform: Rises on marine terraces
Landform position (three-dimensional): Interfluve, rise
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Sandy marine deposits over soft limestone

Typical profile

A - 0 to 6 inches: fine sand
E - 6 to 27 inches: fine sand
Bh - 27 to 35 inches: fine sand
Cr - 35 to 39 inches: weathered bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Natural drainage class: Well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 60 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6s
Hydrologic Soil Group: A
Other vegetative classification: Shallow or moderately deep, sandy or loamy soils on rises and ridges of mesic uplands (G156AC521FL)

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Hydric soil rating: No

Minor Components

Basinger

Percent of map unit: 2 percent

Landform: Drainageways on marine terraces

Landform position (three-dimensional): Dip

Down-slope shape: Linear

Across-slope shape: Concave

Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156AC141FL)

Hydric soil rating: Yes

Duette

Percent of map unit: 2 percent

Landform: Flats on marine terraces

Landform position (three-dimensional): Talf

Down-slope shape: Convex

Across-slope shape: Linear

Other vegetative classification: Sandy soils on rises, knolls, and ridges of mesic uplands (G156AC121FL)

Hydric soil rating: No

Margate

Percent of map unit: 1 percent

Landform: Drainageways on marine terraces

Landform position (three-dimensional): Dip

Down-slope shape: Linear

Across-slope shape: Concave

Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G156AC145FL)

Hydric soil rating: Yes

Immokalee, limestone substratum

Percent of map unit: 1 percent

Landform: Flatwoods on marine terraces

Landform position (three-dimensional): Talf

Down-slope shape: Convex

Across-slope shape: Linear

Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156AC141FL)

Hydric soil rating: No

11—Dade-Urban land complex

Map Unit Setting

National map unit symbol: 1hn8q

Mean annual precipitation: 60 to 68 inches

Mean annual air temperature: 72 to 79 degrees F

Frost-free period: 358 to 365 days

Custom Soil Resource Report

Farmland classification: Not prime farmland

Map Unit Composition

Dade and similar soils: 55 percent

Urban land: 40 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dade

Setting

Landform: Rises on marine terraces

Landform position (three-dimensional): Interfluve, rise

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Sandy marine deposits over soft limestone

Typical profile

A - 0 to 8 inches: gravelly sand

E - 8 to 27 inches: fine sand

Bh - 27 to 35 inches: fine sand

Cr - 35 to 39 inches: weathered bedrock

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Natural drainage class: Well drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)

Depth to water table: About 60 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Very low (about 1.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6s

Hydrologic Soil Group: A

Other vegetative classification: Forage suitability group not assigned (G156AC999FL)

Hydric soil rating: No

Description of Urban Land

Setting

Landform: Marine terraces

Landform position (three-dimensional): Interfluve, talf

Down-slope shape: Linear

Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified

Custom Soil Resource Report

Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: Unranked

Minor Components

Basinger

Percent of map unit: 2 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: Yes

Immokalee, limestone substratum

Percent of map unit: 2 percent
Landform: Flatwoods on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: No

Margate

Percent of map unit: 1 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: Yes

19—Margate fine sand

Map Unit Setting

National map unit symbol: 1hn8z
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Margate

Setting

Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Parent material: Sandy marine deposits over limestone

Typical profile

A - 0 to 8 inches: fine sand
E - 8 to 16 inches: fine sand
Bw - 16 to 28 inches: fine sand
C - 28 to 32 inches: gravelly fine sand
2R - 32 to 36 inches: unweathered bedrock

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Natural drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Occasional
Calcium carbonate, maximum in profile: 5 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 1.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: A/D
Other vegetative classification: Sandy soils on stream terraces, flood plains, or in depressions (G156AC145FL)
Hydric soil rating: Yes

Minor Components

Basinger

Percent of map unit: 5 percent
Landform: Drainageways on marine terraces
Landform position (three-dimensional): Dip
Down-slope shape: Linear
Across-slope shape: Concave
Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands (G156AC141FL)
Hydric soil rating: Yes

Plantation, undrained

Percent of map unit: 5 percent
Landform: Marshes on marine terraces
Landform position (three-dimensional): Talf

Custom Soil Resource Report

Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Organic soils in depressions and on flood plains
(G156AC645FL)
Hydric soil rating: Yes

21—Okeelanta muck, drained, 0 to 1 percent slopes

Map Unit Setting

National map unit symbol: 2tzwc
Elevation: 0 to 30 feet
Mean annual precipitation: 48 to 68 inches
Mean annual air temperature: 70 to 77 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Okeelanta, Drained

Setting

Landform: Depressions on marine terraces
Landform position (three-dimensional): Tread, dip, talf
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Herbaceous organic material over sandy marine deposits

Typical profile

Oa - 0 to 31 inches: muck
Cg - 31 to 65 inches: fine sand

Properties and qualities

Slope: 0 to 1 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Very poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: About 0 inches
Frequency of flooding: None
Frequency of ponding: Frequent
Calcium carbonate, maximum in profile: 2 percent
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: High (about 11.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: A/D

Other vegetative classification: Organic soils in depressions and on flood plains
(G156AC645FL)

Hydric soil rating: Yes

Minor Components

Sanibel

Percent of map unit: 5 percent

Landform: Depressions on marine terraces

Landform position (three-dimensional): Tread, dip, talf

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Organic soils in depressions and on flood plains
(G156AC645FL)

Hydric soil rating: Yes

Tequesta

Percent of map unit: 3 percent

Landform: Depressions on marine terraces

Landform position (three-dimensional): Tread, dip, talf

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Organic soils in depressions and on flood plains
(G156AC645FL)

Hydric soil rating: Yes

Basinger

Percent of map unit: 2 percent

Landform: Depressions on marine terraces

Landform position (three-dimensional): Tread, dip, talf

Down-slope shape: Concave

Across-slope shape: Concave

Other vegetative classification: Sandy soils on flats of mesic or hydric lowlands
(G156AC141FL)

Hydric soil rating: Yes

25—Pennsuco silty clay loam

Map Unit Setting

National map unit symbol: 1hn95

Elevation: 10 feet

Mean annual precipitation: 60 to 68 inches

Mean annual air temperature: 72 to 79 degrees F

Frost-free period: 358 to 365 days

Farmland classification: Not prime farmland

Map Unit Composition

Pennsuco, drained, and similar soils: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pennsuco, Drained

Setting

Landform: Marshes on marine terraces

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Loamy marine deposits over limestone

Typical profile

A - 0 to 5 inches: silty clay loam

Bg - 5 to 38 inches: silt loam

2C - 38 to 53 inches: fine sand

2Cr - 53 to 80 inches: weathered bedrock

Properties and qualities

Slope: 0 to 1 percent

Depth to restrictive feature: 40 to 72 inches to paralithic bedrock

Natural drainage class: Poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)

Depth to water table: About 0 to 12 inches

Frequency of flooding: None

Frequency of ponding: None

Calcium carbonate, maximum in profile: 60 percent

Salinity, maximum in profile: Nonsaline to slightly saline (0.0 to 4.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Very high (about 14.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3w

Hydrologic Soil Group: B/D

Other vegetative classification: Loamy and clayey soils on flats of hydric or mesic lowlands (G156AC341FL)

Hydric soil rating: Yes

Minor Components

Perrine

Percent of map unit: 2 percent

Landform: Marshes on marine terraces

Landform position (three-dimensional): Talf

Down-slope shape: Linear

Across-slope shape: Linear

Other vegetative classification: Loamy and clayey soils on flats of hydric or mesic lowlands (G156AC341FL)

Hydric soil rating: Yes

Pennsuco, tidal

Percent of map unit: 2 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: Yes

Perrine variant

Percent of map unit: 1 percent
Landform: Tidal marshes on marine terraces
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)
Hydric soil rating: Yes

36—Udorthents

Map Unit Setting

National map unit symbol: 1hn9j
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Udorthents

Setting

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

Typical profile

C - 0 to 57 inches: cobbly sand

Properties and qualities

Slope: 2 to 40 percent
Depth to restrictive feature: More than 80 inches
Natural drainage class: Well drained
Runoff class: Negligible

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Sodium adsorption ratio, maximum in profile: 4.0

Available water storage in profile: Very low (about 2.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7s

Hydrologic Soil Group: A

Other vegetative classification: Forage suitability group not assigned (G156AC999FL)

Hydric soil rating: No

37—Udorthents, marly substratum-Urban land complex

Map Unit Setting

National map unit symbol: 1hn9k

Mean annual precipitation: 60 to 68 inches

Mean annual air temperature: 72 to 79 degrees F

Frost-free period: 358 to 365 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents, marly substratum, and similar soils: 55 percent

Urban land: 45 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents, Marly Substratum

Setting

Landform: Marine terraces

Landform position (three-dimensional): Interfluvial

Down-slope shape: Convex

Across-slope shape: Linear

Parent material: Altered marine deposits

Typical profile

C - 0 to 32 inches: gravelly sand

2C - 32 to 60 inches: marly silt loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Natural drainage class: Somewhat poorly drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 5.95 in/hr)

Custom Soil Resource Report

Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum in profile: 15 percent
Salinity, maximum in profile: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 8
Hydrologic Soil Group: A
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: No

Description of Urban Land

Setting

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

Interpretive groups

Land capability classification (irrigated): None specified
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: Unranked

38—Udorthents, shaped

Map Unit Setting

National map unit symbol: 1hn9l
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Udorthents, Shaped

Setting

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

Custom Soil Resource Report

Across-slope shape: Linear
Parent material: Altered marine deposits

Typical profile

C1 - 0 to 30 inches: gravelly sand
C2 - 30 to 50 inches: sand
2R - 50 to 54 inches: weathered bedrock

Properties and qualities

Slope: 0 to 45 percent
Depth to restrictive feature: 40 to 72 inches to paralithic bedrock
Natural drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (1.98 to 19.98 in/hr)
Depth to water table: About 24 to 48 inches
Frequency of flooding: None
Frequency of ponding: None
Salinity, maximum in profile: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Sodium adsorption ratio, maximum in profile: 4.0
Available water storage in profile: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7s
Hydrologic Soil Group: A
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: No

Minor Components

Udorthents

Percent of map unit: 10 percent
Landform: Marine terraces
Landform position (three-dimensional): Interfluvium
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Forage suitability group not assigned (G156AC999FL)
Hydric soil rating: No

40—Urban land

Map Unit Setting

National map unit symbol: 1hn9n
Mean annual precipitation: 60 to 68 inches
Mean annual air temperature: 72 to 79 degrees F
Frost-free period: 358 to 365 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 95 percent

Minor components: 5 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Urban Land

Setting

Landform: Marine terraces

Landform position (three-dimensional): Interfluve, talf

Down-slope shape: Linear

Across-slope shape: Linear

Interpretive groups

Land capability classification (irrigated): None specified

Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)

Hydric soil rating: Unranked

Minor Components

Matlacha, limestone substratum

Percent of map unit: 5 percent

Landform: Flats on marine terraces

Landform position (three-dimensional): Talf

Down-slope shape: Convex

Across-slope shape: Linear

Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)

Hydric soil rating: No

99—Water

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Water

Interpretive groups

Land capability classification (irrigated): None specified

Other vegetative classification: Forage suitability group not assigned
(G156AC999FL)

Hydric soil rating: Unranked

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Custom Soil Resource Report

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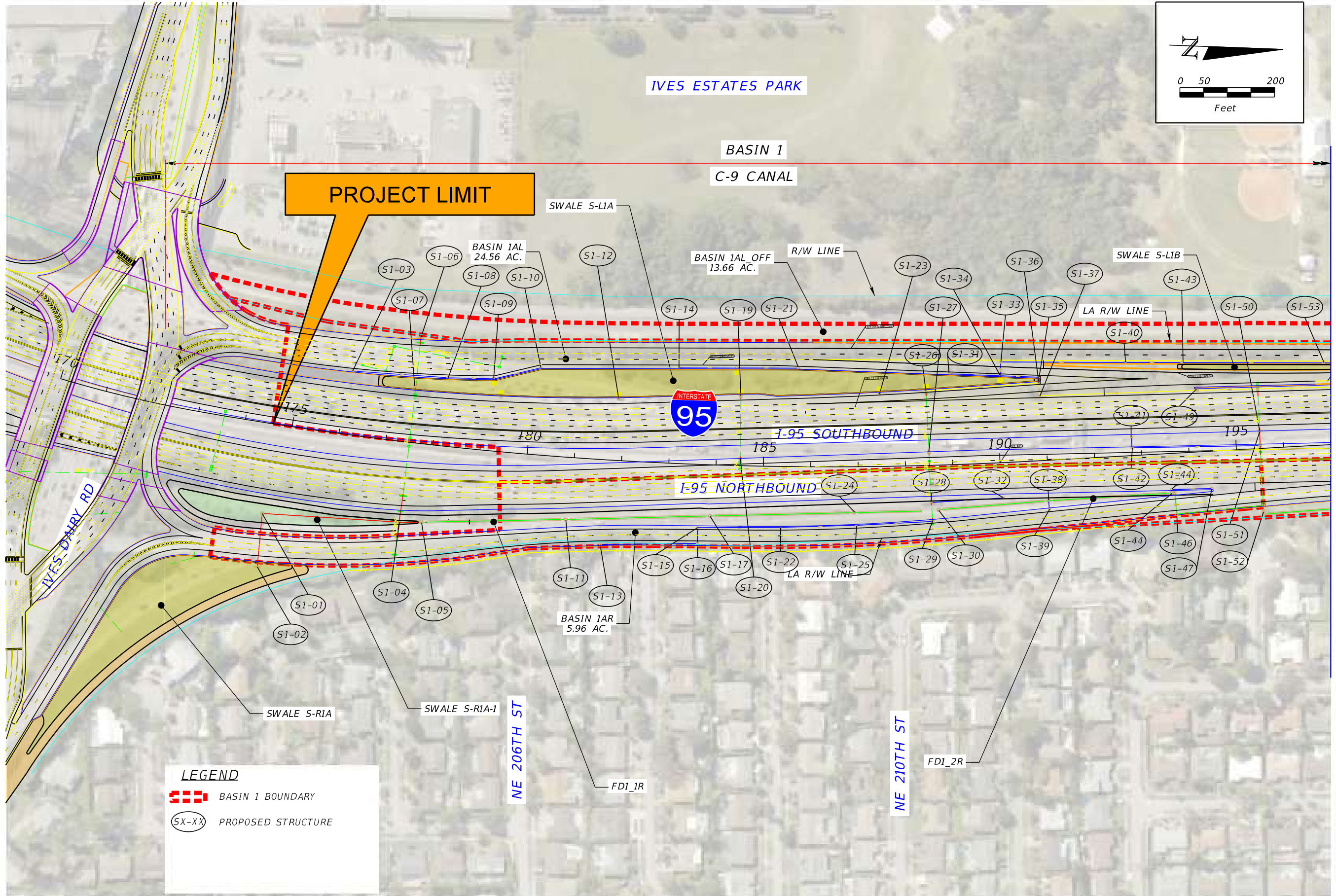
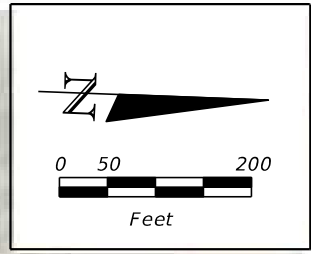
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APPENDIX E

Conceptual Drainage Basin Maps

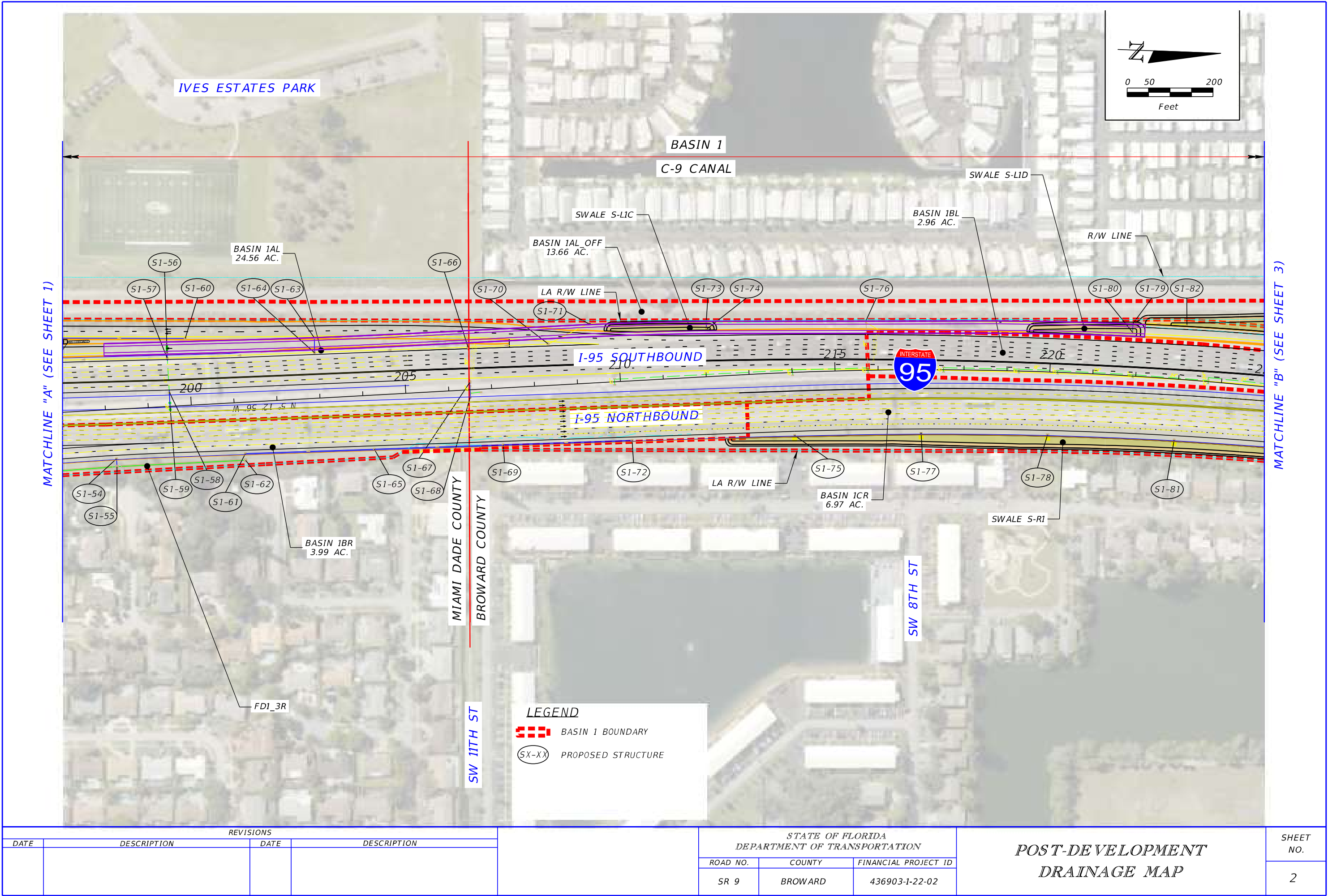


LEGEND

BASIN 1 BOUNDARY

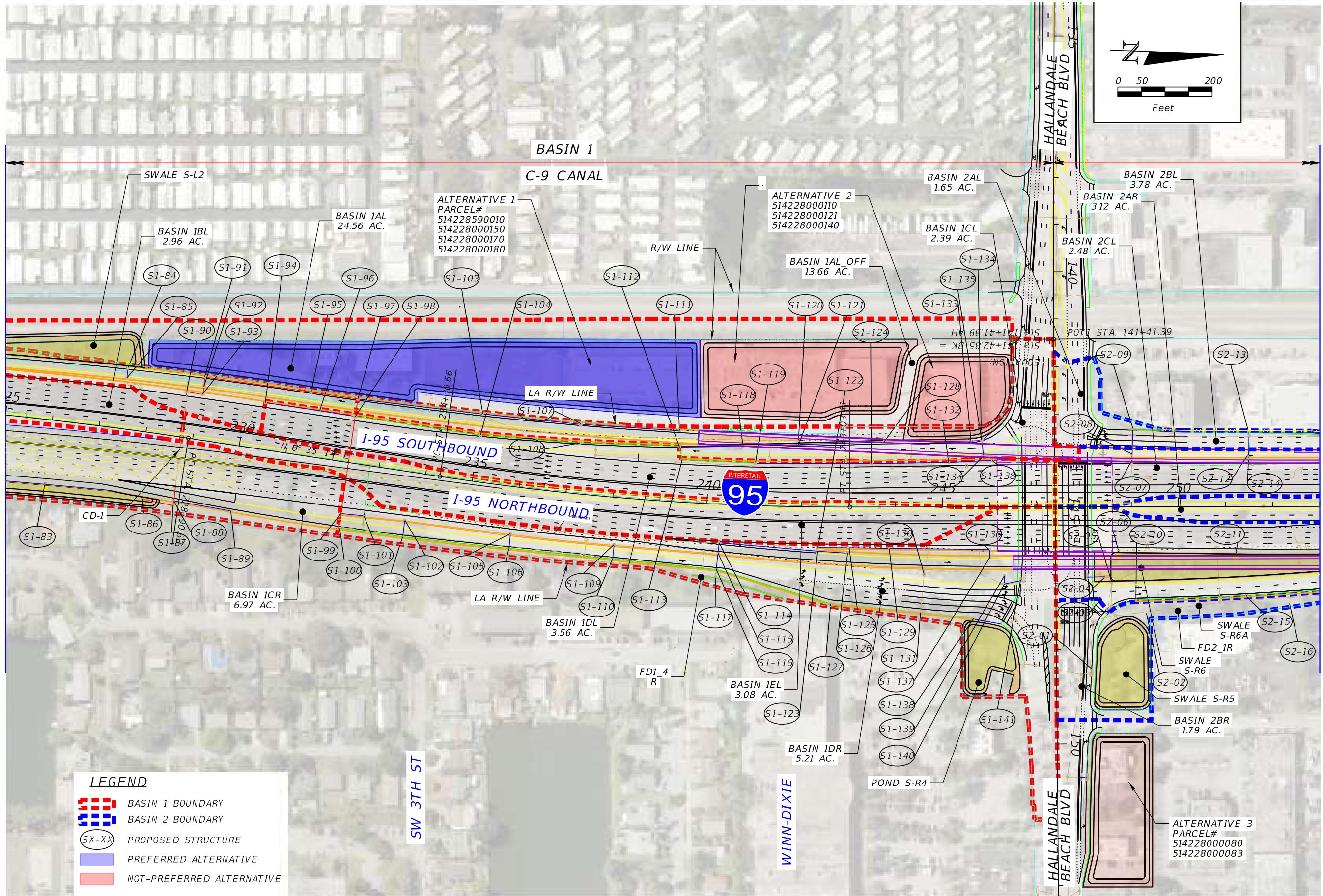
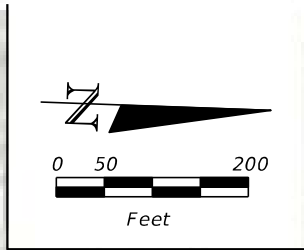
PROPOSED STRUCTURE

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DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				SR 9	BROWARD	436903-1-22-02		



MATCHLINE "B" (SEE SHEET 2)

MATCHLINE "C" (SEE SHEET 4)



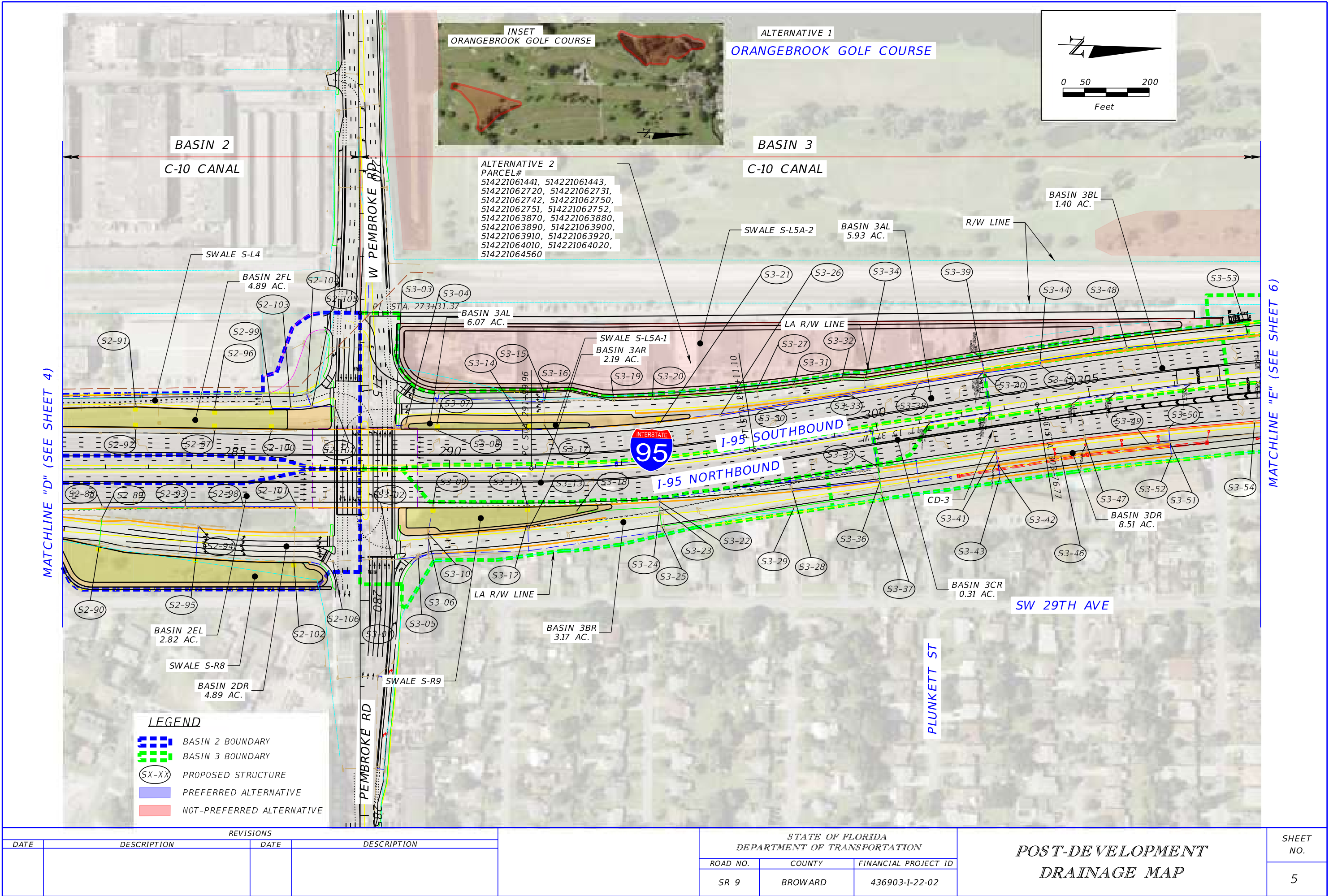
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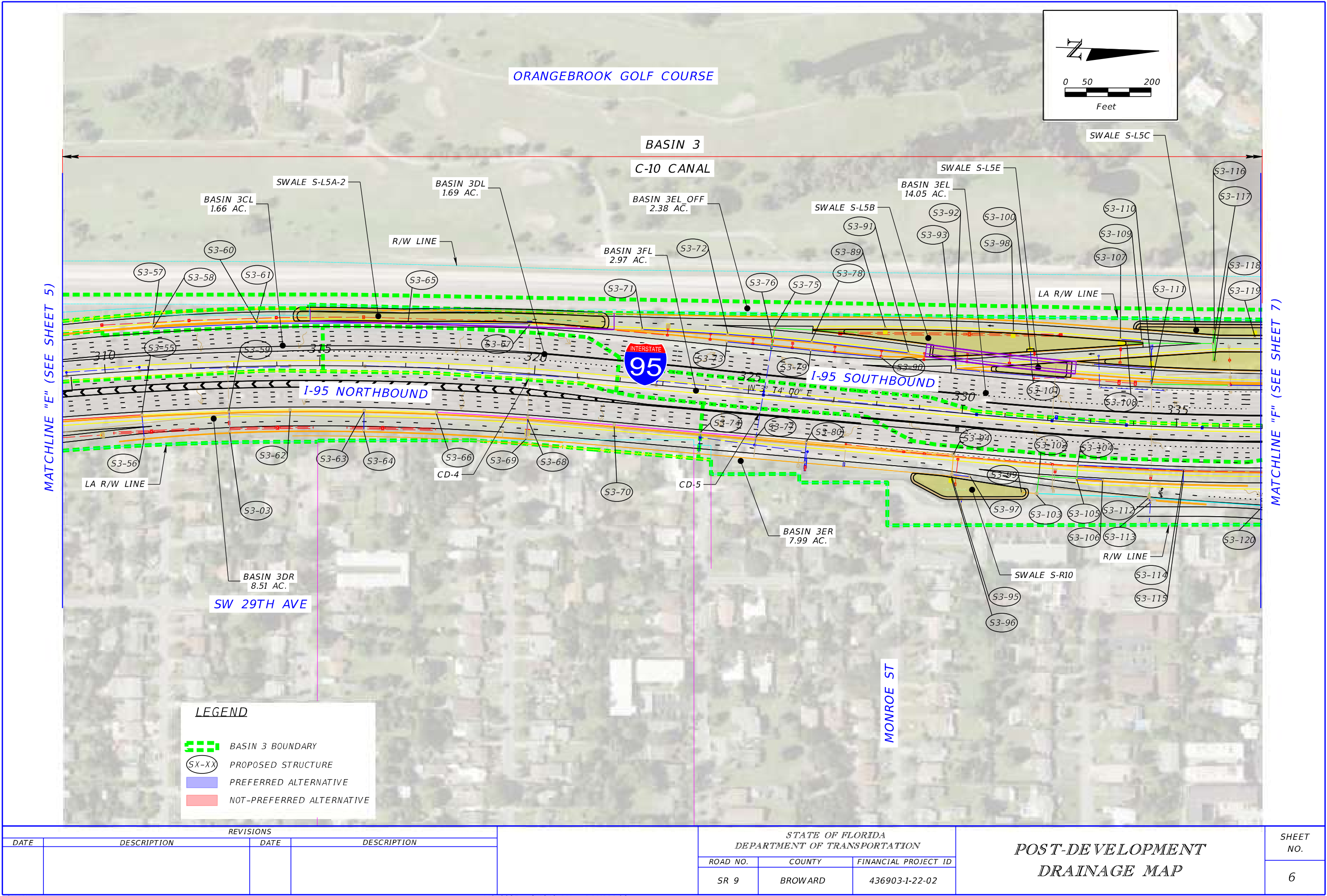
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- BASIN 2 BOUNDARY
- PROPOSED STRUCTURE
- PREFERRED ALTERNATIVE
- NOT-PREFERRED ALTERNATIVE

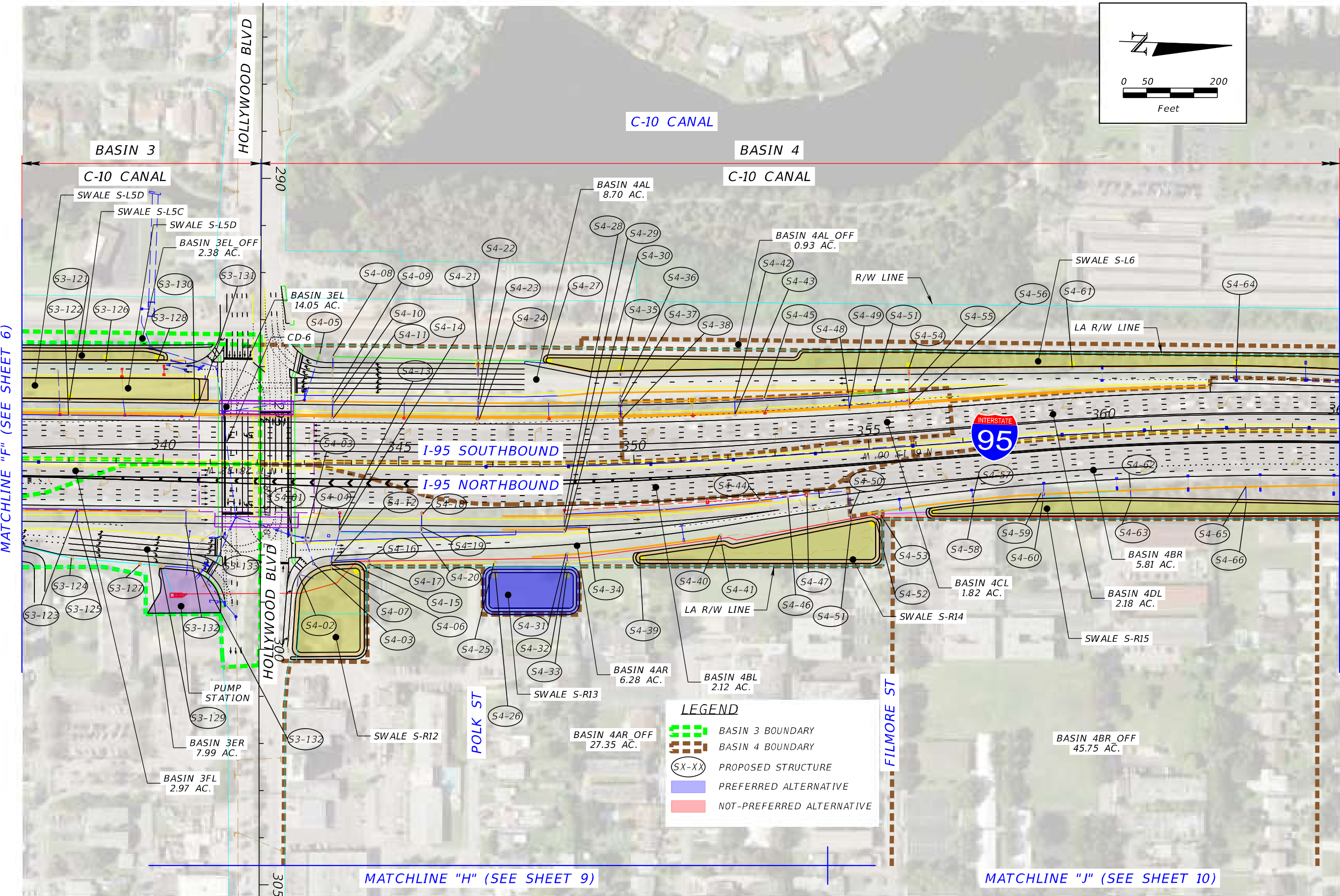
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DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO. SR 9	COUNTY BROWARD	FINANCIAL PROJECT ID 436903-1-22-02		



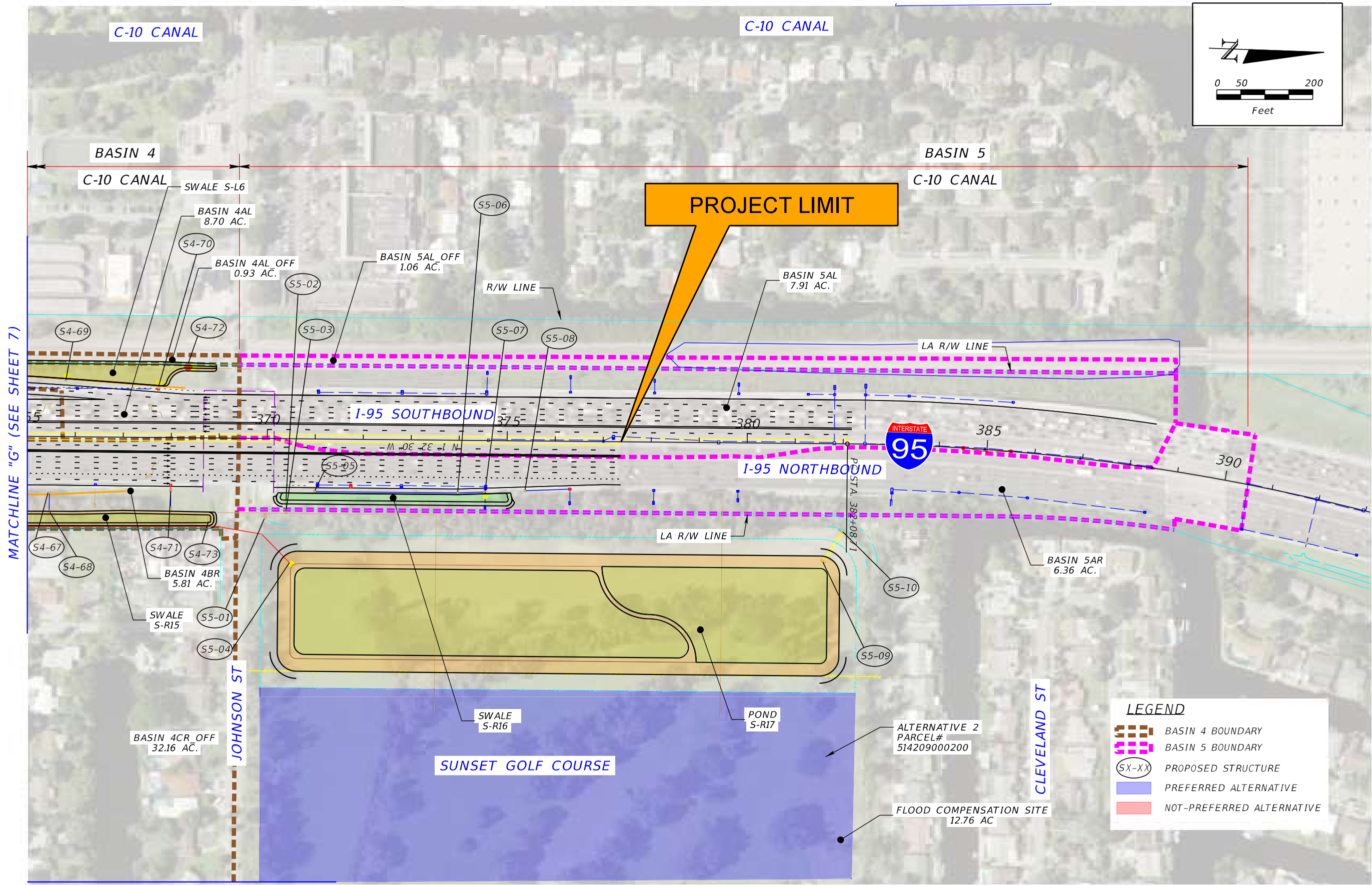
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DATE	DESCRIPTION	DATE	DESCRIPTION			4



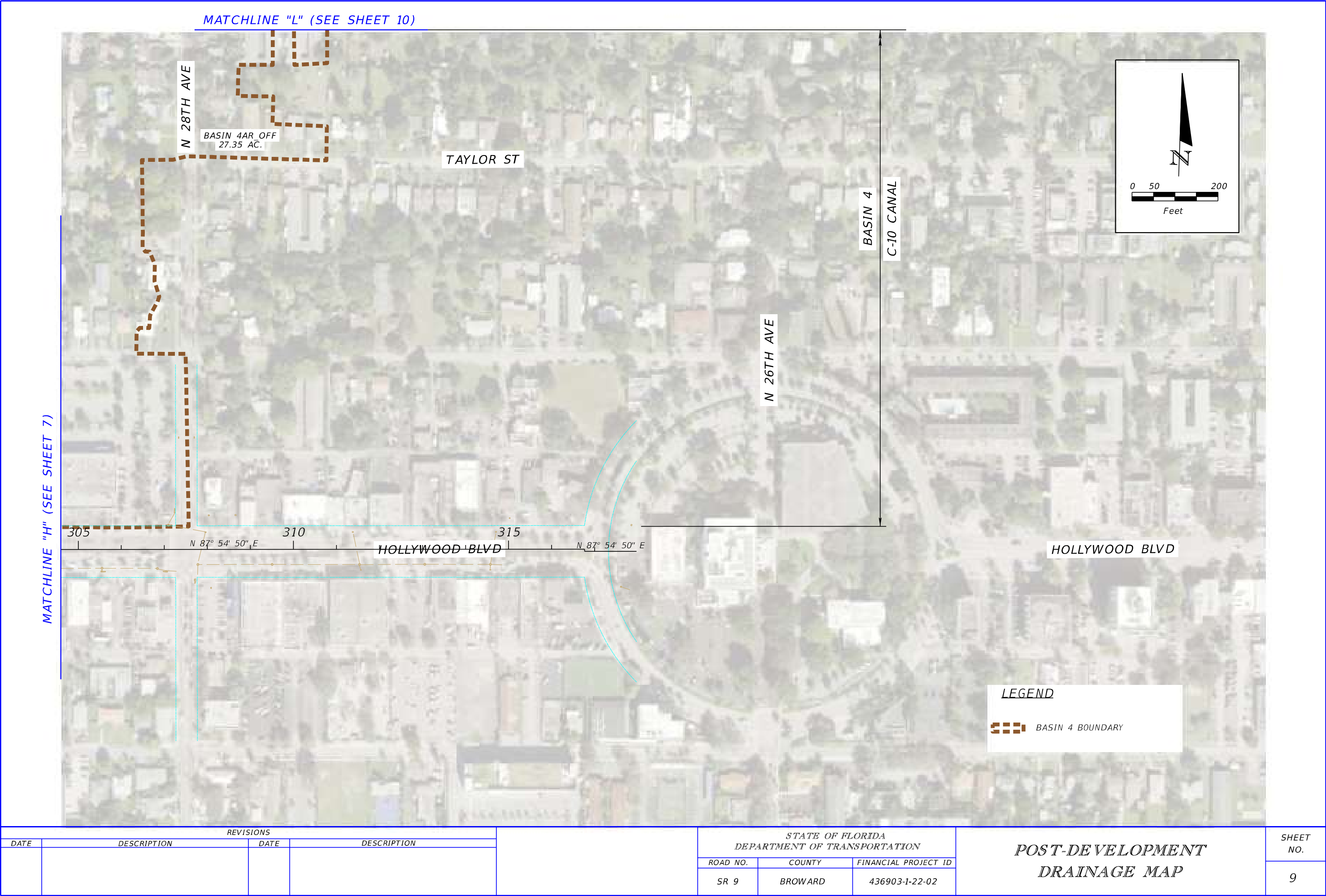


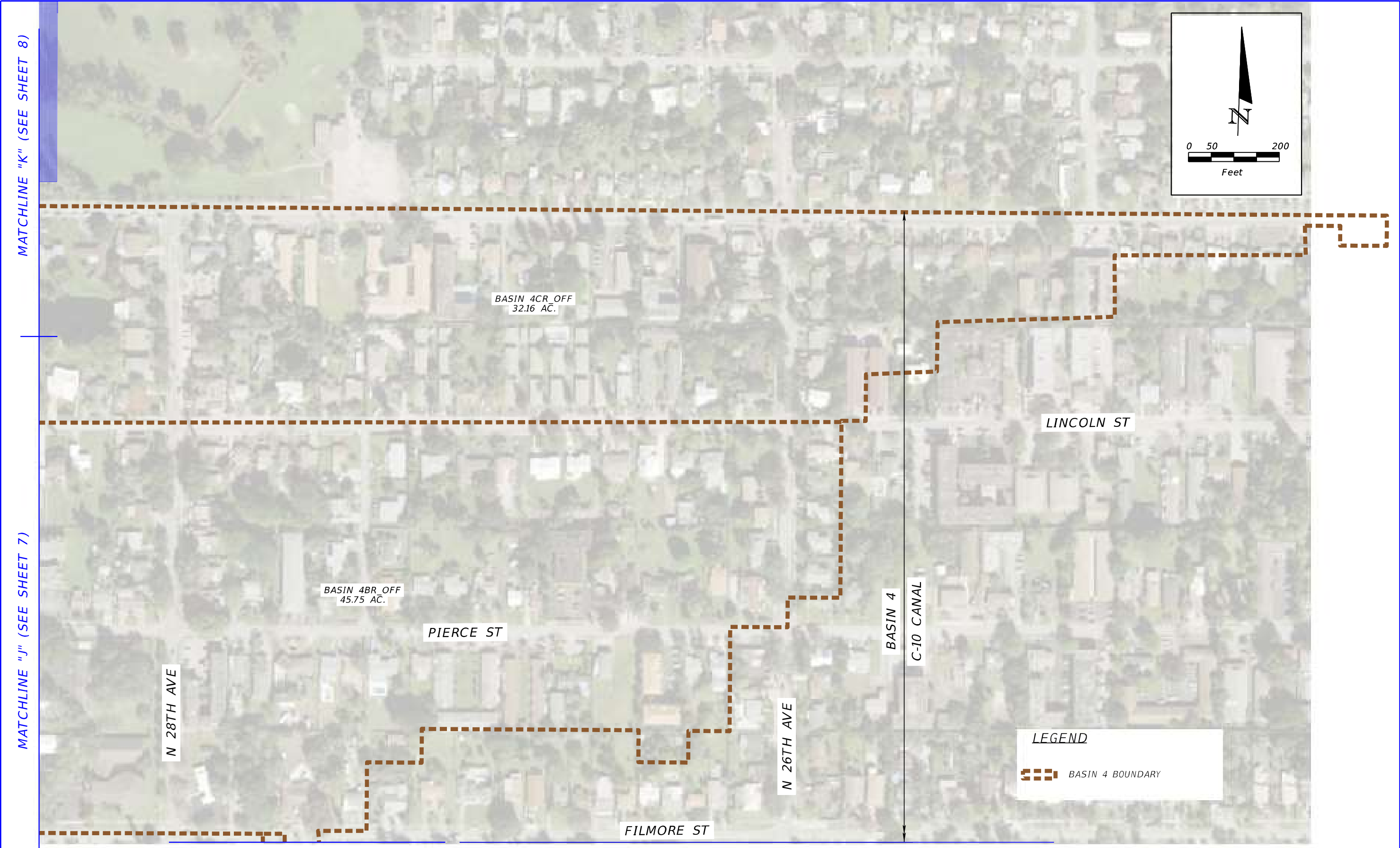


REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			POST-DEVELOPMENT DRAINAGE MAP	SHEET NO. 7
DATE	DESCRIPTION	DATE	DESCRIPTION	ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				SR 9	BROWARD	436903-1-22-02		



REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			POST-DEVELOPMENT DRAINAGE MAP	SHEET NO. 8
DATE	DESCRIPTION	DATE	DESCRIPTION					
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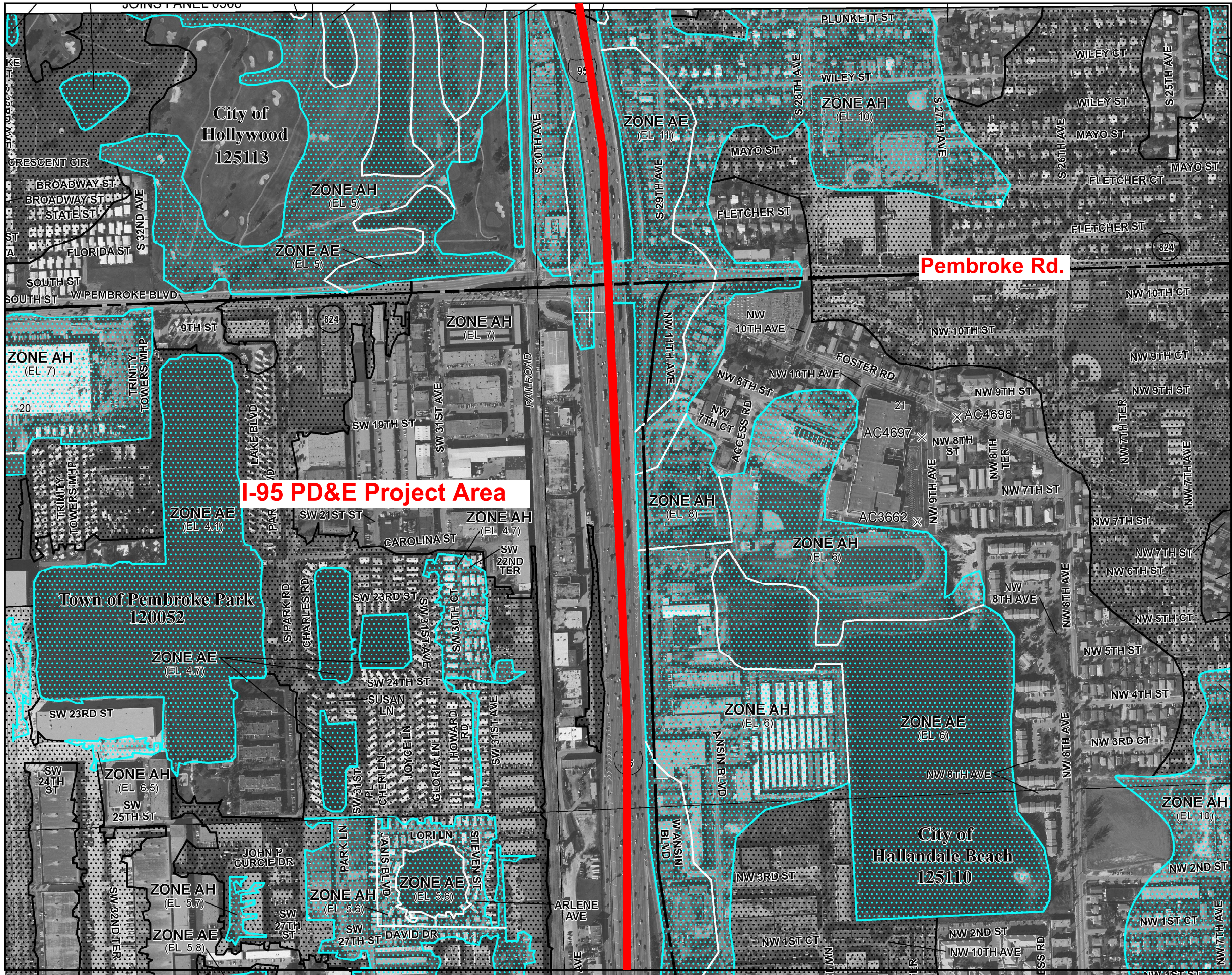


REVISIONS				STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION			POST-DEVELOPMENT DRAINAGE MAP	SHEET NO.
DATE	DESCRIPTION	DATE	DESCRIPTION					
				ROAD NO.	COUNTY	FINANCIAL PROJECT ID		
				SR 9	BROWARD	436903-1-22-02		10



APPENDIX F

Floodplain Encroachment Calculations



ance Program at 1-800-638-6620.

MAP SCALE 1" = 500'

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0731H

FIRM

FLOOD INSURANCE RATE MAP

BROWARD COUNTY, FLORIDA

AND INCORPORATED AREAS

PANEL 731 OF 751

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HALLANDALE BEACH, CITY OF	125110	0731	H
HOLLYWOOD, CITY OF	125113	0731	H
PEMBROKE PARK, TOWN OF	120052	0731	H
WEST PARK, CITY OF	120222	0731	H

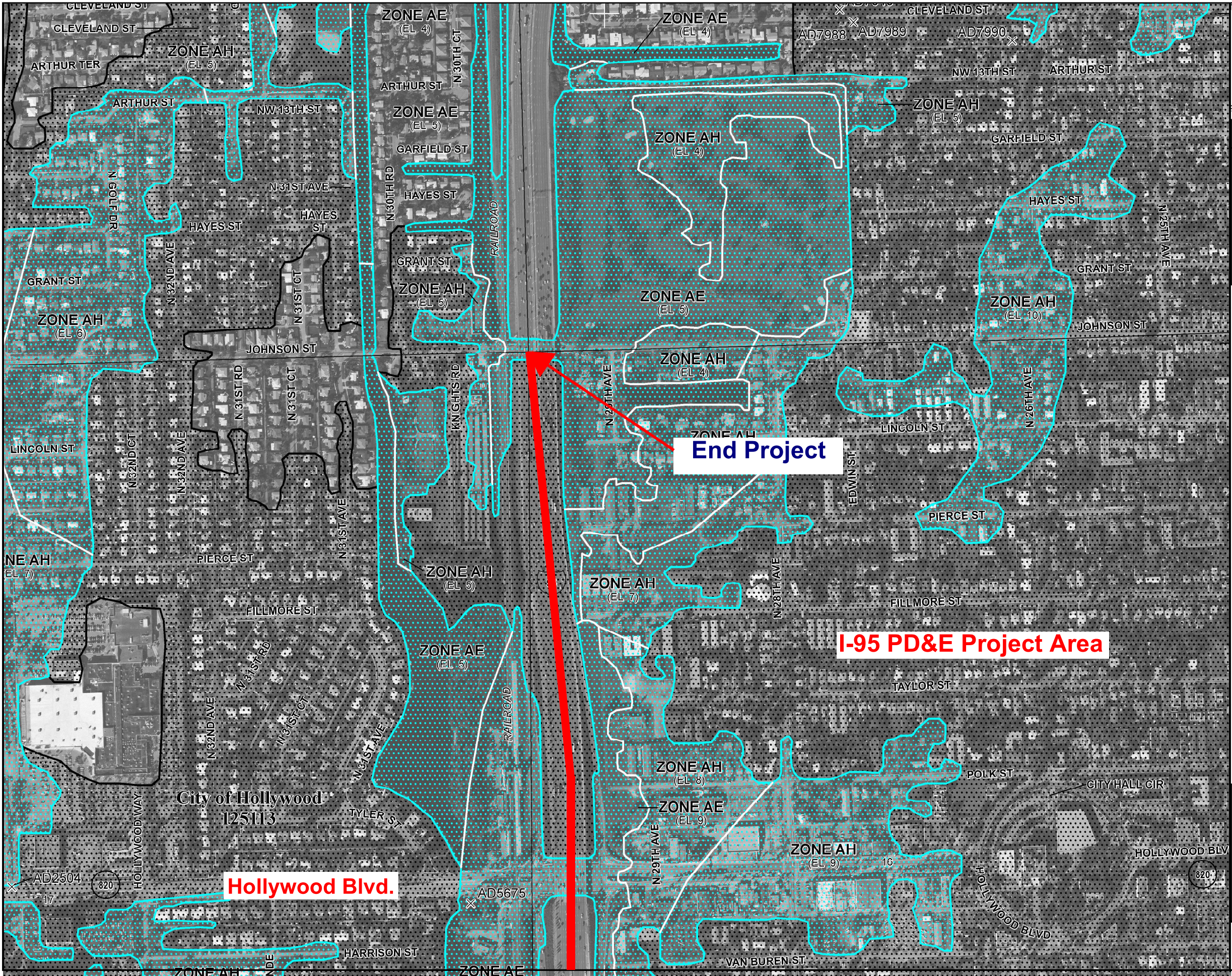
Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

MAP NUMBER
12011C0731H

EFFECTIVE DATE
AUGUST 18, 2014

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



ance Program at 1-800-638-6620.


MAP SCALE 1" = 500'
0 250 500 750 1,000 FEET

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0568H

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

PANEL 568 OF 751
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
HOLLYWOOD, CITY OF	125113	0568	H

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
12011C0568H
EFFECTIVE DATE
AUGUST 18, 2014
Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Summary of Floodplain Encroachment/Compensation Calculations

SFWMD BASIN	BASIN	FLOODPLAIN ENCROACHMENT (AC-FT)	PROVIDEE FLOODPLAIN COMPENSATION (AC-FT)
C-9	BASIN 1	5.90	22.18
C-10	BASIN 2	4.34	
	BASIN 3	9.47	
	BASIN 4	1.08	
		20.80	22.18

Summary of Floodplain Encroachment Calculations

Basin	Roadway XS Station	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	Total (cf)	Total (ac-ft)
	LT					RT					
Basin 1	207+00	0	-	-	-	48		0			
	219+00	0	0	1200	0	104	76	1200	91200		
	229+00	0	0	1000	0	104	104	1000	104000		
	235+00	0	0	600	0	0	52	600	31200		
	236+00	0	0	100	0	0	0	100	0		
	243+00	0	0	700	0	40	20	700	14000		
	246+50	0	0	350	0	56	48	350	16800		
					0				257200	257200	5.90
Basin 2	248+20	0	0	-	-	0		0			
	252+00	0	0	380	0	0	0	380	0		
	254+00	0	0	200	0	8	4	200	800		
	258+00	0	0	400	0	40	24	400	9600		
	259+00	0	0	100	0	104	72	100	7200		
	270+00	0	0	1100	0	88	96	1100	105600		
	274+00	0	0	400	0	24	56	400	22400		
	278+00	0	0	400	0	24	24	400	9600		
	279+00	0	0	100	0	104	64	100	6400		
	280+00	0	0	100	0	48	76	100	7600		
	281+00	0	0	100	0	24	36	100	3600		
	283+00	0	0	200	0	32	28	200	5600		
	286+00	0	0	300	0	40	36	300	10800		
					0				189200	189200	4.34

Basin	Roadway XS Station	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	XS Area (sf)	Average XS Area (sf)	Length between Stations (ft)	Encroached Volume (cf)	Total (cf)	Total (ac-ft)
Basin 3	LT					RT					
	290+00	8				24		0			
	295+00	8	8	500	4000	8	16	500	8000		
	300+00	0	4	500	2000	0	4	500	2000		
	305+00	0	0	500	0	176	88	500	44000		
	310+00	0	0	500	0	208	192	500	96000		
	317+00	0	0	700	0	264	236	700	165200		
	321+00	0	0	400	0	40	152	400	60800		
	336+00	0				0		0			
	340+00	152	76	400	30400	0	400	0			
					36400				376000	412400	9.47
Basin 4	344+00	16				0					
	347+00	0	8	300	2400	16	8	300	2400		
	350+00	16	8	300	2400	24	20	300	6000		
	352+00	32	24	200	4800	16	20	200	4000		
	353+00	0	16	100	1600	48	32	100	3200		
	355+00	0		200	0	24	36	200	7200		
	356+00	0		100	0	8	16	100	1600		
	357+00	0		100	0	16	12	100	1200		
	360+00	0		300	0	32	24	300	7200		
	362+00	0		200	0	0	16	200	3200		
						11200				36000	47200



APPENDIX G

Correspondence



Meeting Minutes

Project: FPID 436903-1-22-02 I-95 PD&E

Subject: I-95 PD&E Study from South of Hallandale Beach Blvd. to North of Hollywood Blvd.

Date: Wednesday, August 01, 2018

Location: City of Hollywood City Hall, Rm. 215

Attendees: See attached sign-in sheet

The meeting took place in City of Hollywood city hall at 2 PM to discuss the PD&E study and drainage improvements for I-95 corridor from South of Hallandale Beach Blvd. to North of Hollywood Blvd.

Introduction to project

After introductions, Ryan Solis-Rios began describing the scope of the project and discussed the project's schedule. He mentioned that there is a public hearing scheduled to take place sometime in 2019 to bring alternatives to the public and the study will end in 2020. Mr. Solis-Rios continued describing the purpose of the project, stating that access on the highway and congestion at the interchange needs to be improved. Currently, there are no funds set aside for the project yet. Mr. Solis-Rios clarified that the I-95 express lanes will not be touched for this project.

Existing Drainage

After the description of the project's scope of work, Mohammad Pervez began to talk about the existing drainage system along I-95. Project limits and affected areas were pointed out on a printed aerial map of the area, as well as current outfalls at C-9 and C-10. Everything south of Hallandale drains to C-9 and everything north goes to C-10. Mr. Pervez stated that the I-95 currently drains off to the active swales on both sides. There is an 84" pipe crossing under I-95 connecting Chavez Lake to the pump station within I-95 R/W. The Pump station discharges to a conveyance channel along CSX railroad which ultimately discharges to Hollywood/C-10 Canal. Mr. Pervez also stated that the runoff from SR 824 currently being treated in the Orangebrook golf course before discharging to the Hollywood/C-10 Canal. Based on the permit history SR 824 is allowed to discharge 100 cfs to the Orangebrook golf course.

Proposed Drainage

Mr. Pervez mentioned that the improvements will include widening which will fill-up the existing roadside swales. The improvement will consider new swales and stormwater facilities (some outside of the existing right of way, near service interchanges) where possible but it will likely not be enough to meet stormwater needs for the project. He also mentioned that one viable option to manage stormwater is to treat and attenuate the I-95 runoff in the Orangebrook Golf Course. Mr. Lopez asked how the additional runoff from Hollywood Blvd. and Pembroke Rd. will be managed and how much storage is needed. Mr. Pervez suggested that one alternative under consideration by the PD&E Team is to expand the ponds



within the golf course to retain more water and to reduce the increased discharge. He mentioned that the project will need approximately 17 acre-ft of storage based on the preliminary calculation.

While discussing about the drainage, Mr. Lopez reported that there is a drainage problem with private properties in the area along Johnson Street. The swales are overflowing to the private properties and losing discharge. A recommendation was made by Mr. Pervez to lower the swale bottom but keep at least 1 foot above seasonal high water to improve drainage and water retention. PD&E team asked about the Sunset golf course, a private golf course, for a potential drainage area. Mr. Lopez responded saying that the city will not be purchasing it, claiming it is too expensive right now for the city of Hollywood. Sunset golf course will be used for analysis but can be marked as a potential pond site for the future projects.

Additional discussion related to the project

Mr. Vazquez asked about Hillcrest golf course. Mr. Lopez mentioned that Hillcrest golf course is no longer available, but the ponds still exist. Mr. Lopez stated that the drainage right of way still exist and may be able to have a diversion of flow to Hillcrest in order to ease capacity at Orangebrook. Possible plan to discharge less to Orangebrook and more to Hillcrest. However, original permits do not show any outfalls for Hillcrest golf course.

Mr. Pervez mentioned that the team will meet with South Florida Water Management District (SFWMD) and present stormwater management options for the project.

Mr. Solis-Rios talked more about the project, stating that the timing of construction for the potential improvements is not yet known. The study will end in 2020. Mr. Solis-Rios also mentioned that the project has not been advertised for final design yet, but the final design may overlap with PD&E. The design usually does not change much after the public hearing. Mr. Vazquez mentioned that City will have a Bond Referendum in March of 2019, and improvements to Orangebrook Golf Course is in the bond program. The City noted that improvements to Orangebrook from the Bond program could include full renovation or partial improvements, based on the funding availability. Mr. Vazquez asked what is needed from the City for the meeting. Mr. Solis-Rios stated that meeting minutes needed to be created to show that the project team met with City Of Hollywood to discuss the options and that there is agreement that Orangebrook Golf Course is a viable alternative for the stormwater management for the project. It was also discussed that FDOT would revisit the stormwater management alternatives with the City and all stakeholders in the final design phase.

The meeting concluded at 3:30 P.M.

Should anyone have additional questions or additions to this record of meeting, please respond to this email sender no later than 5 business days from receipt.



DRAINAGE COORDINATION MEETING WITH CITY OF HOLLYWOOD

I-95 PD&E Study
From South of Hallandale Beach Boulevard (SR 858)
to North of Hollywood Boulevard (SR 820)
Broward County, Florida
FPID # 436903-1-22-02
ETDM# 14254

Wednesday, August 1, 2018
2:00 PM - 3:30 PM

SIGN IN SHEET

NAME	Initial	FDOT / COMPANY	TELEPHONE	EMAIL
1) Kenzot Jasmin		FDOT- D4	(954) 777-4462	Kenzot.Jasmin@dot.state.fl.us
2) Hui Shi	HS	FDOT	(954) 777-4657	Hui.Shi@dot.state.fl.us
3) Claudia Calvo	C.C.	FDOT	(954) 777-4476	Claudia.Calvo@dot.state.fl.us
4) Georgi Celusnek	GC	FDOT	(954) 777-4462	Georgi.Celusnek@dot.state.fl.us
5) Luis Lopez	LL	City of Hollywood	(954) 921-3251	llopez@hollywoodfl.org
6) David Vazquez	DV	City of Hollywood	(954) 921-3404	DVazquez@hollywoodfl.org
7) Gus Zambrano		City of Hollywood	(954) 921-3201	GZambrano@hollywoodfl.org
8) Rick Mitinger		City of Hollywood	(954) 921-3990	RMitinger@hollywoodfl.org
9) Steve Joseph		City of Hollywood	(954) 967-4455	SJoseph@hollywoodfl.org
10) Mike Ciscar		The Corradino Group	(305) 586-7107	Mciscar@corradino.com
11) Ryan Solis-Rios	RJR	The Corradino Group	(954) 777-0044	Rsolis-rios@corradino.com
12) Will Suero	WS	HDR	(954) 535-1876	Will.Suero@hdrinc.com
13) Mohammad Pervez	MP	HDR	(954) 535-1876	Mohammad.Pervez@hdrinc.com
14) Rohan Hameed		HDR	(954) 535-1876	Rohan.Hameed@hdrinc.com
15) Derly Cano		HDR	(954) 535-1876	Derly.Cano@hdrinc.com
16) Christopher Alli	CA	HDR	(954) 535-1876	Christopher.Alli@hdrinc.com
17) Katheline Tabuteau	KT	HDR	(954) 535-1876	Katheline.Tabuteau@hdrinc.com
18) Imtyaz Shaikh		HDR	(954) 535-1876	Imtyazahmad.Shaikh@hdrinc.com
19) ARL WAINOR		CITY OF HOLLYWOOD		rwainor@hollywoodfl.org
20) Wilford Zephyr	W.Z.	City of Hollywood	(954) 921-3994	wzephyr@hollywoodfl.org



DRAINAGE COORDINATION MEETING #2

**I-95 PD&E Study
From South of Hallandale Beach Boulevard (SR 858)
To North of Hollywood Boulevard (SR 820)
FPID # 436903-1-22-02
Broward County, Florida
Thursday, June 14, 2018
9:00 AM – 10:30 AM
Attendees:**

Kenzot Jasmin, FDOT
Georgi Celusnek, FDOT
Claudia Calvo, FDOT
Mary Ellen Milford, FDOT
Ryan Solis, Corradino
Lukas Simons, Corradino
Will Suero, HDR
Mohammad Pervez, HDR
Derly Cano, HDR

MEETING MINUTES

1. Mohammad described the preliminary stormwater system for each basin along the project corridor as follows:
 - Basin 4 comprehended the area from the beginning of the project to Hallandale Beach Blvd. This area ultimately outfall to the Snake Creek Canal. Water quality and attenuation calculations for this basin are based on the additional impervious and the parcels already impacted by the roadway improvements for proposed storage. According to the preliminary calculations, additional parcels will be needed to provide water quality and attenuation for this basin.
 - Basin 5 from Hallandale Beach Blvd. to Pembroke Rd. ultimately discharges to the C-10 Canal. For this basin the worst alternative shows a high impact on the existing swales. This basin was divided on two sub-basins 5-a and 5- b for the analysis. The results reveals that the parcels impacted by the roadway can comply with the require storage for water quality and attenuation for basin 5a and for basin 5-b however, the vacant private parcel located at the south east corner of Pembroke Rd and I-95 is not enough to provide water quality and attenuation for this system.
It is necessary to schedule a meeting with the City of Hallandale and Pembroke Park to verify if additional flow can be handling on the Chaves Lake - pump system.
Georgi explained that the pump station is located on the FDOT RW and maintenance is paid by FDOT but performed by the cities.
 - Basin 6 from Hallandale Blvd. to Johnson St. ultimately discharges to C-10 Canal. This basin was divided in tree sub-basins 6-a, 6-b and 6-c for the calculation analysis. For



the area comprehended between Pembroke Rd. and Hollywood Blvd., the existing swales are highly impacted and the calculation shows that the parcels impacted by roadway improvements and taken for storm water system will not satisfy the criteria requirements for water quality and attenuation. An area on the Orangebrook Golf Course will be needed to provide the required storage.

Ryan mentioned that during the meeting with the City of Hollywood, they were open for a discussion, and that during the life of the PD&E they are not expecting any agreement for a development or renovation on the Golf Course.

It can be conclude that the prefer location for the storm water system for the area comprehended along I-95 between Pembroke Rd. and Hollywood Blvd. is the Orangebrook Golf Course.

Georgi talked about the FDOT drainage easement on the Orangebrook Golf Course and Mohammad mentioned that a meeting will be necessary between FDOT and the City of Hollywood. It was agreed that if the City of Hollywood were to develop the Orangebrook Golf Course, they would need to come to FDOT related to the current drainage easement, and at that time FDOT could participate in a modified easement to account for future stormwater needs related to the PD&E Study recommended improvements.

Basin 6-c comprehends the area north of Hollywood Blvd. to Johnson St. The estimated water quality and attenuation for this area shows that the FDOT parcels and the vacant private parcel at the northeast corner of Hollywood Blvd. and I-95 are not enough to provide the required treatment volume and additional area at the Sunset Golf Course will be necessary to comply with SFWMD treatment criteria requirements.

Will noted that the City of Hollywood Mayor and Commissioner voted recently to evaluate using Eminent Domain for the city to purchase the Sunset Golf Course for stormwater use and for a city park. It was discussed that FDOT could discuss a possible shared acquisition for the site, for stormwater needs related to the current PD&E Study, or perhaps a future PD&E Study for I-95 improvements to the north.

2. Will asked about the option to provide compensation at the Sunset Golf Course for the area between Pembroke Rd. to Johnson St. Mohammad explained that compensation for water treatment can be done for water quality treatment but water quantity storage areas need to be provided between Pembroke Rd. to Hollywood Blvd. for attenuation.
3. Georgi asked to confirm that there is no impact to the pump station located at the west side of I-95, between Pembroke Rd. and Hallandale Beach Blvd. Ryan said there are no impacts to the pump station and determination needs to be made for the clearance elevation between the pump station and the ramp bridge.

Will suggested investigating the criteria for structures (such as the pump station) below bridges due to possible safety issues. The PD&E Team will discuss this matter further with District Maintenance and District Structures.

4. It was discussed with FDOT D4 the level of approach for the Pond Siting Report and it was accepted by FDOT that the Pond Siting Report will emphasize on the best possible option recommended for the project area. A more detailed Pond Siting Process (including legal)



would be applied once the project moved to the design and/or right of way acquisition phases, after the PD&E Study.

5. Ryan and Mohammad mentioned the contamination caused by the superfund at Pembroke Park Warehouse, the limits of contamination need to be confirm by CISCO to verify impacts on the proposed stormwater system.
6. Next step will be to coordinate with the local agencies; it will also be ideal to meet City of Pembroke Park and City of Hallandale together, then City of Hollywood and last with SFWMD for concerns and modifications of the existing permits.
7. Claudia Calvo from FDOT D4 requested to include Hui Shi on the meetings for I-95 PD&E.

The meeting concluded at 10:30 AM.



DRAINAGE CONCEPT MEETING#1

**I-95 PD&E Study
From South of Hallandale Beach Boulevard (SR 858)
To North of Hollywood Boulevard (SR 820)
FPID # 436903-1-22-02
Broward County, Florida**

**Monday, April 02, 2018
1:45 PM - 3:00 PM**

Attendees:

Kenzot Jasmin, FDOT
Georgi Celusnek, FDOT
Hui Shi, FDOT
Ryan Solis, Corradino
Lukas Simons, Corradino
Mohammad Pervez, HDR
Derly Cano, HDR

MEETING MINUTES

1. Ryan opened the meeting with describing project scope and proposed alternatives to the meeting. He mentioned that after the workshop schedule for the month of June the best combination of the proposed alternatives can be define.
2. Mohammad describes the existing drainage conditions, the impacts to the existing drainage and the preliminary stormwater management opportunities. It was mentioned that the improvement will have significant impact to the existing I-95 drainage system. In the proposed condition, there are few opportunities to manage the stormwater within the parcels that are already impacted by the roadway improvement. There are few independent parcels are also identified for further evaluation for stormwater management purposes. It was mentioned that further investigation on R/W Acquisition at vacant parcels for stormwater management use will be done.
3. It was mentioned that all the alternatives will have no impacts to the existing pump station located at the west side of I-95 (with in I-95 R/W)
4. It was discussed that the required clearance requirements over the existing pump station needs to be investigated from the pump station maintenance office to be incorporated in the conceptual design
5. Georgi inquired the design storm for the project. It was clarified that the design storm will be 25 year-72 hour and pre-post rule will be used for storm water quantity calculation
6. Georgi inquired if Flood routing in ICPR will be done. It was clarified in the meeting that since the project is at PD&E stage, ICPR flood routing will not be done. Water quantity volume will be estimated from rainfall depth and CN.



7. Georgi informed that FDOT received a permit package for the Orange Brook Golf Course to remodel the entire Golf Course with new development. Project team requested the information and Georgi mentioned to provide them.
8. Georgi requested to verify what easement right FDOT has at the current Orange Brook Golf Course Permit.
9. The PD&E team requested to arrange meetings with local municipalities to discuss the project.

The meeting concluded at 3:00 PM.



DRAINAGE COORDINATION MEETING WITH CITY OF HOLLYWOOD

I-95 PD&E Study

**From South of Hallandale Beach Boulevard (SR 858)
to North of Hollywood Boulevard (SR 820)**

Broward County, Florida

FPID # 436903-1-22-02

ETDM# 14254

Tuesday, November 10, 2020

10:00 AM

MEETING MINUTES

The summary of the meeting minutes is noted below in bold italics.

1. Introduction to the Project

- a) Scope of the Project
- b) Purpose and Need
- c) Preferred Alternative
- d) Schedule
- ***The Florida Department of Transportation (FDOT) staff and project team introduced themselves (see meeting invite for list of attendees).***
- ***The PD&E Study team presented a brief PowerPoint presentation of the PD&E Study covering the following information:***
 - ***Project Limits and Study Area***
 - ***Scope of the Project***
 - ***Needs of the Project***
 - ***Preferred Alternative Recommendations***
 - ***Schedule***
- ***The project team also presented a large roll plot depicting the PD&E Study recommended alternative on a plan view showing the number of lanes, proposed improvement areas, roadway cross sections, pond locations and adjacent projects.***

2. Drainage Overview

- a) Existing Drainage
 - Existing I-95 Drainage
 - Existing Pembroke Road Drainage
 - I-95 Pump Station - Offsite System

- ***A drainage roll plot was presented depicting the existing and proposed drainage features (culverts, swales, ponds, basins, and pump stations) within the study limits.***
 - ***The drainage engineers described all the basins within the study limits.***
 - ***Basin 1 covers from SW 11th Street to Hallandale Beach Boulevard. This basin discharges into the C-9 Snake Creek Canal. Water quality and quantity will be met within FDOT right of way.***
 - ***Basin 2 covers from Hallandale Beach Boulevard to Pembroke Road.***
 - ***Basin 3 covers from Pembroke Road to Hollywood Boulevard.***
 - ***Basin 4 covers from Hollywood Boulevard to Johnson Street.***
 - ***Basins 2, 3 and 4 discharge into the C-10 Canal. Water quality and quantity will be met by utilizing existing FDOT right of way, new right of way takes and using the Orangebrook Golf Course or the abandoned Sunset Golf Course.***
- b) Proposed Drainage
- Drainage Criteria - Water Quality and Quantity
 - ***The project team discussed the design criteria being used in this project. The criteria includes FDOT, South Florida Water Management District and local requirements.***
 - Proposed Drainage Approach
 - ***Based on the proposed roadway improvements, the existing dry detention swales and ponds will be impacted and volume capacity reduced by the interchange new ramps along I-95. The remaining stormwater facilities will be re-graded to accommodate partially the runoff for the impervious areas. The project will require additional right of way takes to comply with the regulatory agencies' stormwater treatment and attenuation criteria. In addition, runoff from Basin 2 and 3 will be conveyed to either the Orangebrook Golf Course or the abandoned Sunset Golf Course to provide the required stormwater management needs (see the two options below).***
 - ***Option 1 – Add new ponds in non-playable areas within the Orangebrook Golf Course and expand existing ponds draining Pembroke Road. This option will trigger a Section 4(f) process.***
 - ***Option 2 – Utilize the abandoned Sunset Golf Course. This is a recent purchase from the City that will be redesigned to become a passive park. No Section 4(f) process is needed to use this site.***
 - Preliminary Water Quality and Quantity Analyses
 - ***Preliminary analyses were conducted to identify the number and locations of ponds. The results will be documented in a Conceptual Drainage Analysis Report.***
 - Shared-Use Pond at Orangebrook Golf Course - Opportunities/Challenges/Summary
 - ***The project team identified two potential scenarios to use this golf course.***
 - ***Scenario 1: Use this golf course to meet the required stormwater needs based on current conditions and constructing new ponds outside***

playable areas. The Section 4(f) documentation approach will be to present this conversion of land to be considered a de minimis impact because the playable areas are being avoided. At a minimum, a temporary use of the City's property will be needed for construction.

- *Scenario 2: Use this golf course to meet the required stormwater needs based on the City's future plan to redevelop the golf course and that this renovation will occur prior to the FDOT's roadway construction project. In this scenario, the City would renovate the golf course and then construct the ponds to FDOT specifications. The FDOT could provide funding for pond construction, but the City would construct them concurrently with their golf course renovations. Therefore, the current Section 4(f) determination will be "No Use" due to the above timing.*
 - Shared-Use Pond at Sunset Golf Course - Opportunities/Challenges/Summary
 - *The project team identified one potential scenario to use this golf course, which was presented as Option 2 above. The opportunity here is that it will not require a Section 4(f) process. The challenge with this site is that it will require a new pump station to pump the runoff from Basins 2 and 3.*
 - Recommendation from the Project Team
 - *The project team recommends proceeding with the abandoned Sunset Golf Course during the PD&E Study phase as it is currently considered an open space property. During the design phase, further evaluation will be done to evaluate both sites and reconsider both locations.*
 - *FDOT and the City agreed on using the abandoned Sunset Golf Course to meet the stormwater needs in the PD&E Study and obtain LDCA. However, they also both agreed on keeping both golf course options open by documenting them in the official PD&E Study documents and drainage reports. FDOT will reevaluate during the Design phase the use of the Orangebrook Golf Course. By then, City of Hollywood site plans may be available about the renovation/reconstruction of the golf course.*
- c) Next Steps
- Feedback from the City
 - *Raul was concerned about the drainage issues within the abandoned Sunset Golf Course. Residents surrounding the golf course have been complaining about the high elevation of the C-10 Canal. The area of concern is east of I-95 and just south of Johnson Street. The swale is not contained and is discharging into the community.*
 - *David recommended to continue with evaluating both golf course options. Currently the City has maintenance issues with FDOT that will need to be addressed, which affects future interests between both agencies.*
 - *Azita asked if there were any other options not using the golf courses. The project team responded that significant ROW impacts will be required to meet the stormwater needs. One example is acquiring the entire NW quadrant of the I-95/Pembroke Road Interchange, which is not viable.*



- *Luis mentioned that the impacted parcels along Hollywood Boulevard are prime locations for the City. He asked the project team if those parcels could remain available for businesses and/or future developments instead of drainage ponds.*
- *David mentioned that the next step for the abandoned Sunset Golf Course is a master plan of the park. No rezoning has been issued. He expects a short term and long-term plan. This parcel was purchased as an open space with the intention of being a passive park.*
- *Azita asked if vacant lots were looked and considered to reduce the 9.14 ac-ft needed from the golf courses. The project team responded that vacant lots were considered. The biggest issue with vacant lots is that these locations need to have connectivity with each other for the ponds to work and eventually discharge to larger bodies. Properties that are being looked at right now are parcels that are being impacted by the proposed roadway improvements.*
- *Georgi asked regarding the I-595 Project and how they handled their golf courses. In this project, Arrowhead was a private golf course. Therefore, there was no Section 4(f).*
- Discuss an Agreement between FDOT and the City
 - *Both agencies agreed on the next steps and that we need to continue to coordinate with each other as new information becomes available from both agencies.*
 - *Kenzot will follow up with FDOT maintenance and operations to make sure all flooding issues at both golf courses can be worked out between both agencies.*



People 18/151

Jeffrey Coffin (Org)	
Ryan (Org)	
Azita Behmardi	
Clarissa Ip	
Clece Aurelus (Web)	
David Vazquez (Web)	
DERLY Cano	
Georgi Celusnek	
kenzot jasmin	
Luis Lopez	
Lukas Simons - Me	
Lynn Kelley	
Mark (Web)	
Rohan Hameed	
RW (Web)	
Vivek Galav	
Wendy Cyriacks - Environ...	
Will Suero (HDR)	



APPENDIX H

Broward County Land Use Map

BROWARD COUNTY LAND USE PLAN

Natural Resource Map Series- Eastern Broward County: Soils

Legend

Coastal Ridge Soils

- Paola - Urban Land - St. Lucie Association
- Palm Beach - Urban Land - Beaches Association

Low Ridge Knolls and Flatwoods Soils

- Dade - Urban Land Association
- Duette - Urban Land - Pomello Association
- Immokalee - Urban Land - Pompano Association
- Immokalee - Urban Land Association

Low Flatwoods, Sloughs and Marshes Soils

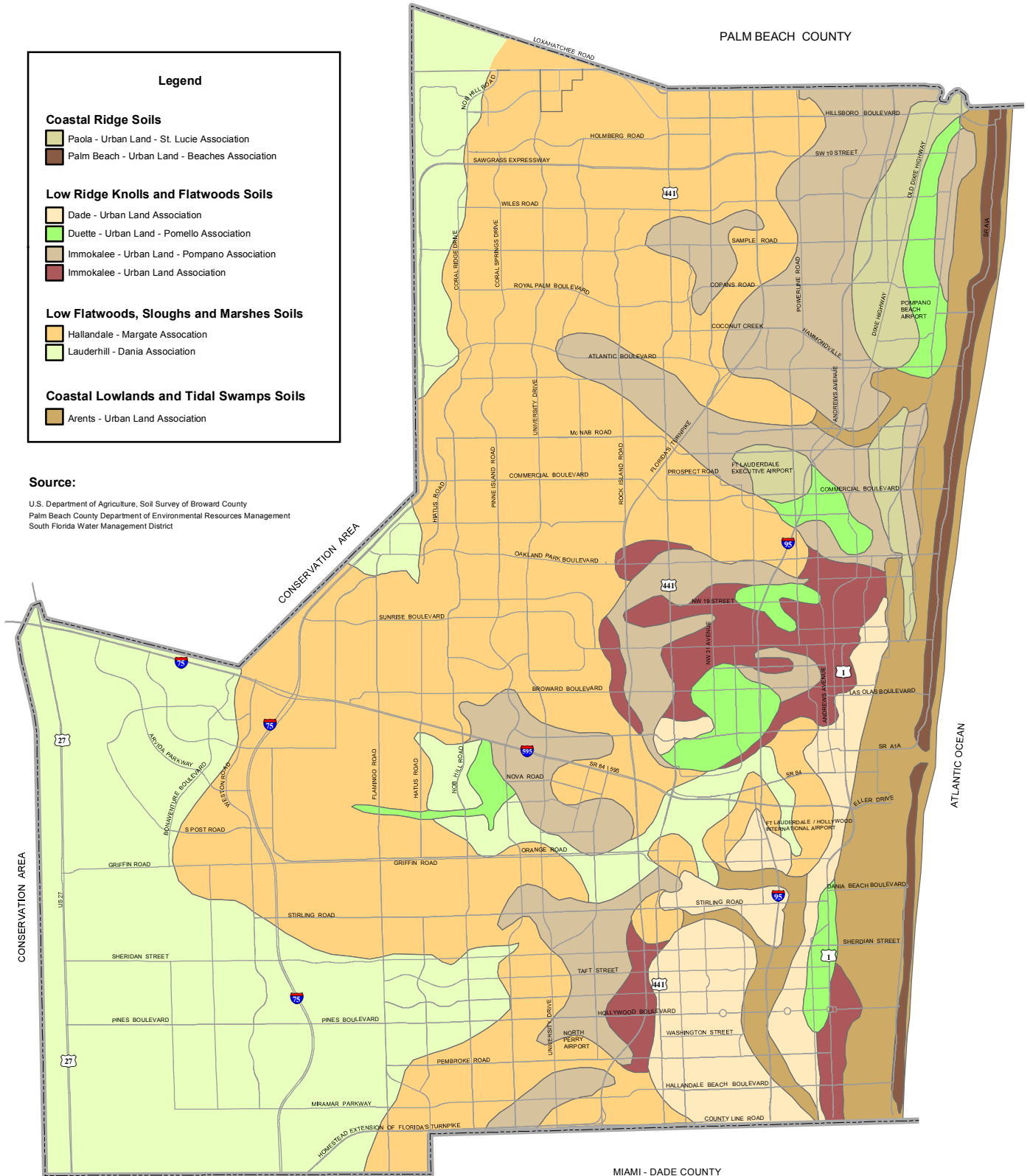
- Hallandale - Margate Association
- Lauderhill - Dania Association

Coastal Lowlands and Tidal Swamps Soils

- Arents - Urban Land Association

Source:

U.S. Department of Agriculture, Soil Survey of Broward County
Palm Beach County Department of Environmental Resources Management
South Florida Water Management District



Interstate 95 (I-95/ SR 9) PD&E Study

From South of Hallandale Beach Boulevard (SR 858) to
North of Hollywood Boulevard (SR 820), Broward County

