Kimley»Horn

MEMORANDUM

To:	Jennifer Marshall, PE FDOT Chief Engineer of Production
From:	Victor Gallo, PE – Project Manager Armando Orozco, PE – Deputy Project Manager Kimley-Horn & Associates, Inc.
Date:	January 15th, 2026
Subject:	New Stormwater Rule Evaluation for I-95 Project Development and Environment (PD&E) Study

Introduction & Objective

This project involves adding express and general-use lanes along I-95/SR 9 from south of SR 860/Miami Gardens Drive to north of the Broward County Line, including interchange improvements at SR 860 and CR 854/Ives Dairy Road in Miami-Dade County. The proposed improvements are based on the Refined Build Concept developed in the 2019 I-95 Corridor Planning Study by FDOT, which evaluated enhancements along I-95 from US 1 to the Broward County Line. As part of Florida's Strategic Intermodal System (SIS) and a designated hurricane evacuation route, I-95 plays a critical role in regional mobility. Within the project limits, I-95 is classified as an Urban Principal Arterial Interstate, consisting of six to eight general-use lanes and two to four express lanes. This segment, located north of the Golden Glades Interchange, traverses several urbanized areas, connecting key employment centers and residential communities in Miami-Dade, Broward, and Palm Beach Counties.

The objective of this task is to review the stormwater management system alternatives developed in the original Stormwater Report, utilizing traditional first-flush treatment volume design and performance standards, and to assess the modifications required to meet the new nutrient reduction criteria established by the updated stormwater rule. Please note, only the stormwater management system for the preferred roadway alternative was evaluated – Alternative 3.

New Stormwater Rule

The new stormwater rule criteria is quantified differently, focusing on the reduction of Total Nitrogen (TN) and Total Phosphorus (TP) in surface water discharges, as determined by Best Management Practice (BMP) efficiency rates based on the existing ambient water quality conditions of the downstream Water of the State, as outlined in Sections 8.3.2 through 8.3.5 of the Applicant's Handbook Volume I (A.H. Vol 1). This technical memorandum presents the findings and verification calculations for the proposed stormwater management facilities to provide reasonable assurance with the nutrient reduction performance standards established under the new stormwater rule, set forth in Chapter 62-330, F.A.C. No changes in volumetric attenuation are expected, so attenuation volumes were not evaluated.

For this evaluation, the Florida Department of Environmental Protection (FDEP) Division of Environmental Assessment and Restoration's (DEAR) Waters Not Attaining Standards (WNAS) from the adopted 2022-2024 Biennial Assessment dataset was used to identify impaired waterbodies (WBIDs) within the HUC 12 sub-watersheds. Impaired WBIDs are defined as those that are not meeting their applicable water quality standards under Chapter 62-302, F.A.C., and have been verified as impaired under Chapter 62-303, F.A.C., which are associated with assessment categories 4a, 4b, and 5. This definition of impaired waterbodies for administration of the ERP program was confirmed with FDEP's DEAR and Division of Water Resource

Management administrators. This memorandum is focused on the A.H. Vol. 1 of the stormwater rule, Applicant's Handbook Volume II (A.H. Vol. 2) will vary by Water Management District (WMD). Although the new rule establishes nutrient reduction rate standards for TN and TP, the rule does not specify if the impairment classification is to be used for nutrient and nutrient response variable impairments, or all water quality parameters (e.g. bacteria, mercury and metals). Thus, two ambient water quality scenarios were evaluated:

- Scenario 1: focused on nutrient-specific impairments.
- Scenario 2: considered additional risks of using impaired WBIDs with any water quality parameters, including but not limited to nutrients, bacteria, mercury, and metals.

This memorandum presents the results of applying the new stormwater rule, as outlined in the A.H. Vol. 1. While the new stormwater rule standards are not yet in effect for current ERP applications, this assessment assumes full implementation without grandfathering to evaluate future impacts on the Department's Work Program. **Table 1** summarizes the applicable performance standards from Section 8.3, limited to those relevant to the I-95 project.

Table 1: New Water Quality Performance Standard Requirements

Ambient Water Quality Classification	TP Nutrient Reduction Rate %	TN Nutrient Reduction Rate %	Nutrient Reduction Analysis	Presumptive TSS Reduction Rate %	A.H. Section
All Sites	80	55	Post ≤ Pre	80	8.3.2
Impaired Waters	80	80	Post ≤ Pre	80	8.3.4
OFW	90	80	Post ≤ Pre	95	8.3.3
Impaired + OFW	95	95	Post ≤ Pre	95	8.3.4

It should be noted that impaired waters not meeting their designated use at the time of application must follow the impaired performance standards. For example, during the PD&E phase, a WBID may be listed as assessment category 4a (impaired with a TMDL); however, by the time the project advances to design and the ERP application is submitted, the WBID could be reclassified as assessment category 2t (meeting its designated use). Then the WBID would no longer be considered impaired and the impaired performance standards would not apply. As the impaired list is updated every two years, the opposite may be true as well. A waterbody that may not be impaired during the PD&E phase could change to impaired with the biennial assessment update by the time the project advances to design and the ERP application is submitted. Then the WBID would be considered impaired and the impaired performance standards would apply. The impairment status of a WBID at the time of ERP application will ultimately determine the water quality performance standard requirements.

Kimley»Horn

Methodology

BMPTrains 2020 Version 4.3.5 was employed to evaluate the minimum nutrient reduction rates provided by the stormwater alternatives originally sized and sited in the original Stormwater Report. Additional BMPs were incorporated to bridge the gap between provided nutrient reduction rates provided by the facilities in the original Stormwater Report, and the minimum nutrient reduction efficiency rates required by the new Rule.

Dry retention facilities were modeled using the retention volumes specified in the Stormwater Report for each drainage roadway basin within the respective catchments. Nutrient reduction rates were evaluated using BMPTrains and the performance criteria outlined in Appendix O of the A.H. Vol. 1, in accordance with applicable regulatory requirements.

In the original Stormwater Report, exfiltration trench calculations did not account for the influence of the seasonal high groundwater table on nutrient reduction efficiency. To address this, the BMPTrains model was re-evaluated to incorporate groundwater elevation constraints, resulting in an effective treatment depth of 1.5-2 feet, compared to the 15 feet assumed in the preliminary analysis. This modification significantly reduced the modeled treatment efficiency of the exfiltration trenches. The placement of some exfiltration trenches in Basins 2-5 from the original PSR does not meet FDOT Drainage Manual criteria and relocating them did not yield sufficient nutrient reduction to be deemed valuable to the HUC 12 compensatory approach; thus, they were removed from the water quality analysis. Any impact on attenuation volume will be determined and corrected during the design phase of the project.

Given the high degree of urbanization within the project limits and the extensive impervious surface areas requiring nutrient reduction, non-traditional BMPs were incorporated to enhance nutrient reduction requirements of the updated Rule. Second-generation baffle boxes, identified as EcoVaults in the original Stormwater Report, were included as components of the treatment train. The nutrient reduction rates for each EcoVault were capped at the values 15.5% for TP and 19.05% for TN as specified in Appendix O of the A.H. Vol. 1. No additional baffle boxes were introduced; rather, the units proposed in the original Stormwater Report were integrated into the treatment strategy for each HUC 12 sub-watershed.

The BMPTrains model's primary focus was on the nutrient reduction rate of TN and TP verifying the ability to meet the new required nutrient reduction rate criteria as set forth in Chapter 62-330 F.A.C. and the A.H. Vol. 1. Within the pond's BMPTrains, separate catchments were created for each pond alternative (as set forth in the original Stormwater Report). The pre/post Event Mean Concentration (EMC) values were sourced from the A.H. Vol. 1, Table 9.2 for Highways.

Analysis & Results

This project encompasses five roadway basins; each associated with proposed stormwater management systems. Due to limited available space and the high nutrient reduction rates required for outfalling to impaired water bodies also classified as OFWs, this project was considered using the HUC 12 Overtreatment Compensatory Treatment method. The project limits fall within three HUC 12 sub-watersheds: Biscayne Canal, Royal Glades Canal, and North Biscayne Bay. North Biscayne Bay HUC 12 sub-watershed discharges to Biscayne Bay, which is classified as an OFW. North Biscayne Bay HUC 12 is impaired for nutrients, bacteria, mercury and metals downstream, requiring a 95% reduction in both TN and TP for both scenarios. In contrast, the Biscayne Canal and Royal Glades Canal HUC 12 sub-watersheds' ambient water quality analysis shows no impaired waters or OFWs within its boundaries, which will require the 55% TN and 80% TP nutrient reduction standards. Because both scenarios yield the same nutrient

reduction requirements, only one scenario was evaluated. See **Appendix A** for details of the impairments for each HUC 12 sub-watershed. Refer to **Table 2** for a Water Quality Summary of Findings.

Table 2: Scenario 1 Ambient Water Quality Summary of Findings

Total No. HUC 12 Basins	HUC 12s Not Meeting Nutrient Reduction Rate Requirements[1]	HUC 12s Impaired for Nutrients	HUC 12s Upstream of an OFW
3	3	1	1

1. Per the original Stormwater Report.

Alternative 1

Biscayne Canal HUC 12 – Roadway Basin 1

Basin 1 extends from the start of the project to approximately 200 feet south of SR 860. It lies within the HUC 12 Biscayne Canal Basin and the Biscayne Canal C-8 Drainage Basin (WBID 3285). According to the original Stormwater Report, stormwater runoff from this basin will be treated within the Golden Glades Interchange drainage system, which is currently slated for improvement and reconstruction. Basin 1 includes a network of interconnected dry retention areas, as described in the Stormwater Report. The originally proposed dry retention systems were analyzed using BMPTrains and the performance was validated against Appendix O of the A.H. Vol. 1. The analysis showed a combined nutrient reduction rate of 87% for both TN and TP which surpasses the required nutrient reduction standards of 55% TN and 80% TP.

Royal Glades Canal HUC 12 – Roadway Basins 2-4

Basins 2–4 extend from approximately 200 feet south of SR 860 to CR 854 and are located within the HUC 12 Royal Glades Canal Sub-watershed and the Snake Creek C-9 East Drainage Basin (WBID 3283). The stormwater management systems originally proposed in the Stormwater Report included dry retention areas, baffle boxes (EcoVaults), and roadside conveyance swales, which were evaluated using BMPTrains. Exfiltration trenches were also proposed in the original Stormwater Report, however the placement of some do not meet FDOT Drainage Manual criteria and relocating them did not yield sufficient nutrient reduction to be deemed valuable to the HUC 12 compensatory approach; thus, they were removed from the water quality analysis. Whether or not the exfiltration trenches are still a viable solution to meet attenuation requirements will be addressed during the design phase of the project.

The nutrient reduction rate for baffle boxes was capped at 19.05% for TN and 15.5% for TP in accordance with Appendix O, reflecting performance thresholds for second-generation baffle boxes, irrespective of the original EcoVault summary tables. A supplemental BMP was implemented in Basin 3 to meet the minimum treatment efficiency within the HUC12. In Basin 3, a dry retention system was added on a triangular island situated between the I-95 mainline and an exit ramp. The added dry retention combined with the retention systems in the original Stormwater Report overall provide a significant nutrient reduction rate of 83%. In Basin 4, the BMPTrain consists of two dry retention BMPs (Retention 8 and Retention 9) and an offsite swale. The offsite swale is considered to run parallel to Retention 8; therefore, averaging the two BMP's nutrient reduction rates (resulting in 39% efficiency) allows them to then be in series with Retention 9 and

the EcoVault. As a conservative approach, the entire basin was considered as the catchment area for the swale. The true basin limits to the swale will need to be determined in the design phase.

The new retention facility in Basin 3, in conjunction with the originally proposed swales, EcoVaults, and dry retention areas, provides efficiency rates of 78% and 80% for TN and TP respectively for Royal Glades Canal Basin which meets requirements under the new stormwater Rule.

North Biscayne HUC 12 – Roadway Basin 5

Basin 5 extends from CR 954 to the end of the project near CR 858. It is situated within the North Biscayne Bay HUC 12 sub-watershed and lies within the Oleta River and Intracoastal Waterway C-9 East Drainage Basin (WBIDs 3226L and 3226G3). To achieve nutrient reduction requirements for discharges to an OFW, several additional dry retention BMPs were incorporated on top of those proposed in the original Stormwater report. These include multiple retention systems located within available infield areas between the I-95 mainline and adjacent ramps, as well as a larger retention facility sited within Ives Estates Park, located adjacent to the basin. The implementation of these supplemental BMPs is designed to enhance nutrient reduction, collectively achieving a compensatory nutrient reduction rate of 95% for both TN and TP. This meets the elevated nutrient reduction standards required for impaired basins discharging to an OFW.

Basin 5 is identified as being within the C-9 Canal watershed in the original Drainage Report. However, the documentation provided in the original Drainage Report to support that claim is merely an outdated basin map which is unclear where the basin boundaries truly are. Further evaluation suggests that the northern segment of Basin 5 drains towards the Oleta River not the C-9 Canal. To mitigate the possibility that the entire Basin 5 drains to the Oleta River, all of Basin 5 was considered to drain towards the Oleta River, which is impaired and an OFW, requiring the 95 percent nutrient reduction for TN and TP.

Other Alternatives Considered

Alternative 1 centers on a treatment train comprising of a combination of BMPs and maintenance-deprioritized practices like baffle boxes. This section explores the conceptual framework for incorporating additional BMPs that may trigger significant considerations. Including non-traditional compensatory treatment strategies, chemical treatment, septic to sewer conversion, and potential overlap with existing initiatives such as the WATERSS (Watershed Approach to Evaluate Regional Stormwater Solutions) program. Demonstrating the possible need to develop novel BMPs tailored to the unique challenges of projects, like the I-95 corridor. The implications of these approaches extend well beyond conventional design constraints, potentially reshaping project scope, regulatory compliance, and long-term operational feasibility.

In traditional PD&E studies where space constraints are less of a concern, ponds are typically sized and sited on adjacent available parcels to manage stormwater attenuation and treatment. However, for projects like this segment of the I-95 corridor, this approach presents significant challenges, including the potential for costly right-of-way acquisition, uncertain hydraulic feasibility, and the socioeconomic impacts of repurposing parcels that are currently occupied by homes and businesses. These factors highlight the need for more innovative solutions that minimize disruption while still meeting environmental objectives.

Off-site compensatory treatment per Section 9.7.2 of the A.H. Vol. 1 may be feasible at locations within the same HUC 12 sub-watershed. While these facilities would not directly treat runoff generated from I-95, they would be designed to treat stormwater from nearby roadway networks, achieving an equivalent level of nutrient reduction to that required by the I-95 widening. The underlying principle is that as long as the net

nutrient reduction within the HUC 12 sub-watershed remains consistent, the environmental benefit is preserved - even if the treatment occurs outside the immediate I-95 drainage footprint. This off-site compensatory treatment strategy introduces critical flexibility in stormwater treatment facilities. By allowing nutrient load reductions to occur elsewhere within the HUC 12 sub-watershed, designers are no longer constrained to locating BMPs immediately adjacent to or within the I-95 corridor - an area characterized by dense urban development and limited available space. This approach opens the possibility of utilizing more cost-effective or logistically feasible sites, such as publicly owned parcels, underutilized land, or areas with fewer right-of-way constraints, while still ensuring compliance with the nutrient reduction targets established under the new Rule. This holistic approach is likely to overlap with the WATERSS program as it encourages regional collaboration and innovative solutions at the watershed level, instead of individual roadway corridors. It should be noted however that off-site compensatory treatment has not been favorable in every district and would require further coordination with SFWMD, FDEP, municipalities, legal, and right-of-way teams. Another potential version of this could be a Regional System that treats both I-95 runoff and runoff from other off-site facilities. A system of BMPs within the HUC12 could benefit multiple partners, this corresponds with Section 373.413(6), F.S. for comingle benefits.

Stormwater harvesting as an alternative BMP could provide compensatory treatment within the Royal Glades Canal HUC 12 sub-watershed encompassing the majority of the roadway sub-basins. This approach involves capturing and storing stormwater in a designated pond, from which it will be pumped to the Presidential Estates golf course located along the I-95 corridor. The available irrigable surface area of the golf course was estimated using aerial imagery from Google Earth at 62.7 acres. The harvest volume was assumed to be equivalent to the effective storage volume of the adjacent pond (Retention Area 9), and a harvest rate of 1 inch per week was applied. Modeling results indicate that stormwater harvesting can achieve nutrient reduction rates of approximately 41% for both TN and TP in Basin 4, and contribute to the compensatory nutrient reduction of the Royal Glades Canal HUC 12 sub-watershed. When implemented as a compensatory treatment measure, this BMP has the potential to help enable the HUC 12 sub-watershed to meet the nutrient reduction requirements of the new Rule, particularly in highly urbanized areas such as Miami. Implementation of this strategy would necessitate regional coordination and formal agreements with private entities to address the feasibility and logistics of conveying stormwater runoff from FDOT corridors for use in golf course irrigation.

Chemical treatment through Alum injections is a feasible alternative for achieving significant nutrient reductions, primarily by enhancing flocculation processes. The nutrient reduction rate of alum treatment is highly dependent on the dosage concentration, with the potential to effectively reduce both TN and TP levels. However, Alum injections are beneficial where there is a large volume of water, more than that of a single project, therefore it would be more applicable at a regional HUC12 level. The key consideration for implementing alum-based treatment is the long-term operation, maintenance, and regulatory oversight of the flocculation basin infrastructure. As noted in consultations with the FDOT Central Office, this approach is considered viable, provided that regional agreements are established with local agencies willing to manage system maintenance and provide reasonable assurance. Currently, Appendix O does not include concentration-dependent nutrient reduction rates, limitations, or design guidance specific to alum injection systems. Such information would be valuable for infrastructure sizing and system optimization.

As part of a broader watershed-based management strategy, septic-to-sewer conversion offers a viable means of achieving measurable nutrient reductions. Septic-to-sewer conversion involves transitioning existing on-site septic systems to centralized sanitary sewer infrastructure, thereby eliminating soil-based nutrient treatment in favor of regional wastewater treatment. This process significantly reduces the discharge of dissolved nutrients, particularly TN, to the surrounding environment. The resulting nutrient load

reduction may be quantified and credited toward meeting nutrient reduction requirements for roadway projects, subject to verification and approval under applicable regulatory frameworks. However, TP may still need to be treated within the project unless the impairment is Orthophosphate. Coordination with FDEP DEAR and local municipalities will be necessary to determine the benefits of septic-to-sewer conversion for each project.

This segment of the I-95 corridor illustrates some unique challenges posed by the new stormwater rule, particularly for projects with downstream impaired water bodies also classified as OFWs, in heavily urbanized areas, and areas with virtually no available space for traditional BMPs, all while contending with a high groundwater table. Projects like this highlight the need for innovative BMP solutions tailored to dense urban environments. Advanced research and development of such BMP systems should be considered to align the Department's transportation goals with evolving environmental regulations.

Conclusion

In conclusion, meeting minimum nutrient reduction rates for the I-95 corridor widening necessitated the integration of HUC12 compensatory treatment to meet nutrient reduction requirements of the new Rule. The clearly defined limits of only impaired water bodies and OFW downstream of project basins within the HUC12 boundary was instrumental in determining the correct required nutrient reduction for each Basin. Additionally, Basin 2 would have been unable to meet the nutrient reduction criteria alone. Compensatory treatment within the HUC12 was absolutely necessary for the project to meet the nutrient reduction requirements. The analysis employs a comprehensive array of BMPs, including dry retention systems, and baffle boxes (EcoVaults) to meet the mandated nutrient reduction rate for TN and TP. This outcome underscores the rigorous nature of the new stormwater rule standards for projects like I-95, which demand significant nutrient reductions, particularly in urbanized areas with limited space for traditional stormwater management solutions. The results and alternatives presented herein highlight the critical need for innovative, flexible approaches and regional collaboration to effectively address the environmental challenges posed by such projects.

APPENDIX A

Nutrient Reduction Analysis

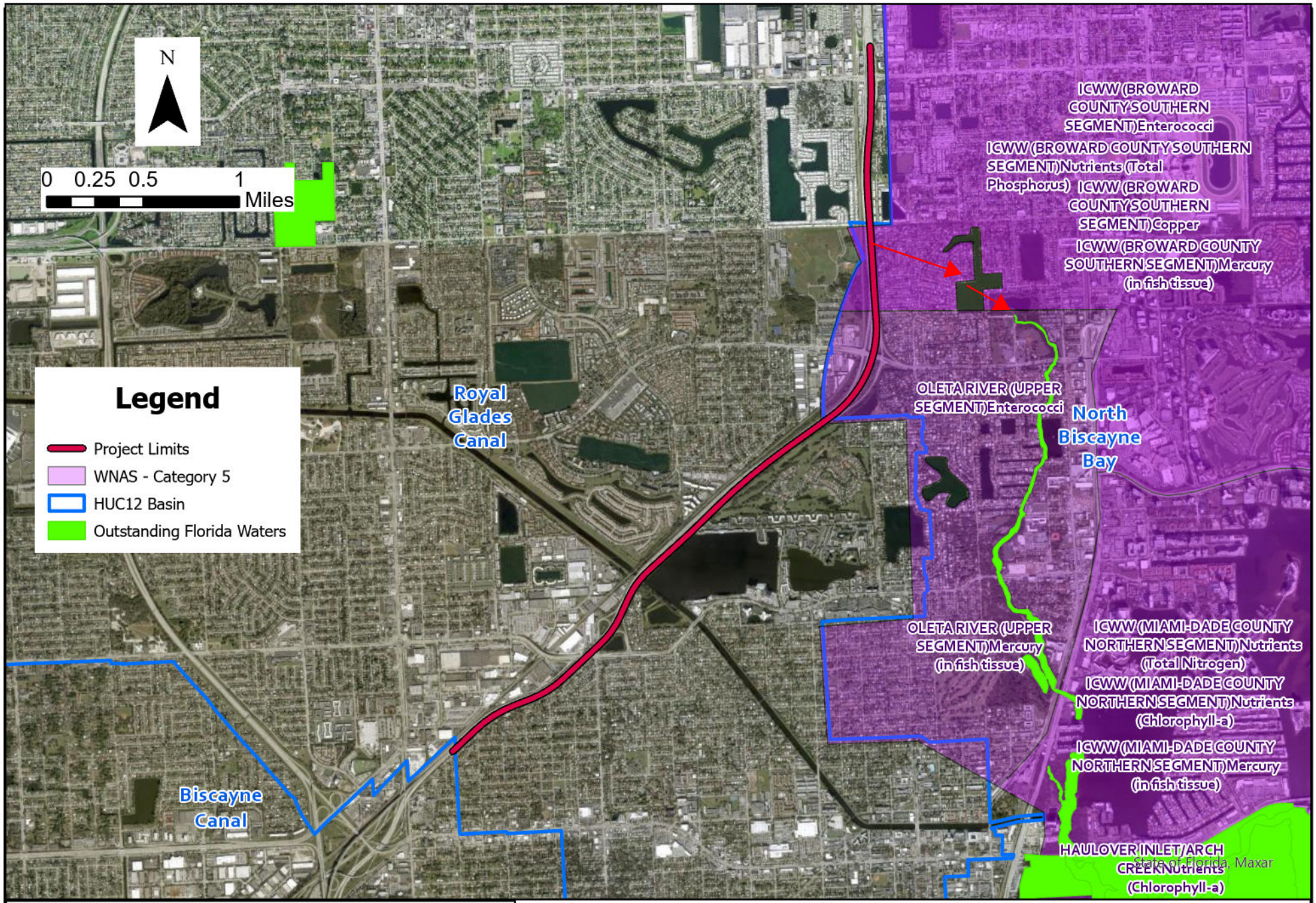
Performance Efficiency Rate Matrix

Stage Storage Table (Basin 5)

Exhibits: WNAs and HUC-12 Basins, Pond Sites (BMPs)

NUTRIENT REDUCTION ANALYSIS BY HUC 12

HUC 12	Total Nitrogen Loading			Total Phosphorus Loading		
	Pre (kg/yr)	Post (kg/yr)	Increase Loading	Pre (kg/yr)	Post (kg/yr)	Increase Loading
Biscayne Canal	86.561	93.112	7%	11.98	12.887	7%
Royal Glades Canal	647.654	784.565	17%	89.635	108.584	17%
North Biscayne Bay	225.07	270.25	17%	31.15	37.4	17%



\\kimley-horn.com\FL_ORL02\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95 - WNAS.aprx - 10/1/2025 3:39 PM - Mya.Cornish

Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

WNAS & HUC 12 BASINS

I-95 NEW RULE POND SITING ANALYSIS
MIAMI DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	October, 2025	Figure 1

IMPAIRMENT STATUS TABLE

Impairment Status of WBIDs For Scenario 1							
Basin	**HUC 12**		**WBID**	**WBID**	**Status**	**Impairment**	**Assessment Category**
1	30902061403	Biscayne Canal	3285	C-8/BISCAYNE CANAL	Not Impaired		
2,3,4	30902061402	Royal Glades Canal	3283	SNAKE CREEK CANAL (EAST)	Not Impaired		
5	30902061406	North Biscayne Bay	3226L	OLETA RIVER (UPPER SEGMENT)	Impaired + OFW		
			3226G3	ICWW (BROWARD COUNTY SOUTHERN SEGMENT)		Nutrients (Total Phosphorus)	5
			3226H1	ICWW (MIAMI-DADE COUNTY NORTHERN SEGMENT)		Nutrients (Total Nitrogen)	5

Impairment Status of WBIDs for Scenario 2							
Basin	**HUC 12**		**WBID**	**WBID**	**Status**	**Impairment**	**Assessment Category**
1	30902061403	Biscayne Canal	3285	C-8/BISCAYNE CANAL	Not Impaired		
2,3,4	30902061402	Royal Glades Canal	3283	SNAKE CREEK CANAL (EAST)	Not Impaired		
5	30902061406	North Biscayne Bay	3226L	OLETA RIVER (UPPER SEGMENT)	Impaired + OFW	Mercury, Bacteria	4a, 5
			3226G3	ICWW (BROWARD COUNTY SOUTHERN SEGMENT)		Mercury, Bacteria, Metals (Copper)	4a, 5
			3226H1	ICWW (MIAMI-DADE COUNTY NORTHERN SEGMENT)		Nutrients (Chlorophyll-A), Mercury (in fish tissue)	4a, 5

PERFORMANCE EFFICIENCY RATE MATRIX

Project: *I-95/State Road from South of SR 860/Miami Gardens Drive to North of Broward County Line*
FPID: *414964-1* *Location:* Miami-Dade County

Compensatory Nutrient Loading & BMP Efficiency Analysis Summary

Basin	Outfall (HUC 12)	Pre-Dev. Loading (kg/yr)		Post-Dev. Loading (kg/yr)		BMP Series Train Description	Annual Capture Efficiency Rate						Provided BMP Efficiency Rate	
							TN			TP				
		TN	TP	TN	TP		BMP1	BMP2	BMP3	BMP1	BMP2	BMP3	TN	TP
BASIN System 1	Biscayne Canal	**86.56**	**11.98**	**93.11**	**12.89**	Retention*	87%			87%			87%	87%
BASIN System 2	Royal Glades Canal	**48.34**	**6.69**	**63.70**	**8.82**	EcoVault[1]	19%			16%			19%	16%
BASIN System 3	Royal Glades Canal	**169.81**	**23.50**	**221.09**	**30.60**	Dry Retention + EcoVault[1]	83%	19%		83%	16%		86%	86%
BASIN System 4	Royal Glades Canal	**429.50**	**59.44**	**499.77**	**69.17**	Dry Retention + Swale/Rention 8[2] + EcoVault[1]	71%	39%	19%	71%	39%	16%	82%	85%
BASIN System 5	North Biscayne Bay	**225.07**	**31.15**	**270.25**	**37.40**	Dry Retention (PSR + new added)	96%			96%			96%	96%

1. EcoVault efficiency sourced from Appendix O - Second generation baffle box

2. The swale efficiency rate and dry retention 8 efficiency rate were averaged to model the two BMPs in parallel. The average was then put in series with the other BMPs.

* Retention System provided in ponds in Golden Glades Reconstruction Project

Required BMP Efficiency Rate Evaluation Summary

Development Type: Development
Ambient Water Quality Standard, Not Verified Impaired
TMDL/BMAP/RAP? No
Minimum BMP Efficiency: TN 55% TP 80% Biscayne Canal

Development Type: Development
Ambient Water Quality Standard, Not Verified Impaired
TMDL/BMAP/RAP? No
Minimum BMP Efficiency: TN 55% TP 80% Royal Glades Canal

Development Type: Development
Ambient Water Quality OFW + Impaired/TMDL/BMAP/RAP
TMDL/BMAP/RAP? No
Minimum BMP Efficiency: TN 95% TP 95% North Biscayne Bay

					Minimum Required Treatment Summary									Provided Treatment Summary						
Outfall (HUC 12)	Pre-Dev. Nutrient Loading (kg/yr)		Post-Dev. Nutrient Loading (kg/yr)		Development Loading Increase (kg/yr)		Post-Dev. BMP Load Allowable (kg/yr)		Reduction from Pre-Dev Condition		Required BMP Efficiency Rate			Post-Dev. BMP Nutrient Loading (kg/yr)			Provided BMP Efficiency Rate		Provided Pre-Development Reductions	
	TN	TP	TN	TP	TN	TP	TN	TP	TN	TP	TN	TP		TN	TP		TN	TP	TN	TP
Biscayne Canal	86.6	12.0	93.1	12.9	6.6	0.9	4.7	0.6	**7%**	**7%**	**55%**	**80%**		12.1	1.7		**87%**	**87%**	86%	86%
Royal Glades Canal	647.7	89.6	784.6	108.6	136.9	18.9	39.2	5.4	**17%**	**17%**	**55%**	**80%**		171.2	22.1		**78%**	**80%**	74%	75%
North Biscayne Bay	225.1	31.2	270.3	37.4	45.2	6.3	13.5	1.9	**17%**	**17%**	**95%**	**95%**		10.8	1.5		**96%**	**96%**	95%	95%



K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 10:54 AM - Cheyenne.Schumacher

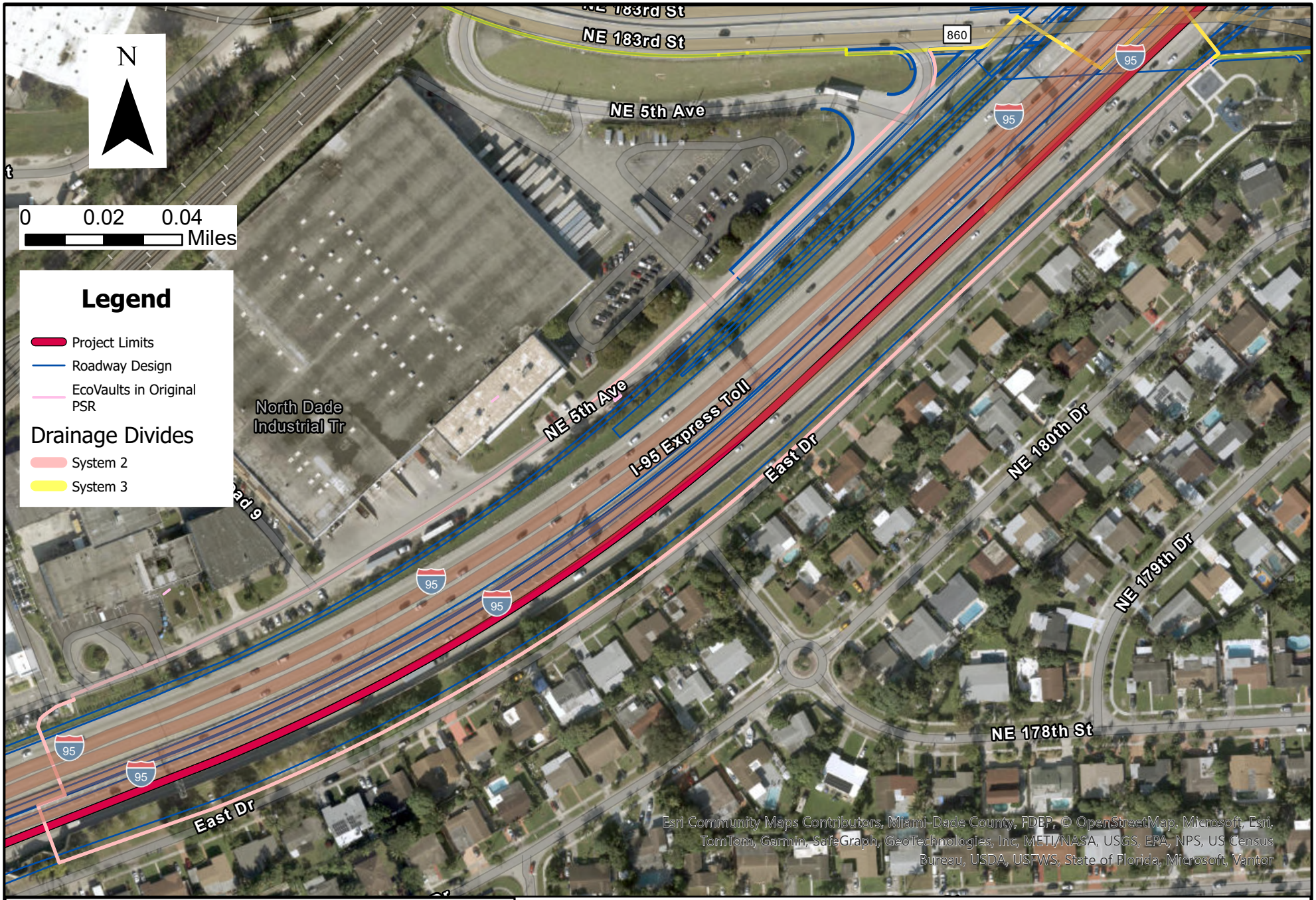
Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin 1

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 2



Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.

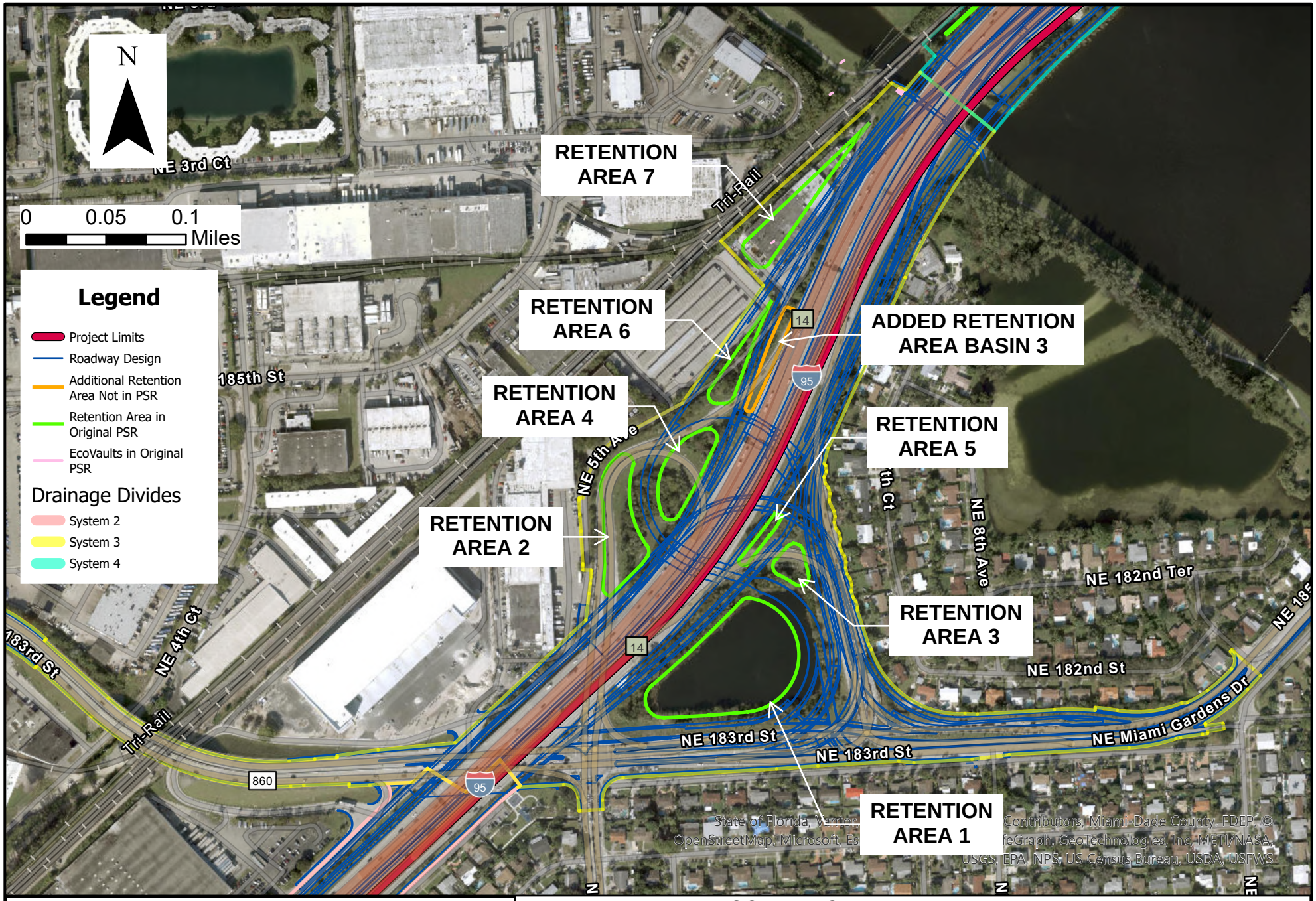
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin 2

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 3

K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 10:55 AM - Cheyenne.Schumacher



State of Florida, Vantor, ... Contributors, Miami-Dade County, FDEP, ©
OpenStreetMap, Microsoft, Es... feGraph, GeoTechnologies, Inc, METI/NASA,
USGS, EPA, NPS, US Census Bureau, USDA, USFWS

Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin 3 - Retention Areas

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 4

K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 12/22/2025 6:50 PM - Cheyenne.Schumacher



Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin 4 - Swales

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 5

K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 2:55 PM - Cheyenne.Schumacher



K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 2:55 PM - Cheyenne.Schumacher

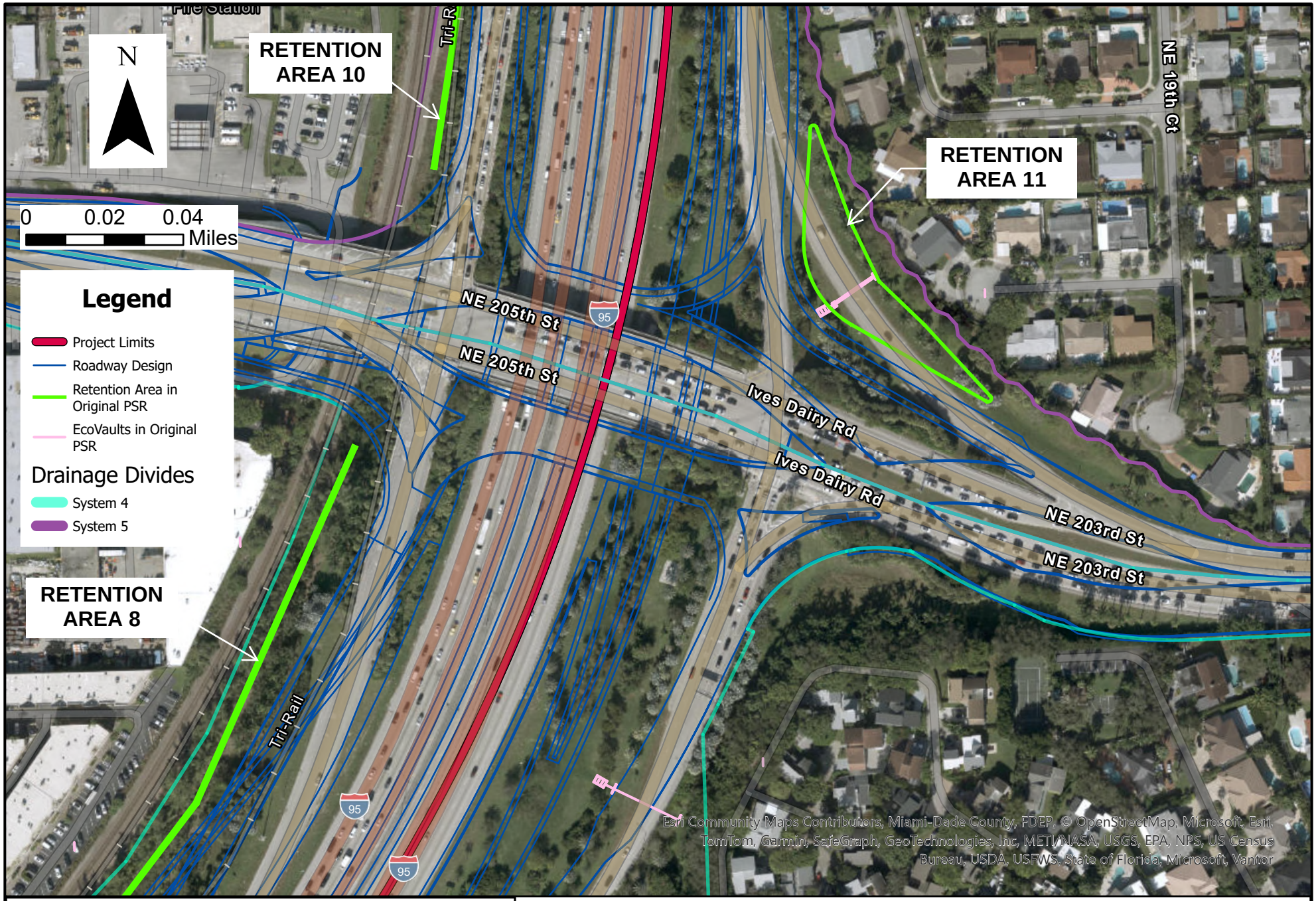
Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin4 - Swales and Dry Retention

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 6



K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 10:55 AM - Cheyenne.Schumacher

Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Intersection of Basin 4 & 5

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 7



Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.

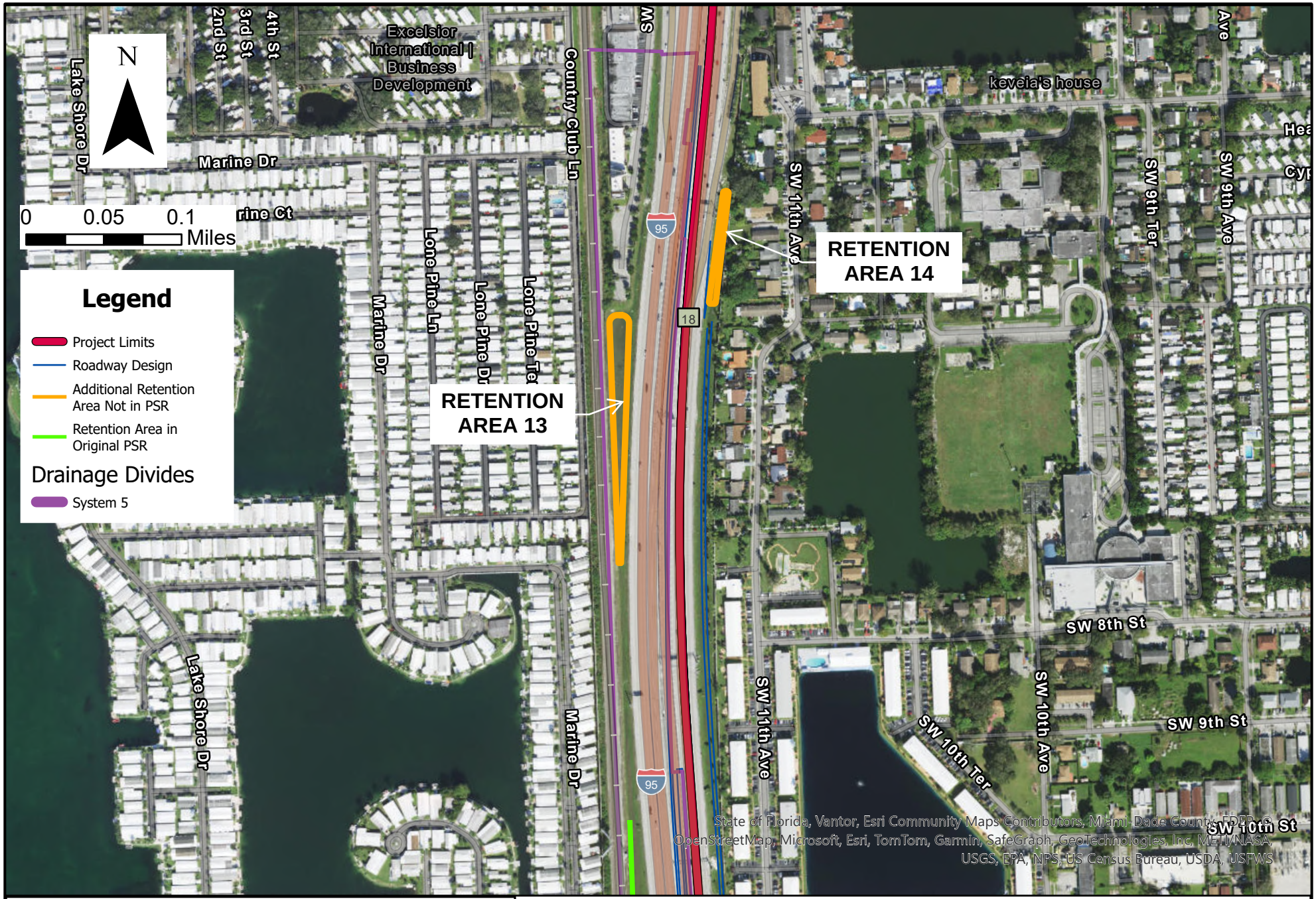
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin 5 - Retention Areas

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 8

K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 10:55 AM - Cheyenne.Schumacher



K:\ORL_Roadway\240000011_New Stormwater Rule Analysis\I-95 Pond Siting Report\GIS\I-95.aprx - 11/4/2025 10:55 AM - Cheyenne.Schumacher

Kimley»Horn

© 2025 Kimley-Horn and Associates, Inc.
200 S Orange Ave, Suite 600, Orlando, FL 32801
Phone: (407) 898-1511
www.kimley-horn.com CA 00000696

SCENARIO 1 - Basin 5 - Retention Areas 2

I-95 NEW RULE POND SITING ANALYSIS
MIAMI-DADE COUNTY, FLORIDA

Scale: As Noted	FPID: 414964-1-22-01	November, 2025	Figure 9

STAGE STORAGE TABLES FOR ADDED RETENTION AREAS IN ROADWAY BASIN 3

Proposed

Added Retention Area Basin 3			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	0.16	0.00	BMP Bottom
2.00	0.30	**0.46**	BMP Top

STAGE STORAGE TABLES FOR ROADWAY BASIN 5 RETENTION BMPS

Original PSR

Retention Area 10			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	0.03	0.00	BMP Bottom
1.00	0.03	**0.03**	BMP Top

Retention Area 11			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	0.65	0.00	BMP Bottom
1.00	0.65	**0.65**	BMP Top

Retention Area 12			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	0.29	0.00	BMP Bottom
1.00	0.29	**0.29**	BMP Top

Proposed

Prop. Retention Area 13			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	0.64	0.00	BMP Bottom
1.00	0.83	**0.74**	BMP Top

Prop. Retention Area 14			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	0.15	0.00	BMP Bottom
1.00	0.24	**0.20**	BMP Top

Prop. Retention Area 15			
Stage *ft-NAVD*	**Area** *acres*	**Volume** *ac-ft*	**Description**
0.00	6.26	0.00	BMP Bottom
1.00	6.47	**6.37**	
2.00	6.71	**12.96**	
3.00	6.94	**19.78**	BMP Top

APPENDIX B

BMPTrains Reports

System 1

Catchment Information

Analysis: Specified Removal Efficiency Required Removal N: 55% P: 80%

Catchment Name	System 1
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall (in)	58.50

Pre-Condition Landuse Information

Pre-Condition Landuse	User Defined Values
Pre Condition Area (acres)	16.09
Pre Rational Coefficient (0-1)	0.72
Pre Non DCIA Curve Number	61.00
Pre DCIA Percent (0-100)	87.70
Pre Nitrogen EMC (mg/l)	1.250
Pre Phosphorus EMC (mg/l)	0.173
Pre Runoff Volume (ac-ft/yr)	56.163
Pre Nitrogen Loading (kg/yr)	86.561
Pre Phosphorus Loading (kg/yr)	11.980

Post-Condition Landuse Information

Post-Condition Landuse	User Defined Values
Post Condition Area (acres)	16.09
Post Rational Coefficient (0-1)	0.77
Post Non DCIA Curve Number	61.00
Post DCIA Percent (0-100)	95.00
Post Nitrogen EMC (mg/l)	1.250
Post Phosphorus EMC (mg/l)	0.173
Post Runoff Volume (ac-ft/yr)	60.414
Post Nitrogen Loading (kg/yr)	93.112
Post Phosphorus Loading (kg/yr)	12.887

Retention Design

Retention Depth (in)	2.380
Retention Volume (ac-ft)	3.191

Watershed Characteristics

Catchment Area (acres)	16.09
Contributing Area (acres)	16.090

Non-DCIA Curve Number	61.00
DCIA Percent	95.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	87
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	87

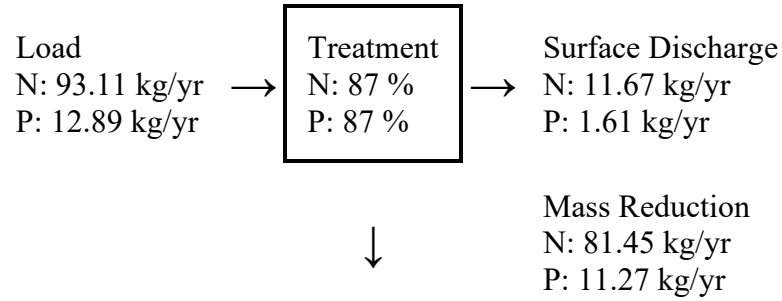
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	81.447
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	11.272
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



System 2

Project: I-95 Alt. 3 System 2

Date: 11/03/2025

Catchment Information

Analysis: Specified Removal Efficiency Required Removal N: 80% P: 80%

Catchment Name	System 2
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall (in)	58.50
Pre-Condition Landuse Information	
Pre-Condition Landuse	User Defined Values
Pre Condition Area (acres)	11.40
Pre Rational Coefficient (0-1)	0.56
Pre Non DCIA Curve Number	61.00
Pre DCIA Percent (0-100)	67.40
Pre Nitrogen EMC (mg/l)	1.250
Pre Phosphorus EMC (mg/l)	0.173
Pre Runoff Volume (ac-ft/yr)	31.363
Pre Nitrogen Loading (kg/yr)	48.339
Pre Phosphorus Loading (kg/yr)	6.690
Post-Condition Landuse Information	
Post-Condition Landuse	User Defined Values
Post Condition Area (acres)	11.40
Post Rational Coefficient (0-1)	0.74
Post Non DCIA Curve Number	61.00
Post DCIA Percent (0-100)	91.40
Post Nitrogen EMC (mg/l)	1.250
Post Phosphorus EMC (mg/l)	0.173
Post Runoff Volume (ac-ft/yr)	41.331
Post Nitrogen Loading (kg/yr)	63.702
Post Phosphorus Loading (kg/yr)	8.816

System 3

Project: I-95 Alt. 3 System 3

Catchment Information

Analysis: Specified Removal Efficiency Required Removal N: 55% P: 80%

Catchment Name	System 3
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall (in)	58.50
Pre-Condition Landuse Information	
Pre-Condition Landuse	User Defined Values
Pre Condition Area (acres)	48.55
Pre Rational Coefficient (0-1)	0.47
Pre Non DCIA Curve Number	61.00
Pre DCIA Percent (0-100)	54.20
Pre Nitrogen EMC (mg/l)	1.250
Pre Phosphorus EMC (mg/l)	0.173
Pre Runoff Volume (ac-ft/yr)	110.178
Pre Nitrogen Loading (kg/yr)	169.812
Pre Phosphorus Loading (kg/yr)	23.502
Post-Condition Landuse Information	
Post-Condition Landuse	User Defined Values
Post Condition Area (acres)	48.55
Post Rational Coefficient (0-1)	0.61
Post Non DCIA Curve Number	61.00
Post DCIA Percent (0-100)	73.00
Post Nitrogen EMC (mg/l)	1.250
Post Phosphorus EMC (mg/l)	0.173
Post Runoff Volume (ac-ft/yr)	143.448
Post Nitrogen Loading (kg/yr)	221.089
Post Phosphorus Loading (kg/yr)	30.599

Project: I-95 Alt. 3 System 3
Date: 11/3/2025

Retention Design

Retention Depth (in)	1.638
Retention Volume (ac-ft)	6.627

Watershed Characteristics

Catchment Area (acres)	48.55
Contributing Area (acres)	48.550
Non-DCIA Curve Number	61.00
DCIA Percent	73.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	83
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	83

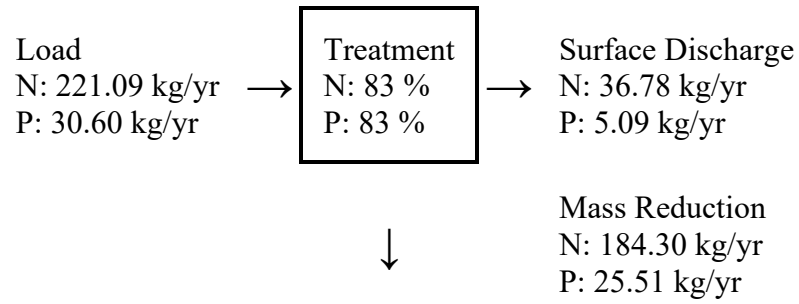
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	184.304
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	25.508
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



System 4

Project: I-95 Alt. 3 System 4

Catchment Information

Analysis: Specified Removal Efficiency Required Removal N: 55% P: 80%

Catchment Name	System 4
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall (in)	58.50
Pre-Condition Landuse Information	
Pre-Condition Landuse	User Defined Values
Pre Condition Area (acres)	106.24
Pre Rational Coefficient (0-1)	0.54
Pre Non DCIA Curve Number	61.00
Pre DCIA Percent (0-100)	63.90
Pre Nitrogen EMC (mg/l)	1.250
Pre Phosphorus EMC (mg/l)	0.173
Pre Runoff Volume (ac-ft/yr)	278.672
Pre Nitrogen Loading (kg/yr)	429.503
Pre Phosphorus Loading (kg/yr)	59.443
Post-Condition Landuse Information	
Post-Condition Landuse	User Defined Values
Post Condition Area (acres)	106.24
Post Rational Coefficient (0-1)	0.63
Post Non DCIA Curve Number	61.00
Post DCIA Percent (0-100)	75.70
Post Nitrogen EMC (mg/l)	1.250
Post Phosphorus EMC (mg/l)	0.173
Post Runoff Volume (ac-ft/yr)	324.266
Post Nitrogen Loading (kg/yr)	499.774
Post Phosphorus Loading (kg/yr)	69.169

Retention Design

Retention Depth (in)	1.048
Retention Volume (ac-ft)	9.276

Watershed Characteristics

Catchment Area (acres)	106.24

Contributing Area (acres)	106.240
Non-DCIA Curve Number	61.00
DCIA Percent	75.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	71
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	71

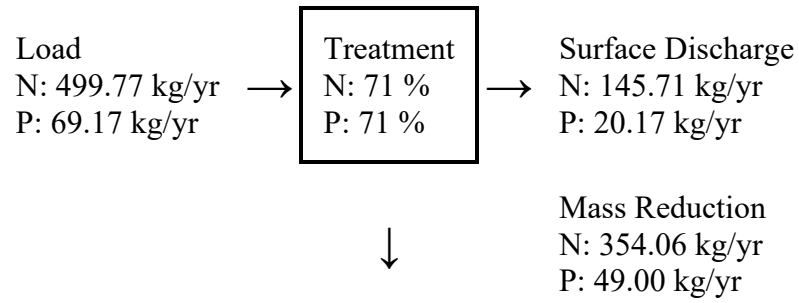
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	354.062
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	49.002
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



Retention Design

Retention Depth (in)	0.109
Retention Volume (ac-ft)	0.961

Watershed Characteristics

Catchment Area (acres)	106.24
Contributing Area (acres)	106.240
Non-DCIA Curve Number	61.00
DCIA Percent	75.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	13
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	13

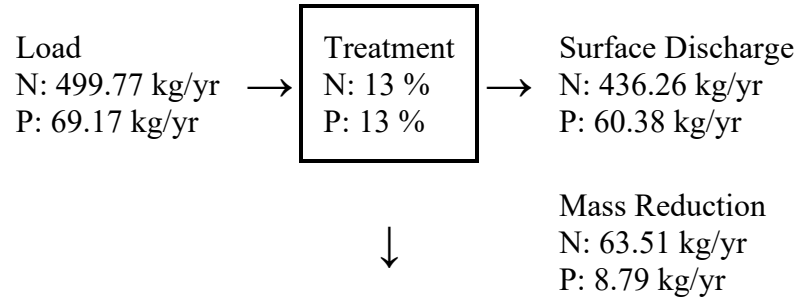
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	63.511
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	8.790
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



Swale Design

Swale Top Width for Flood Conditions - **W** (ft) 40.000

Swale Bottom Width - **B** (ft)	24.000
Swale Length - **L** (ft)	3,375.000
Average Impervious Length (ft)	3,375.000
Average Impervious Width (ft)	118.000
Average Pervious Width (ft)	40.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	2.500
Side Slope of Swale horizontal/vertical - **Z**	6.000
Average Height of Swale Block - **H**	1.000
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	12.242
Number of Swale Blocks	1

Watershed Characteristics

Catchment Area (acres)	106.24
Contributing Area (acres)	106.240
Non-DCIA Curve Number	61.00
DCIA Percent	75.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	64
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	64

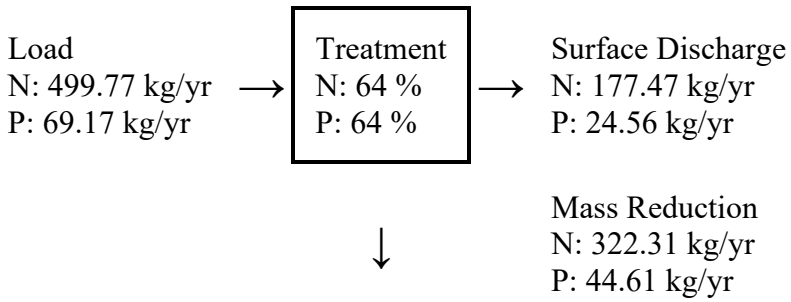
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	79.403
TN Mass Load (kg/yr)	322.307
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	44.607
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



System 5

Project: I-95 Alt. 3 System 5

Catchment Information

Analysis: Specified Removal Efficiency Required Removal N: 95% P: 95%

Catchment Name	System 5
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall (in)	58.50
Pre-Condition Landuse Information	
Pre-Condition Landuse	User Defined Values
Pre Condition Area (acres)	56.04
Pre Rational Coefficient (0-1)	0.53
Pre Non DCIA Curve Number	86.75
Pre DCIA Percent (0-100)	52.00
Pre Nitrogen EMC (mg/l)	1.250
Pre Phosphorus EMC (mg/l)	0.173
Pre Runoff Volume (ac-ft/yr)	146.031
Pre Nitrogen Loading (kg/yr)	225.070
Pre Phosphorus Loading (kg/yr)	31.150
Post-Condition Landuse Information	
Post-Condition Landuse	User Defined Values
Post Condition Area (acres)	61.67
Post Rational Coefficient (0-1)	0.58
Post Non DCIA Curve Number	61.00
Post DCIA Percent (0-100)	69.90
Post Nitrogen EMC (mg/l)	1.250
Post Phosphorus EMC (mg/l)	0.173
Post Runoff Volume (ac-ft/yr)	175.347
Post Nitrogen Loading (kg/yr)	270.254
Post Phosphorus Loading (kg/yr)	37.403

Retention Design

Retention Depth (in)	4.400
Retention Volume (ac-ft)	22.612

Watershed Characteristics

Catchment Area (acres)	61.67
Contributing Area (acres)	61.670
Non-DCIA Curve Number	61.00
DCIA Percent	69.90
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	95
Provided TN Treatment Efficiency (%)	96
Required TP Treatment Efficiency (%)	95
Provided TP Treatment Efficiency (%)	96

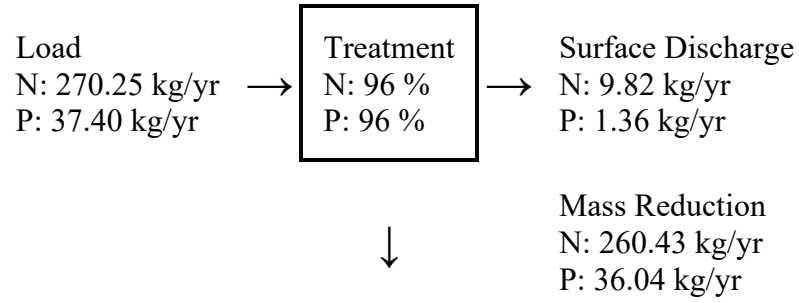
Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	260.432
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	36.044
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)



APPENDIX C

Original Stormwater Report



January 2025

PRELIMINARY STORMWATER MANAGEMENT REPORT

I-95/State Road (SR) 9 Project Development and Environment (PD&E) Study
From South of SR 860/Miami Gardens Drive to North of Broward County Line
Miami-Dade County, Florida

Financial Management Number: 414964-1-22-01
Federal Aid Project Number: N/A
Efficient Transportation Decision Making (ETDM): 14419

DISTRICT VI

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.

PRELIMINARY STORMWATER MANAGEMENT REPORT

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

FDOT Financial Project Identification Number: 414964-1-22-01
Efficient Transportation and Decision Making (ETDM) Number: 14419

Project Study Limits:
From South of SR 860/Miami Gardens Drive
to North of the Broward County Line
Miami-Dade County, Florida

Prepared for:

FDOT District Six
1000 NW 111th Avenue
Miami, Florida 33172

Prepared by:
AECOM Technical Services, Inc.
2 Alhambra Plaza, Suite 900
Coral Gables, FL 33134

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 FDOT pursuant to 23 U.S.C. § 327 and a Memorandum of Understanding dated May 26, 2022, and executed by FHWA and FDOT.

TABLE OF CONTENTS

PAGE

1. Introduction 1
   - Figure 1: Project Location Map 2
   - 1.1 Purpose and Scope 3
   - 1.2 Available Data 3
     - Table 1-1: Available documents and data 3
2. Project Alternatives 4
   - 2.1 No-Build Alternative 4
   - 2.2 Build Alternatives 4
3. Drainage System Improvements 6
   - 3.1 Description of Drainage Systems 6
     - Table 3-1: Build Alternative 1 – Drainage Summary 8
     - Table 3-2: Build Alternative 2 – Drainage Summary 9
     - Table 3-3: Build Alternative 3 – Drainage Summary 9
4. Design Criteria and Parameters 10
   - 4.1 Design High Water Elevation 10
   - 4.2 Stormwater Quantity Criteria 10
     - 4.2.1 Design Storms 10
       - Table 4-1: Design Storm Events 11
     - 4.2.2 Rainfall Depth 11
       - Table 4-2: Design Storm Events & Rainfall Depths 11
     - 4.2.3 Rainfall Distribution & Peak Factor 11
       - Table 4-3: Rainfall Distributions 12
     - 4.2.4 Spread 12
       - Table 4-4: FDOT Spread Criteria 12
   - 4.3 Stormwater Quality Criteria 12
   - 4.4 FEMA Floodplain Compensation 15
   - 4.5 FDEP Nutrient Loading 15
5. Adherence to Design Criteria and Project Limitations 16
6. Drainage Related Permits 16

APPENDIX A: No-Build Alternative Drainage Maps
APPENDIX B: Build Alternative #1 Drainage Maps
APPENDIX C: Build Alternative #2 Drainage Maps
APPENDIX D: Build Alternative #3 Drainage Maps
APPENDIX E: Water Quality Calculations
APPENDIX F: EcoVault
APPENDIX G: Geotechnical Test Data
APPENDIX H: Design Aids
APPENDIX I: FEMA FIRM Maps
APPENDIX J: Floodplain Compensation Calculations
APPENDIX K: Nutrient Loading Analysis
APPENDIX L: Existing ERP Permit From SFWMD
APPENDIX M: Relevant Portions of State Job No. 87270-3404

1 INTRODUCTION

This roadway project entails providing additional express and general-use lanes on I-95/SR 9 from south of SR 860/Miami Gardens Drive (MGD) to north of the Broward County Line and implementing interchange improvements at SR 860/Miami Gardens Drive and CR 854/Ives Dairy Road (IDR) within Miami-Dade County. The project study area is shown on the project location map (see **Figure 1**).

The improvements proposed as part of the project stem from the Refined Build Concept that was developed as part of the Interstate 95 Corridor Planning Study, conducted by the FDOT in May 2019, that assessed enhancements along the length of the I-95/SR 9 corridor within Miami-Dade County from US 1/SR 5 (Mile Post 0.000) to the Broward County Line. As such, this project is part of a larger effort to improve the I-95/SR 9 corridor within Miami-Dade County and regionally within Broward and Palm Beach Counties.

Within the project limits, I-95/SR 9 is classified as 'Urban Principal Arterial Interstate' and consists of six to eight general use lanes and two to four express lanes; the typical section varies throughout the project segment. This particular section of the corridor is located north of the Golden Glades Interchange (GGI) in northern Miami-Dade County and traverses five U.S. Census Designated Places, including North Miami Beach, Ojus, Ives Estates, Pembroke Park, and Hallandale Beach. It connects to SR 860/Miami Gardens Drive, an important east-west facility within northern Miami-Dade County.

It should be noted that the greater I-95/SR 9 corridor is part of Florida's Strategic Intermodal System (SIS) highway network and is a designated state hurricane evacuation route. In addition, I-95/SR 9 serves a critical role in facilitating the north-south movement of traffic in southeast Florida as one of two major expressways (Florida's Turnpike being the other) that connect the major employment centers and residential areas between Miami-Dade, Broward, and Palm Beach Counties. The corridor traverses dense urban areas with predominantly commercial and residential uses, including downtown Miami.

Overall, the project will offer enhanced mobility options for motorists and transit users as it will provide additional capacity along the I-95/SR 9 corridor throughout northern Miami-Dade County. Consistent with the existing managed lanes system on I-95/SR 9, the additional express lanes are anticipated to operate using variable toll pricing based on congestion to optimize traffic flow.

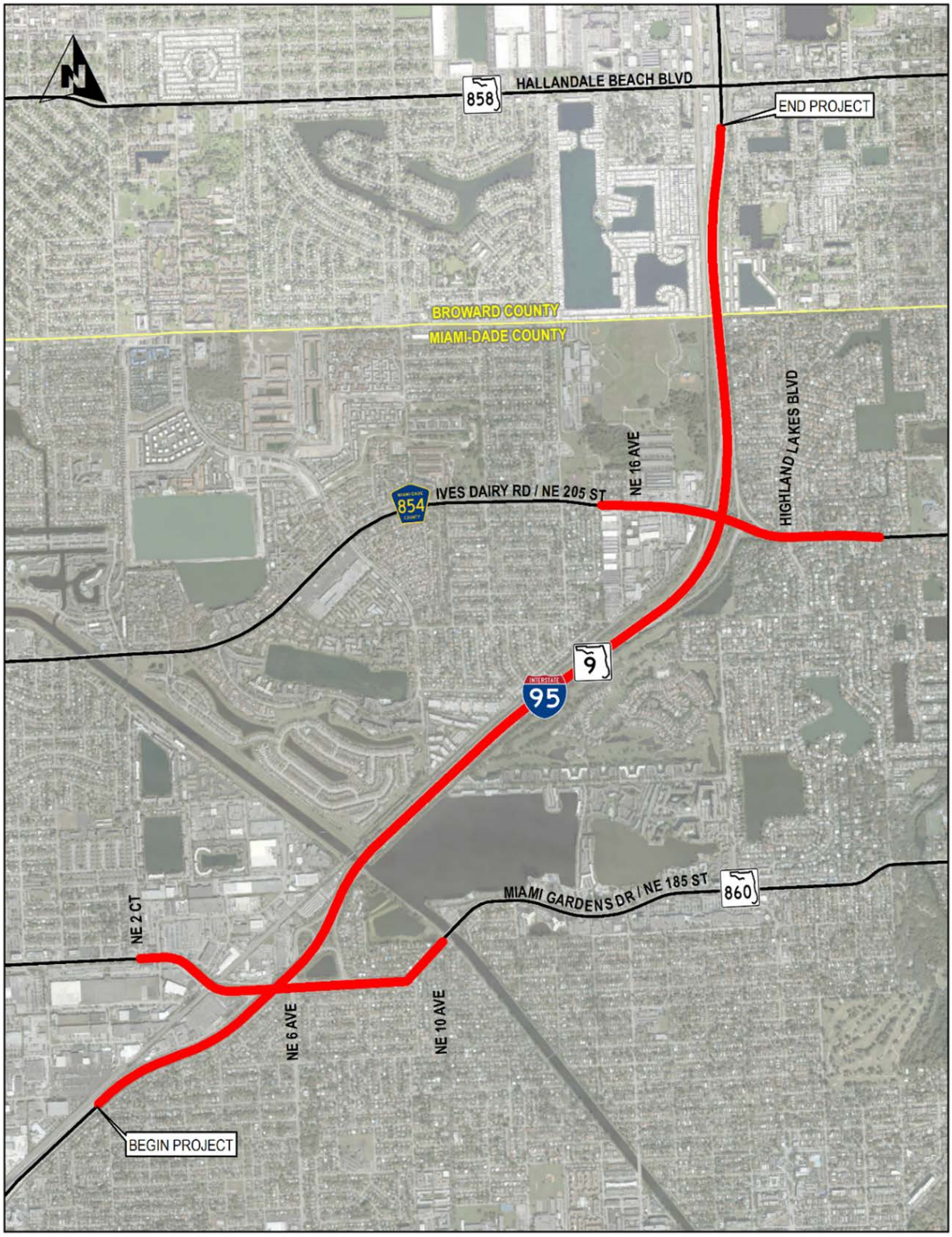


Figure 1: Project Location Map

1.1 Purpose and Scope

The following supports the Purpose and Need for this study, which was screened through the FDOT projects ETDM Programming tool:

- Address the deficient operational capacity and relieve existing/future congestion along the I-95/SR 9 corridor
- Preserve the operational integrity and regional functionality of I-95/SR 9 (and, therefore, the regional transportation network) by complementing similar corridor improvements throughout Miami-Dade, Broward, and Palm Beach Counties
- Enhance emergency evacuation and response times

1.2 Available Data

Table 1-1 lists the key available documents and data which were used to support this report's analysis.

Table 1-1: Available Documents and Data

Document	Date	Source/By
Financial Project ID 422796-1-52-01 and 422796-2-52-01	2011	Metric Engineering
Topographic Survey	---	FDOT

This data was made available by FDOT District 6.

2 Project Alternatives

2.1 No-Build Alternative

The No-Build Alternative proposes to keep the existing corridor into the future without other improvements, except for routine maintenance. Planned and approved adjacent projects in the area (both to the south at the Golden Glades Interchange and to the north in Broward County) are considered, without any proposed changes within the limits of this project. No traffic capacity, operation, safety, mobility, or evacuation improvements would be implemented to the I-95 mainline, the Express Lanes, or the two arterials within the study area. The effect of the No-Build Alternative includes the continuation of existing delays and congested traffic conditions. Also, since travel demand and truck traffic are projected to increase over the next 20 years, given the continued growth expected in this area of Miami-Dade County, under this alternative, congestion and delay will worsen; levels of service on the arterials will deteriorate; and no related environmental impacts, such as traffic noise levels, will be addressed. The No-Build Alternative will not require any acquisition of right-of-way and it will not impact any parks or trail access. This alternative is considered to be a viable alternative to serve as a baseline comparison against the proposed Build Alternatives (See Appendix A for the No-Build Alternative Drainage Maps).

2.2 Build Alternatives

Build Alternative #1 will provide two express lanes throughout the entire corridor; will add one additional general use lane in each direction; will reconfigure the SR 860/Miami Gardens Drive interchange; will provide a Diverging Diamond Interchange configuration at CR 854/Ives Dairy Road; will maintain at-grade access to I-95 from SR 860/Miami Gardens Drive; will add bicycle lanes and sidewalks along SR 860/Miami Gardens Drive; and will add an eastbound through lane, bicycle lanes, and one sidewalk along CR 854/Ives Dairy Road (see Appendix B for the Build Alternative #1 Drainage Maps).

Build Alternative #2 will provide two express lanes throughout the entire corridor; will add one additional general use lane in each direction; will introduce braided ramp bridge access for the express lanes; will reconfigure the SR 860/Miami Gardens Drive interchange, including the addition of second level bridges; will provide a Single Point Urban Interchange configuration at CR 854/Ives Dairy Road; will provide grade-separated bridge access to I-95 from SR 860/Miami Gardens Drive; will add bicycle lanes and sidewalks along SR 860/Miami Gardens Drive; and will add an eastbound through lane, bicycle lanes, and two sidewalks along CR 854/Ives Dairy Road (see Appendix C for the Build Alternative #2 Drainage Maps).

Build Alternative #3 will provide two express lanes throughout the entire corridor; will add one additional general use lane in each direction; will introduce braided ramp bridge access for the express lanes; will reconfigure the SR 860/Miami Gardens Drive interchange; will provide a

Diverging Diamond Interchange configuration at CR 854/Ives Dairy Road; will provide grade-separated bridge access to I-95 from SR 860/Miami Gardens Drive; will add bicycle lanes and sidewalks along SR 860/Miami Gardens Drive; and will add an eastbound through lane, bicycle lanes, and one sidewalk along CR 854/Ives Dairy Road (see Appendix D for the Build Alternative #3 Drainage Maps).

3 DRAINAGE SYSTEM IMPROVEMENTS

The project is mostly located in unincorporated Miami-Dade County with smaller portions located in the City of North Miami Beach, City of Hallandale Beach, and the Town of Pembroke Park, the latter two of which are municipalities within Broward County. The project is also within the jurisdictional boundary of the South Florida Water Management District (SFWMD) and Miami-Dade County Department of Regulatory and Economic Resources (DRER), and Broward County Environmental Protection and Growth Management Department (EPGMD).

SFWMD and DRER have established several criteria for water quality, depending on the proposed type of stormwater treatment facility. Existing facilities provide water quality treatment and attenuation of roadway runoff via dry and wet detention/retention ponds. All proposed stormwater management facilities will provide the necessary water quality treatment volume and limit the post-development peak discharge rate into the Biscayne Canal (C-8), Snake Creek Canal (C-9), the Oleta River, and the Intracoastal Waterway to the pre-development peak discharge rate. Water quality treatment and discharge attenuation will be provided via existing and proposed dry and wet detention/retention ponds, French Drains, and EcoVault Structures - or approved equal (see Appendix F). EcoVault Structures - or approved equal are required to supplement the provided water quality treatment due to the limited right-of-way within the project limits available for retention areas, and any areas of poor soil infiltration rates for any proposed French drains. Also, French drains will not be permitted to be located within areas of known contamination as per the CSER. It must be noted that a Water Use Permit will be required from the SFWMD for dewatering activities that will be necessary for the construction of the EcoVault structures (or approved equal).

Based on the conceptual drainage design evaluation for the proposed improvements, the stormwater management facilities (including swales, detention/retention areas and ponds, French drains, and EcoVault Structures - or approved equal) will meet FDOT drainage criteria as well as SFWMD permit criteria (see Appendix E). The improvements will have no negative drainage impacts to the surrounding areas and the proposed stormwater management facilities will have the capacity to adequately treat and attenuate roadway runoff within the project limits. Therefore, water quality impacts to downstream receiving waters are not anticipated to occur.

3.1 Description of Drainage Systems

System 1 – I-95/SR 9 From the Begin Project to Approx. 200’ South of Miami Gardens Dr.

Stormwater runoff will be directed towards the south via a closed storm sewer network and into the Golden Glades Interchange drainage systems, which are currently being proposed for improvement and are to be constructed prior to this subject project. The Golden Glades Interchange drainage systems will consist of interconnected dry retention ponds and French drains, with an emergency overflow into the SFWMD Biscayne Canal (C-8). All water quality and pre-post attenuation criteria requirements are being designed into the Golden Glades

Interchange drainage systems, and will be provided entirely within the interconnected dry retention ponds and French drains within the interchange itself. This drainage system is located within the SFWMD C-8 Drainage Basin (see Appendix H). This drainage concept will be the same for Build Alternatives 1, 2, and 3, with the only differences being the total length of French drains and the number and locations of retention ponds (refer to Tables 3-1, 3-2, and 3-3 below).

System 2 – I-95/SR9 From Approx. 200' South of Miami Gardens Dr. to Miami Gardens Dr.

Stormwater runoff from this drainage system will be routed into a series of proposed French drains and EcoVault Structures - or approved equal for both water quality and pre-post attenuation. The proposed French drain and EcoVault Structures – or approved equal will be designed to be able to handle 100% of the stormwater runoff with no emergency overflow provided. There is no physical room with the right-of-way for any wet or dry retention ponds or swales and as such, French drains are the only viable method for disposal of the stormwater runoff. This drainage system is located within the SFWMD C-9 East Drainage Basin (see Appendix H). This drainage concept will be the same for Build Alternatives 1, 2, and 3, with the only differences being the total length of French drains and the number and locations of retention ponds (refer to Tables 3-1, 3-2, and 3-3 below).

System 3 – I-95/SR9 From Miami Gardens Dr. to Snake Creek Canal (C-9)

Stormwater runoff will be directed towards the infield areas within the I-95/Miami Gardens Drive Interchange, which will act as dry retention ponds and be able to provide for the required water quality and pre-post attenuation prior to discharge through an EcoVault Structure – or approved equal and over an emergency overflow weir into the SFWMD Snake Creek Canal (C-9). In addition, the capacity of the interchange infield areas will be increased through the use of proposed French drains in spot areas in order to ensure that all of the water quality and pre-post attenuation criteria are adhered to. This drainage system is located within the SFWMD C-9 East Drainage Basin (see Appendix H). This drainage concept will be the same for Build Alternatives 1, 2, and 3, with the only differences being the total length of French drains and the number and locations of retention ponds (refer to Tables 3-1, 3-2, and 3-3 below).

System 4 – I-95/SR9 From Snake Creek Canal (C-9) to Ives Dairy Rd.

Stormwater runoff will be routed into roadside swales and dry retention interchange infield areas within the Ives Dairy Road Interchange for water quality and stormwater attenuation treatment. The capacity of these roadside swales and interchange infield areas will need to be supplemented by proposed French drain and EcoVault Structures – or approved equal in order to be able to meet the applicable water quality and attenuation criteria. An emergency outfall into the existing lake located in the southeast quadrant of the I-95/Ives Dairy Road Interchange will be provided for disposition of the excess stormwater runoff. This drainage system is located within the SFWMD C-9 East Drainage Basin (see Appendix H). This drainage concept will be the same for Build Alternatives 1, 2, and 3, with the only differences being the total length of French drains and the number and locations of retention ponds (refer to Tables 3-1, 3-2, and 3-3 below). It must be noted that in the pre-development conditions, offsite areas adjacent to and

located along the east side of I-95 drain towards I-95, and are routed towards the south (towards the C-9 Canal) and towards the north (towards the existing lake in the southeast quadrant of the I-95/Ives Dairy Road Interchange) via an existing roadside ditch. The proposed widening of I-95, in particular for Alternative 2 and 3, will encroach upon and eliminate this existing roadside ditch. As a result, additional right-of-way will need to be acquired in order to replace this ditch and be able to maintain these existing flow patterns. This additional required right-of-way is shown on the Drainage Maps included in Appendices C and D of this report.

System 5 – I-95/SR9 From Ives Dairy Rd. to the End Project

Stormwater runoff will be routed directly onto swales adjacent to I-95 which will act as dry retention areas for the treatment of water quality and pre-post attenuation. In addition, due to limited right-of-way, proposed French drain and EcoVault Structures – or approved equal will be added in order to supplement the capacity of the roadside swales and be able to meet all water quality and pre-post attenuation requirements. No emergency outfall will be provided for this drainage system. This drainage system is located within the SFWMD C-9 East Drainage Basin (see Appendix H). This drainage concept will be the same for Build Alternatives 1, 2, and 3, with the only differences being the total length of French drains and the number and locations of retention ponds (refer to Tables 3-1, 3-2, and 3-3 below).

TABLE 3-1
BUILD ALTERNATIVE 1 - DRAINAGE SUMMARY

DRAINAGE SYSTEM	TOTAL DRAINAGE AREA (ACRES)	IMPERVIOUS DRAINAGE AREA (ACRES)	PERVIOUS DRAINAGE AREA (ACRES)	REQUIRED WQ VOLUME (AC-FT)	WQ PROVIDED BY PONDS (AC-FT)	TOTAL LENGTH OF FRENCH DRAIN (FT.)	WQ PROVIDED BY FD (AC-FT)	ECOVAULT STRUCTURES REQUIRED?
1	15.977	14.918	1.059	3.1079	3.1080	0	0.0000	N/A (1)
2	10.490	9.935	0.555	2.0698	0.0000	792	0.3021	YES
3	26.824	18.546	8.278	3.8638	7.3750	515	0.1964	YES
4	91.622	57.483	34.139	11.9756	12.8260	1858	0.7086	YES
5	61.136	36.653	24.483	7.6360	6.5090	551	0.2101	YES

(1) BMP's will be designed and constructed by others as part of the Golden Glades Reconstruction Project.

TABLE 3-2

BUILD ALTERNATIVE 2 - DRAINAGE SUMMARY

DRAINAGE SYSTEM	TOTAL DRAINAGE AREA (ACRES)	IMPERVIOUS DRAINAGE AREA (ACRES)	PERVIOUS DRAINAGE AREA (ACRES)	REQUIRED WQ VOLUME (AC-FT)	WQ PROVIDED BY PONDS (AC-FT)	TOTAL LENGTH OF FRENCH DRAIN (FT.)	WQ PROVIDED BY FD (AC-FT)	ECOVAULT STRUCTURES REQUIRED?
1	16.075	15.281	0.794	3.1835	3.1840	0	0.0000	N/A (1)
2	10.858	9.823	1.035	2.0465	0.0000	899	0.3429	YES
3	44.327	32.401	11.926	6.7502	5.7550	788	0.3005	YES
4	93.121	71.802	21.319	14.9588	1.9650	1097	0.4184	YES
5	60.636	43.023	17.613	8.9631	3.1460	1096	0.4180	YES

(1) BMP's will be designed and constructed by others as part of the Golden Glades Reconstruction Project.

TABLE 3-3

BUILD ALTERNATIVE 3 - DRAINAGE SUMMARY

DRAINAGE SYSTEM	TOTAL DRAINAGE AREA (ACRES)	IMPERVIOUS DRAINAGE AREA (ACRES)	PERVIOUS DRAINAGE AREA (ACRES)	REQUIRED WQ VOLUME (AC-FT)	WQ PROVIDED BY PONDS (AC-FT)	TOTAL LENGTH OF FRENCH DRAIN (FT.)	WQ PROVIDED BY FD (AC-FT)	ECOVAULT STRUCTURES REQUIRED?
1	16.087	15.344	0.743	3.1967	3.1970	0	0.0000	N/A (1)
2	11.403	10.421	0.982	2.1710	0.0000	1130	0.4310	YES
3	48.545	35.420	13.125	7.3792	6.1650	788	0.3005	YES
4	106.243	80.444	25.799	16.7592	10.2370	1667	0.6358	YES
5	61.669	43.131	18.538	8.9856	0.9700	3093	1.1797	YES

(1) BMP's will be designed and constructed by others as part of the Golden Glades Reconstruction Project.

4 DESIGN CRITERIA AND PARAMETERS

This section outlines the FDOT District 6, South Florida Water Management District (SFWMD), and Miami-Dade County Department of Regulatory and Economic Resources (DRER) stormwater quantity and quality criteria applicable to the proposed drainage systems. The criteria and parameters outlined in this section are derived from the applicable published regulations, permit design manuals, and design standards.

4.1 Design High Water Elevation

The design high water elevation for most projects within Miami-Dade County is typically derived from the Public Works Department Design Standard W.C. 2.2, which is determined from the average October groundwater level data available from 1960 to 1975. Design Standard W.C. 2.2 shows the wet season groundwater elevation within the 2.5 ft-NGVD (0.92 ft-NAVD) elevation contour (see Appendix H). This project is considered to be located within an inland area. As a result, the Design High Water Elevation is not tidally influenced.

4.2 Stormwater Quantity Criteria

The stormwater quantity criteria are to be based on the most stringent requirement between the FDOT, SFWMD, and DRER criteria. The FDOT Drainage Manual and applicable Design Handbooks' requirements, which are typically more stringent than the DRER's criteria outlined in the Policy for Design of Drainage Structures in Miami-Dade County (December 1980), are to be implemented where applicable. The FDOT District 6 has also implemented more stringent requirements than outlined in the Drainage Manual because of the unique hydrologic, hydrogeologic, and drainage conditions present in Miami-Dade County. These requirements are documented in the ICPR Applications Manual.

4.2.1 Design Storms

The FDOT Drainage Manual requires that drainage systems for those other than interstate facilities be designed for a 3-year frequency design storm. However, FDOT District 6 has implemented a local policy to design all non-interstate facilities for a 10-year critical design storm. Therefore, the drainage systems for the proposed improvements are to be designed for a 10-year frequency design storm of critical duration.

FDOT also requires that proposed drainage systems meet the offsite discharge requirements outlined in Chapter 14-86 Florida Administrative Code (FAC). The offsite discharge criteria outlined in Chapter 14-86 is based on a critical storm frequency analysis including storm events with 2 to 100 year frequency, and 1-hour to 10-day duration. In order to streamline the analysis, FDOT District 6 has limited the analysis to a total of seven design storm events, which have been proven to be the critical storms in designing drainage systems in South Florida. FDOT District 6 prefers that peak stages during the 10-year event of critical duration not exceed the lowest grate elevation within a given basin. The design storm events listed in Table 4-1 are to be used in the proposed drainage system analysis and design for the proposed improvements.

Per SFWMD requirements, the 25 year – 72 hour rainfall event must also be examined to analyze the post-development discharge rate for this project.

Table 4-1: Design Storm Events

Design Storm Event
10 year - 1 hour
10 year - 8 hour
10 year - 24 hour
25 year - 72 hour
100 year - 1 hour
100 year - 8 hour
100 year - 24 hour

4.2.2 Rainfall Depth

The rainfall depth is the total amount of precipitation over the duration of a rainfall or design storm event. The rainfall depths for the 10 and 100 year design storm events included in Table 4-2 are based on the Zone 10 rainfall intensity-duration-frequency curves included in the FDOT Drainage Manual. The 25 year – 72 hour rainfall depth is based on the depth published in the SFWMD Applicants Handbook Volume II. Table 4-2 details the storm events and their respective rainfall.

Table 4-2: Design Storm Events & Rainfall Depths

Design Storm Event	Rainfall Depth (inches)
10 year - 1 hour	3.55
10 year - 8 hour	6.80
10 year - 24 hour	8.88
25 year - 72 hour	13.00
100 year - 1 hour	5.10
100 year - 8 hour	9.60
100 year - 24 hour	13.44

4.2.3 Rainfall Distribution & Peak Factor

The design event rainfall distribution defines how the rainfall depth is distributed throughout the storm event. The distributions to be used in the analysis of the drainage systems, which are also indicated in the FDOT District 6 ICPR Applications Manual, are shown in Table 4-3.

Table 4-3: Rainfall Distributions

Design Storm Event	Rainfall Distribution
10 year - 1 hour	FDOT 1-hour
10 year - 8 hour	FDOT 8-hour
10 year - 24 hour	FDOT 24-hour
25 year - 72 hour	SFWMD 72-hour
100 year - 1 hour	FDOT 1-hour
100 year - 8 hour	FDOT 8-hour
100 year - 24 hour	FDOT 24-hour

A unit hydrograph is a normalized storm hydrograph for one-inch of rainfall excess distributed uniformly over the watershed at a constant rate during a specific design period. The peak rate factor (K) is used to reflect the effect of storage on hydrograph shape. For the location of the study area, a unit hydrograph with a peak rate factor of 256 is to be used as recommended in the SFWMD Applicants Handbook, Volume II.

4.2.4 Spread

Table 4-4: FDOT Spread Criteria

The spread resulting from a rainfall intensity of 4.0 inches per hour shall be limited as follows:		
Typical Section Condition	Design Speed (mph)	Spread Criteria*
Parking Lane or Full Width Shoulders	All	No Encroachment
All Other	Design Speed <= 45	Keep 1/2 of lane clear
	45 < Design Speed <= 55	Keep 8' of lane clear
	Design Speed > 55	No encroachment
*The criteria in this column applies to travel, turn, or auxiliary lanes adjacent to barrier wall or curb, in normal or super elevated sections.		

The spread, or ponded width, of runoff at an inlet location is a geometric function of the cross sectional geometry, the longitudinal pavement/gutter slope, and the total runoff of the contributing basin(s).

4.3 Stormwater Quality Criteria

The design high water elevation for most projects within Miami-Dade County is typically derived from the Public Works Department Design Standard W.C. 2.2, which is determined from the average October groundwater level data available from 1960 to 1975. Design Standard W.C.

2.2 shows the wet season groundwater elevation within the 2.5 ft-NGVD (0.92 ft-NAVD) elevation contour.

The SFWMD requires that all projects meet state water quality standards, as set forth in Chapter 17-302, Florida Administrative Code (FAC). To assure that these criteria are met, the Project must meet the following volumetric retention/detention requirements, as describe in the SFWMD Permit Volume IV:

1. For wet detention systems, the first inch of runoff from the project or the total runoff from 2.5 inches times the percent impervious, whichever is greater, must be detained on-site. A wet detention system is a system that maintains the control elevation below one foot from the seasonal high groundwater elevation and does not bleed-down more than one-half inch of detention volume in 24 hours.

2. Dry detention systems must only provide 75 percent of the required wet detention volume. Dry detention systems must maintain the control elevation at least one foot above the seasonal high groundwater elevation.

3. Retention systems must only provide 50 percent of the wet detention volume.

4. For projects with more than 50 percent of imperviousness, discharge to the receiving water bodies must be made through baffles, skimmers, or other mechanisms suitable of preventing oil and grease from discharging to / or from the retention / detention areas.

DRER also requires that all projects meet the state water quality standards. To assure that this criteria is met, 100 percent of the first inch of runoff must be retained on-site. The volume is equivalent to retaining one inch of runoff from the furthest hydrologic point in the project. The methodology for estimating this volume is outlined in DRER's Policy for Design of Drainage Structures as follows:

$$V = 60\ C\ i\ A\ T_t$$

Where:

V = Required stormwater quality volume [cubic feet]
C = Runoff coefficient [dimensionless]
i = Storm intensity [inches per hour]
A = Total tributary area [acres]
T_t = Duration of storm whose runoff is polluted and contaminated [minutes]
$= T_{1"} + T_c$

Where:

$$T_{1"} = \frac{2940\ F^{-0.11}}{308.5\ C - 60.5\ (0.5895 + F^{-0.67})}$$

Where:

F = Storm frequency [years]
C = Runoff coefficient

T_c = Time of concentration [minutes]

i = Storm intensity [inches per hour]

$$i = \frac{308.5}{48.6\ F^{-0.11} + T_t\ (0.5895 + F^{-0.67})}$$

Where:

F = Storm frequency [years]

T_t = Duration of storm whose runoff is polluted and contaminated [minutes]

For the subject project, DRER requires that the one-inch of runoff be retained for a rainfall event with a 10-year frequency.

For the proposed drainage design, the more stringent criteria of either the SFWMD or Miami-Dade County DRER will be used.

4.4 FEMA Floodplain Compensation

The Federal Emergency Management Agency (FEMA) has produced Flood Insurance Rate Maps (FIRM) showing the locations of floodplains throughout the United States. A copy of the FIRM for the project areas are included in Appendix I of this report. In order to ensure that proposed developments do not adversely affect the flood levels of adjacent properties, it is required to compensate for any reduction in the storage capacity of the Base Floodplain (100 year floodplain) with an equivalent amount of storage elsewhere within the same floodplain.

The project lies within FEMA 100-year floodplain, within Zones AE, AH, and X with base flood elevations. Given the significant increase in storage within the corridor for stormwater management, there is no anticipated adverse floodplain impacts associated with this project. The modifications to the drainage systems due to this project are not anticipated to result in a significant change in capacity to carry floodwater, with minimal to no increase in flood heights and flood limits. Floodplain compensation analysis is included in Appendix J of this report.

4.5 FDEP Nutrient Loading

The Florida Department of Environmental Protection (FDEP) has recently adopted a rule change to its policy on nutrient loading. The new rule, which still needs to be ratified by the legislature to become effective, requires all stormwater treatment systems to provide a level of treatment sufficient to accomplish the greater of the following nutrient load reduction criteria:

a) an 80 percent reduction of the average annual loading of total phosphorus (TP) and a 55 percent reduction in the average annual loading of total nitrogen (TN) from the proposed project; or

b) a reduction such that the post-development condition average annual loading of nutrients does not exceed the pre-development condition nutrient loading

Calculations showing adherence to this requirement is presented in Appendix K of this report.

5 ADHERENCE TO DESIGN CRITERIA AND PROJECT LIMITATIONS

Due to the nature of this phase of the project, there was limited data available to conduct an in-depth drainage analysis. Roadway Profiles, Roadway Cross Sections, Proposed DTM, and Percolation Tests were not available during this project phase. As a result, certain assumptions needed to be made in order to establish a baseline design and criteria for the ultimate final drainage design. One percolation test from a previous design project within the Miami Gardens Drive Interchange (see Appendix G) was used as an assumed infiltration rate for the entire subject project corridor. In addition, the physical locations and dimensions of the proposed retention areas, French drains, and EcoVault Structures – or approved equal were established based solely on a horizontal plan view design of the project.

Preliminary drainage calculations conducted with the above stated limitations for all three build alternatives indicates that the available physical space to place retention areas and French drains will not suffice to be able to meet the required water quality and nutrient loading criteria. As a result, we are proposing the use of EcoVault Structures – or approved equal in order to make up for any shortcomings in meeting these criteria. The exact placement and sizes of these EcoVault Structures – or approved equal will be determined during the final design phase of the drainage when a more complete set of information (such as percolation tests, roadway profiles, and roadway cross sections) are available. Based upon the functionality and capacity of EcoVault Structures – or approved equal, this is not an unreasonable assumption.

6 DRAINAGE RELATED PERMITS

It must be noted that in all likelihood, dewatering activities will be required for the installation of the EcoVault Structures – or approved equal. As a result, a Water Use Permit from the SFWMD will be required for the dewatering activities.

A SFWMD Right-of-Way Occupancy Use Permit / USACE Section 408 Approval is required for temporary use/access & staging and temporary/permanent installations within the SFWMD C-9 (Snake Creek) Canal.

A SFWMD ERP will be required for proposed roadway capacity widening and drainage improvements under the proposed build alternatives.

A DRER Class V Permit will be required for proposed off-system direct impacts to NE 5th Avenue.

Dredge and Fill impacts within the C-9 (Snapper Creek) Canal below the SHWE/OHW will require a federal FDEP State 404 Dredge and Fill Permit.

A National Pollutant Discharge Elimination System (NPDES) Stormwater Construction Generic Permit (CGP) for stormwater discharge from large and small construction activities will need to be obtained from the FDEP.

APPENDIX A

No-Build Alternative Drainage Maps



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 1

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 2

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 3

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

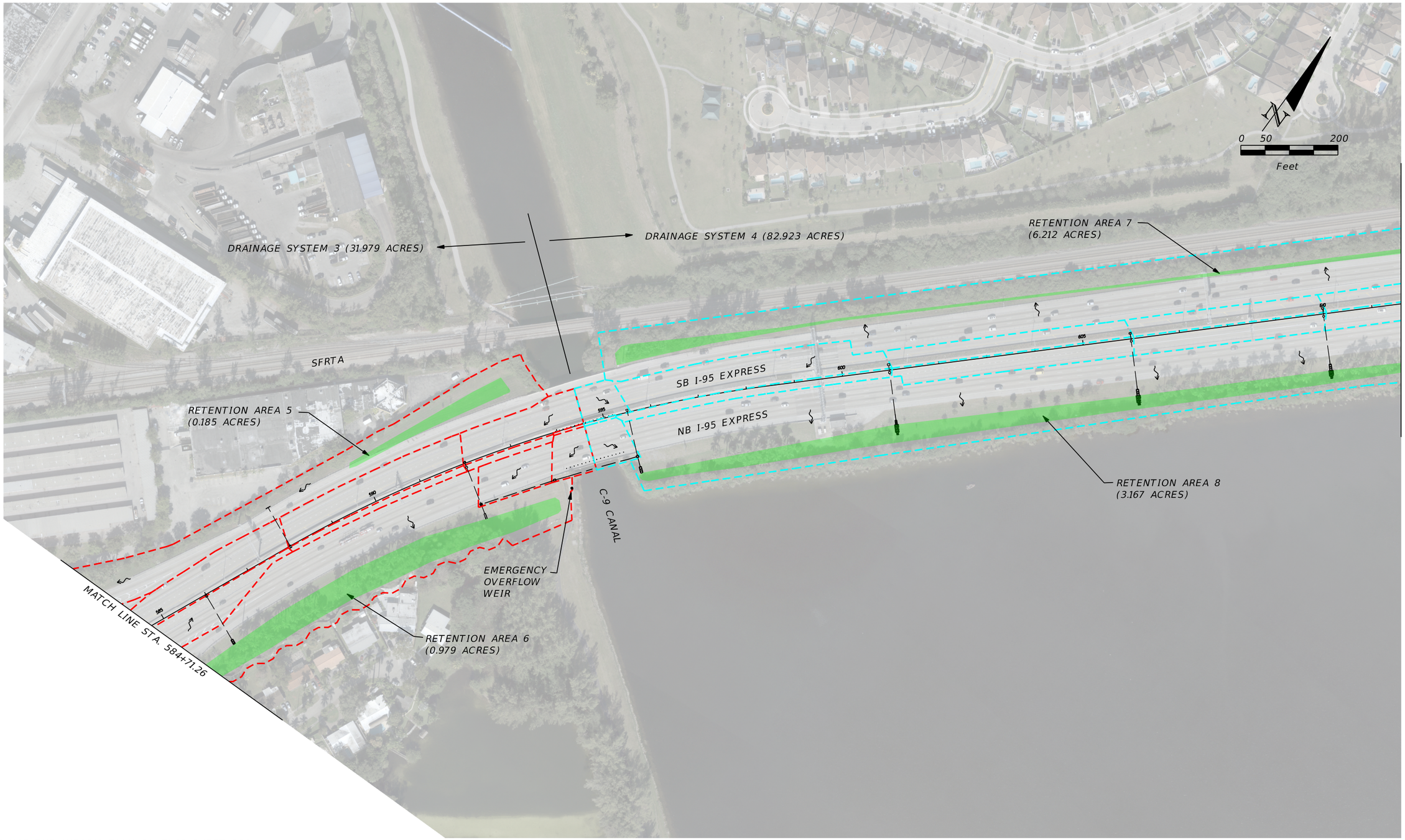
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 4

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

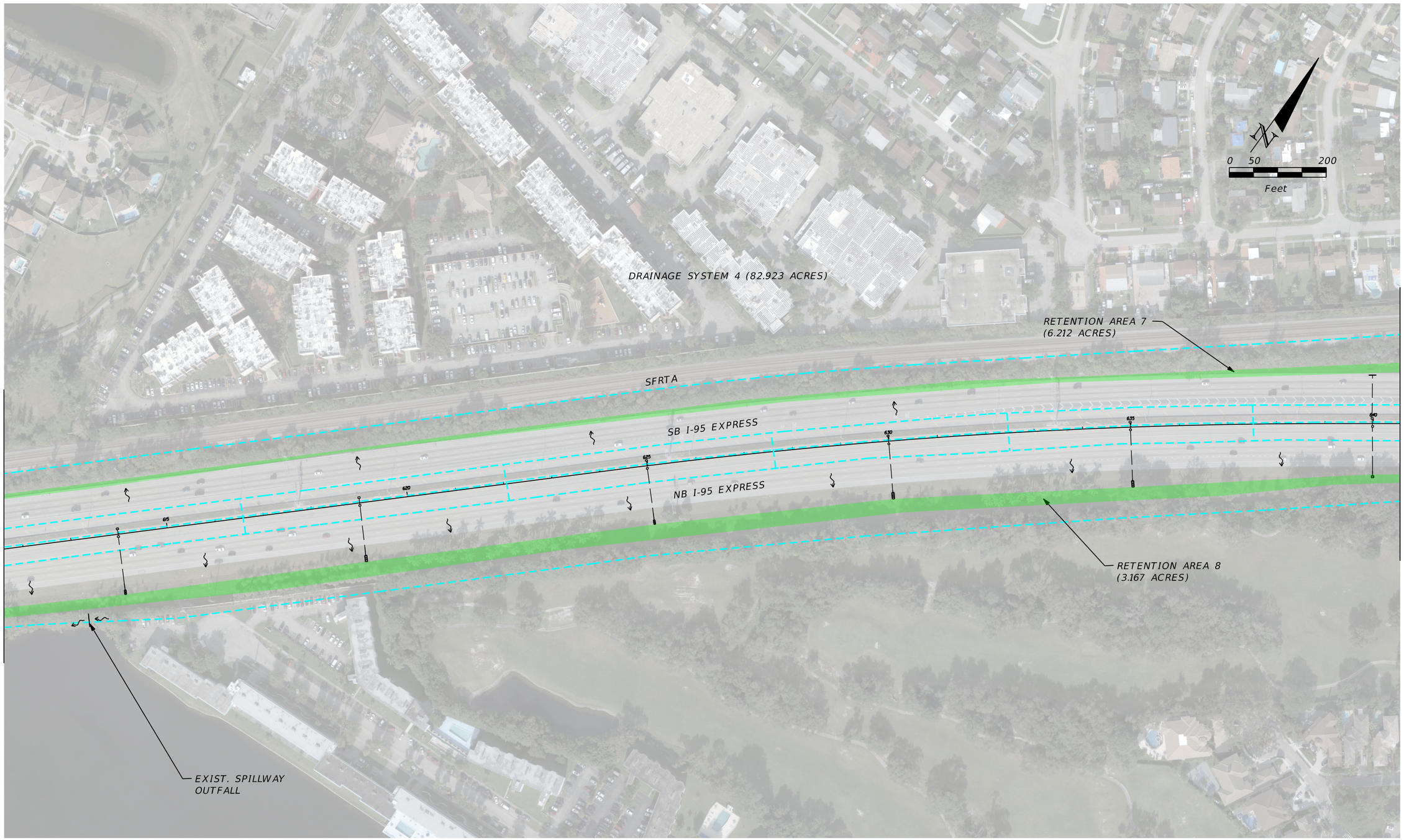
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 5

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

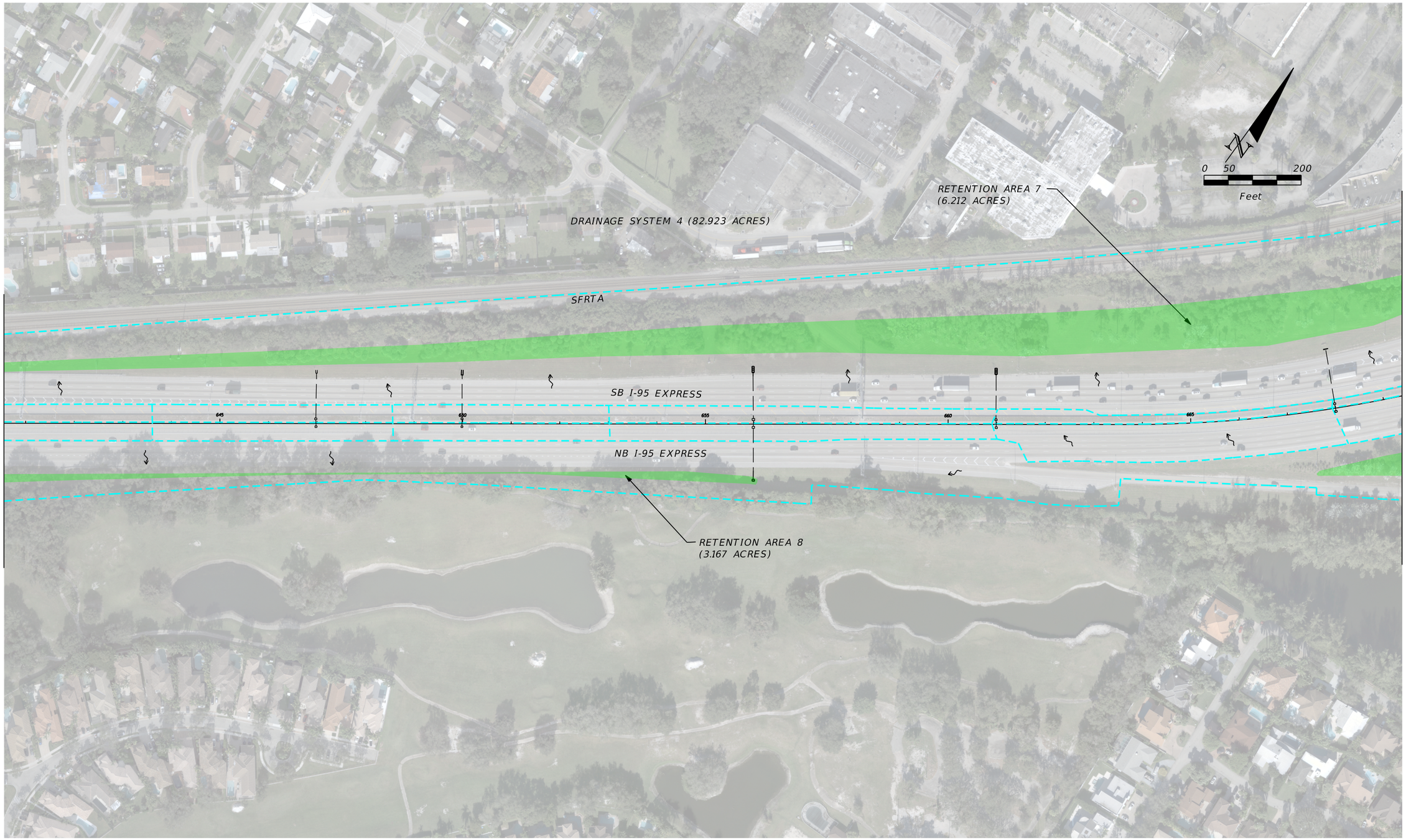
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 6

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 7

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$

MATCH LINE STA. XX+XX.XX

MATCH LINE STA. 669+39.23

RETENTION AREA 7
(6.212 ACRES)

N

0 50 200
Feet

DRAINAGE SYSTEM 4 (82.923 ACRES)

IVES DAIRY RD
NE 203RD ST.

DRAINAGE SYSTEM 5 (56.037 ACRES)

RETENTION AREA 10
(0.359 ACRES)

SB I-95 EXPRESS

NB I-95 EXPRESS

RETENTION AREA 9
(3.143 ACRES)

EMERGENCY
OVERFLOW

RETENTION AREA 11
(0.806 ACRES)

RETENTION AREA 12
(0.692 ACRES)

RETENTION AREA 13
(0.500 ACRES)

MATCH LINE STA. 695+12.00

MATCH LINE STA. XX+XX.XX

DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO.
8

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 9

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 10

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

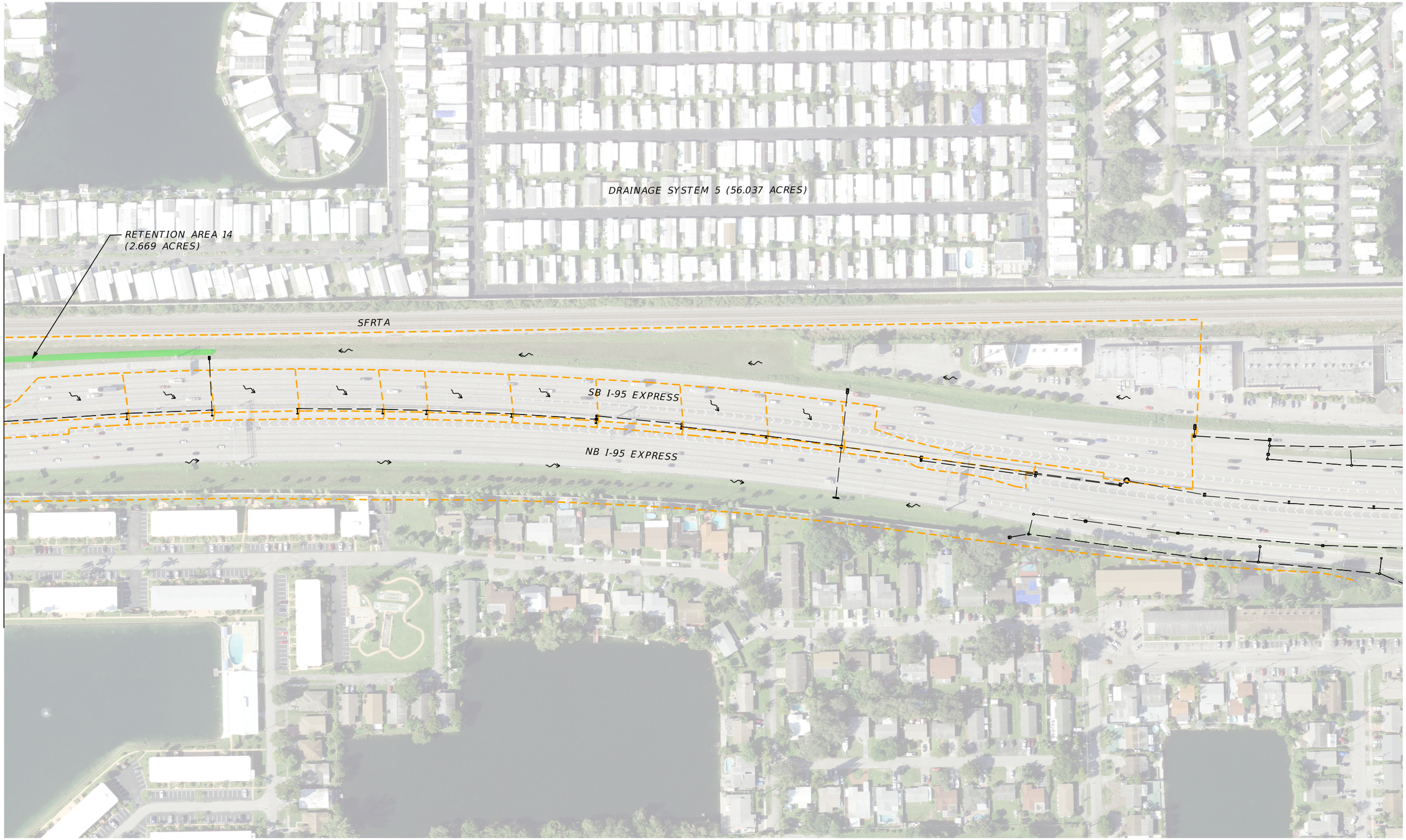
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

EXISTING DRAINAGE MAP

SHEET NO. 11

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

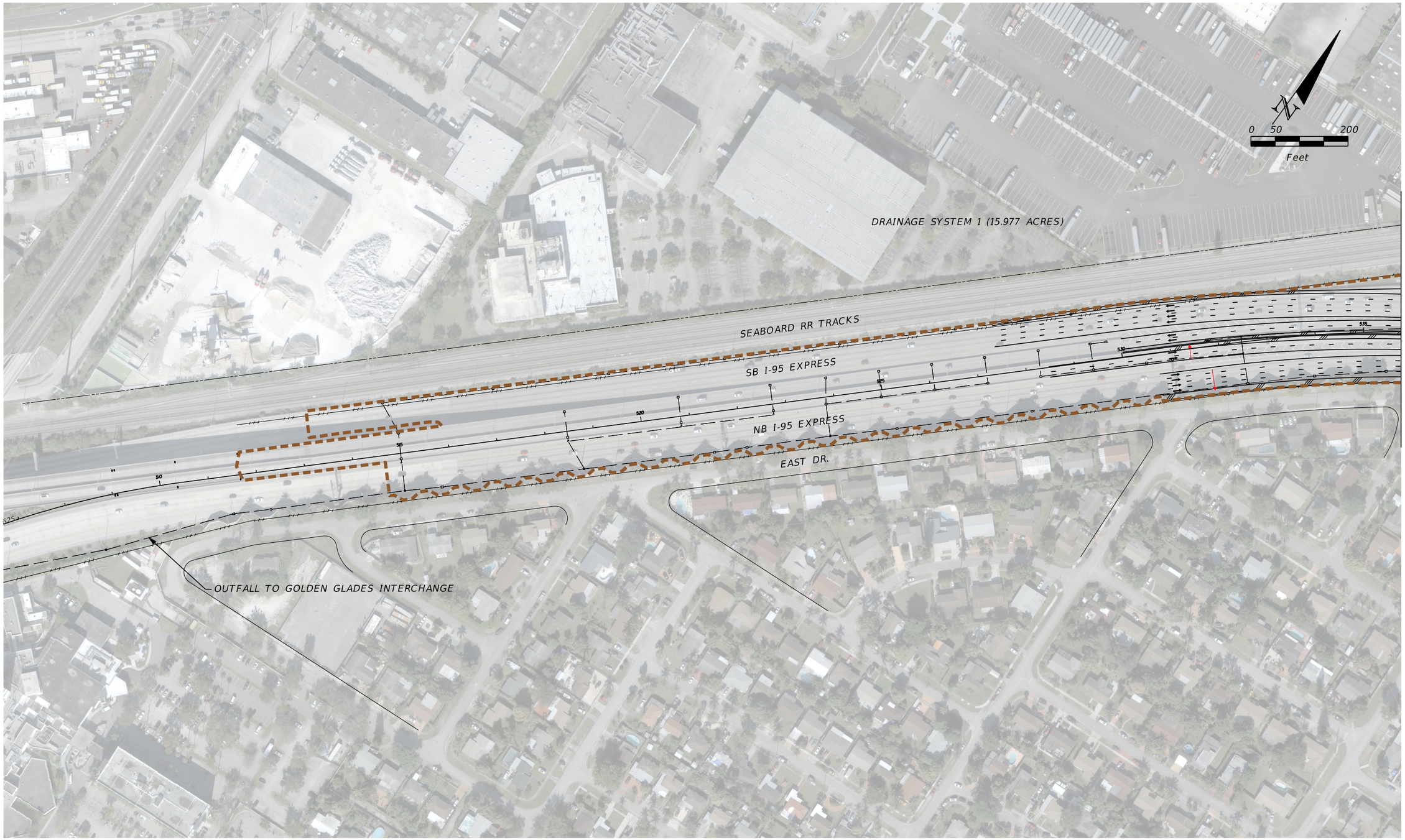
EXISTING DRAINAGE MAP

SHEET NO. 12

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$

APPENDIX B

Build Alternative #1 Drainage Maps



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

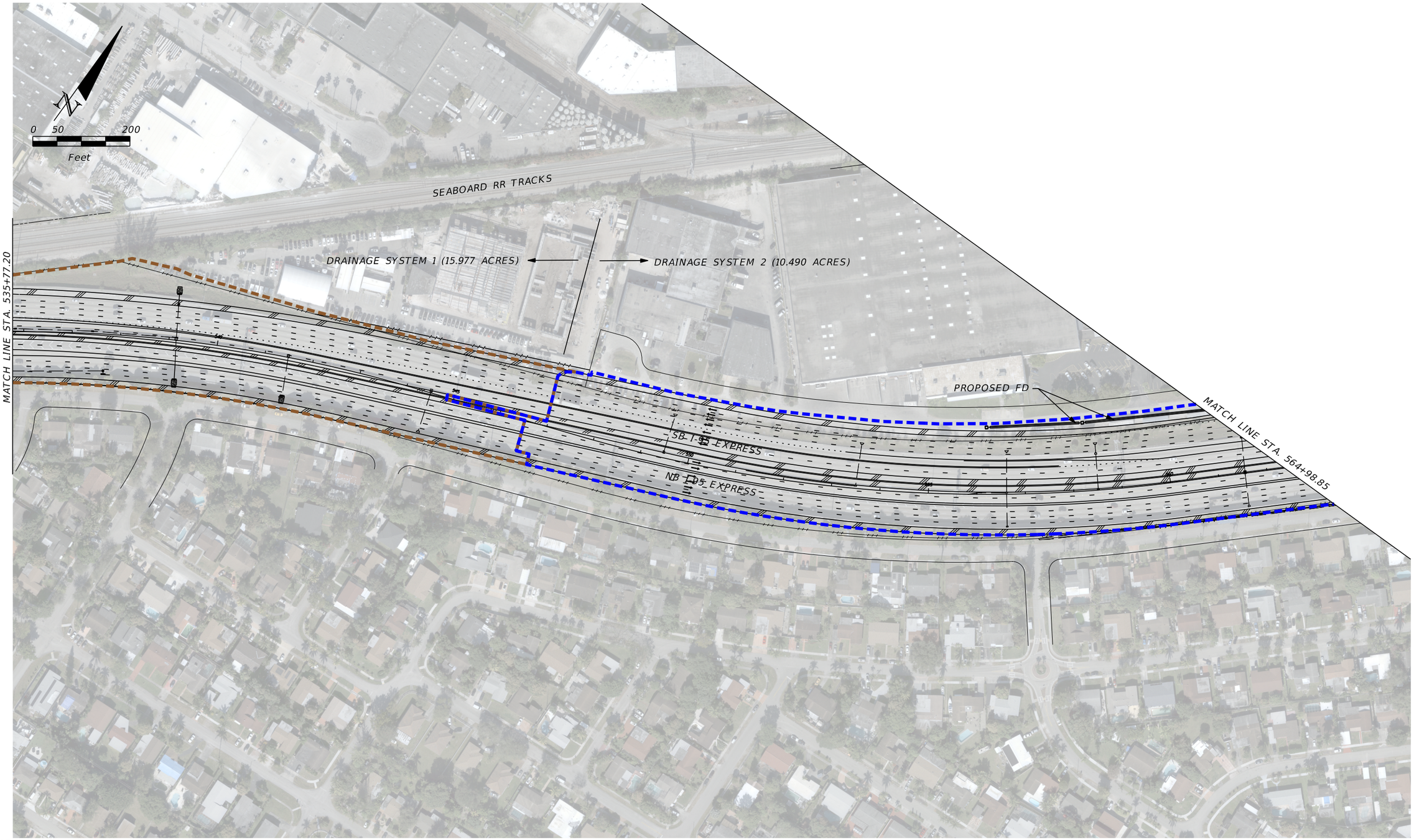
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 1

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

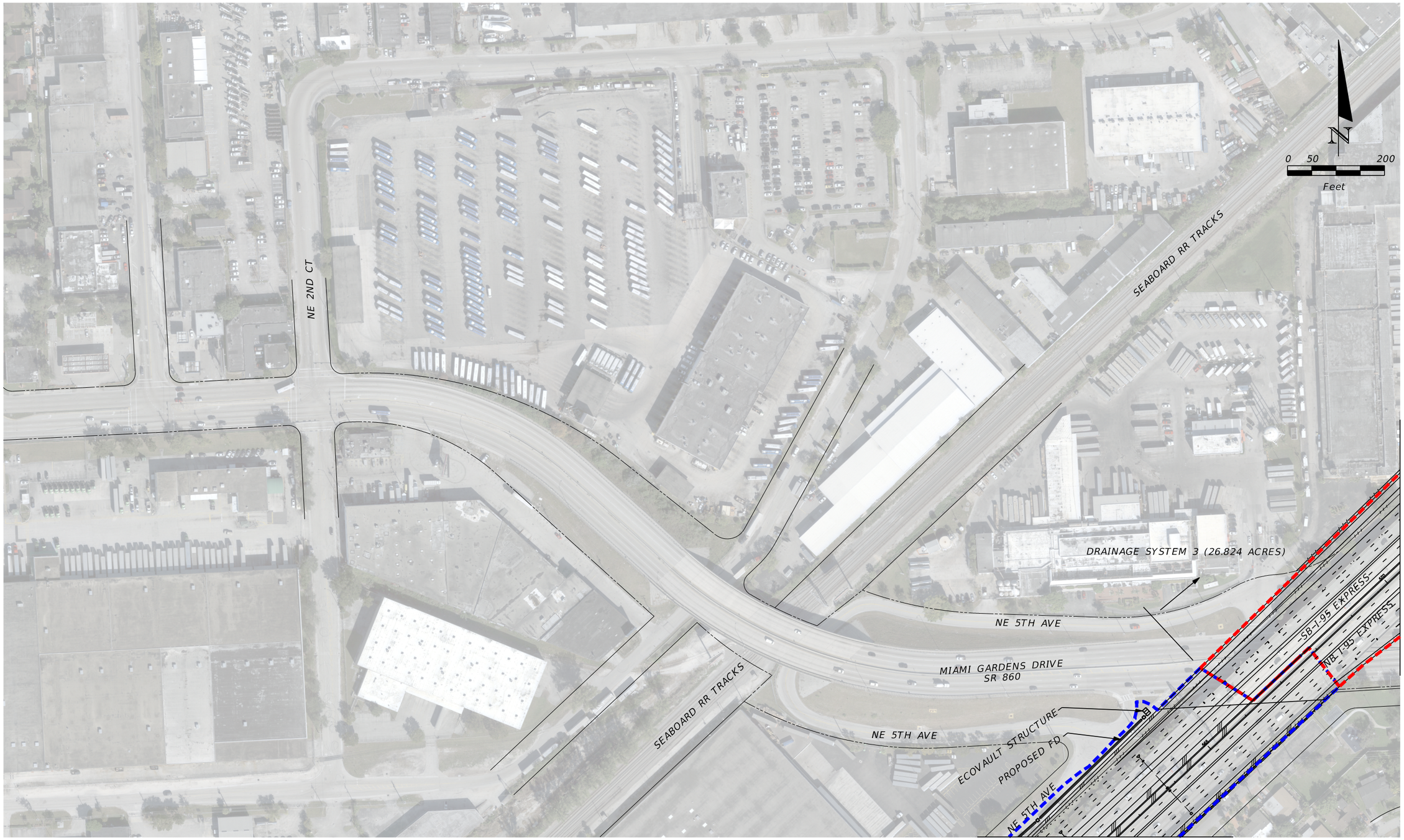
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 2

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 3

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

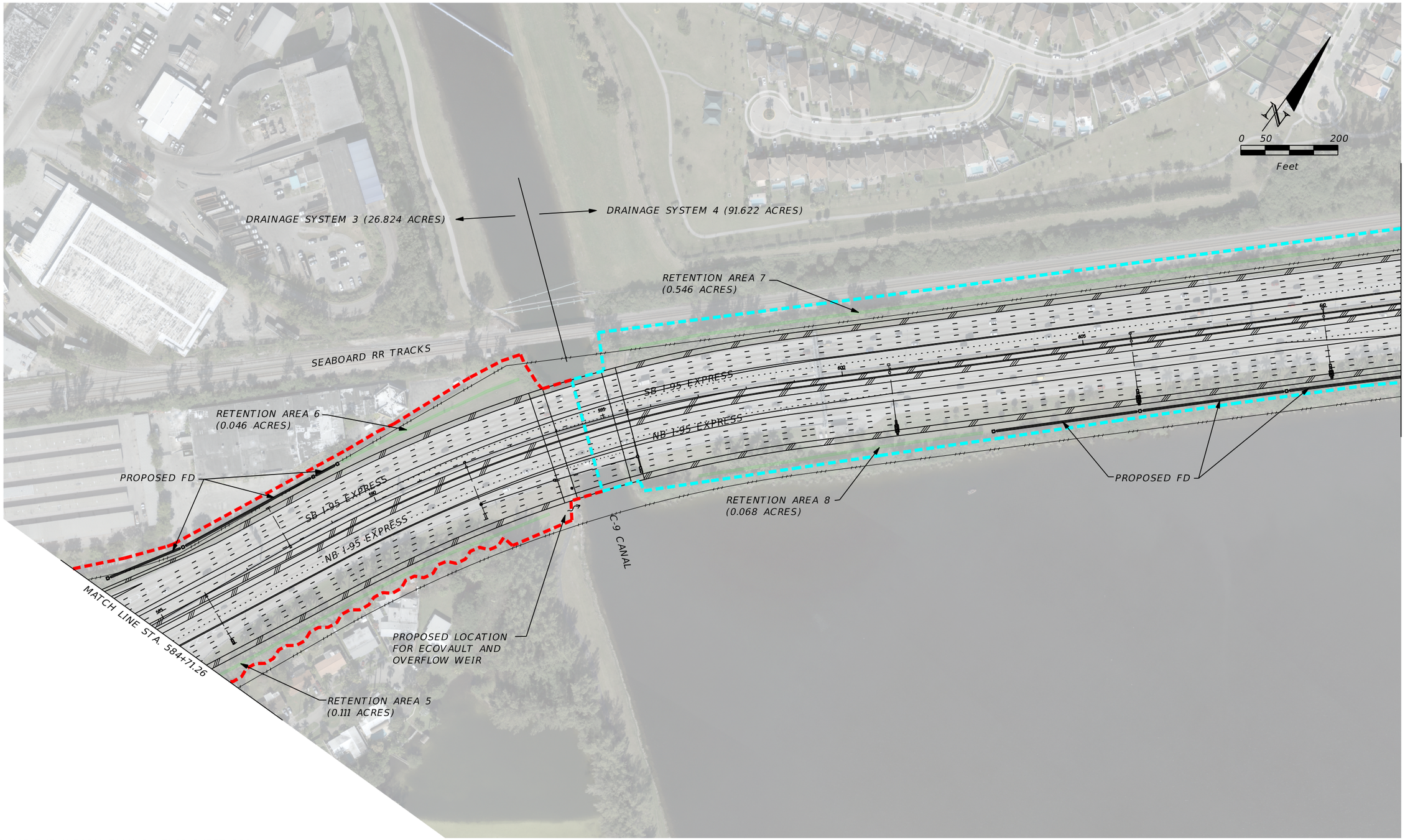
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 4

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

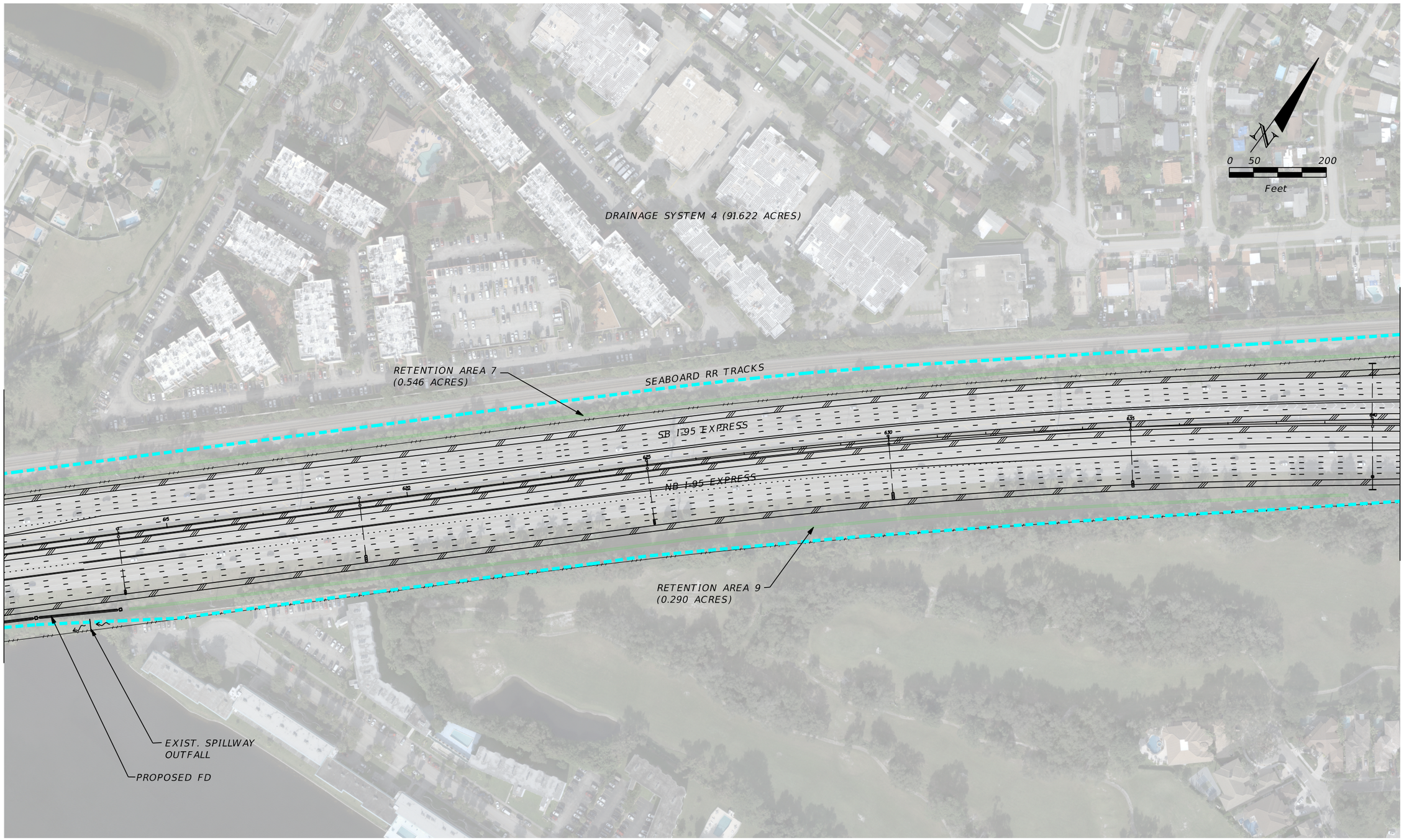
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 5

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

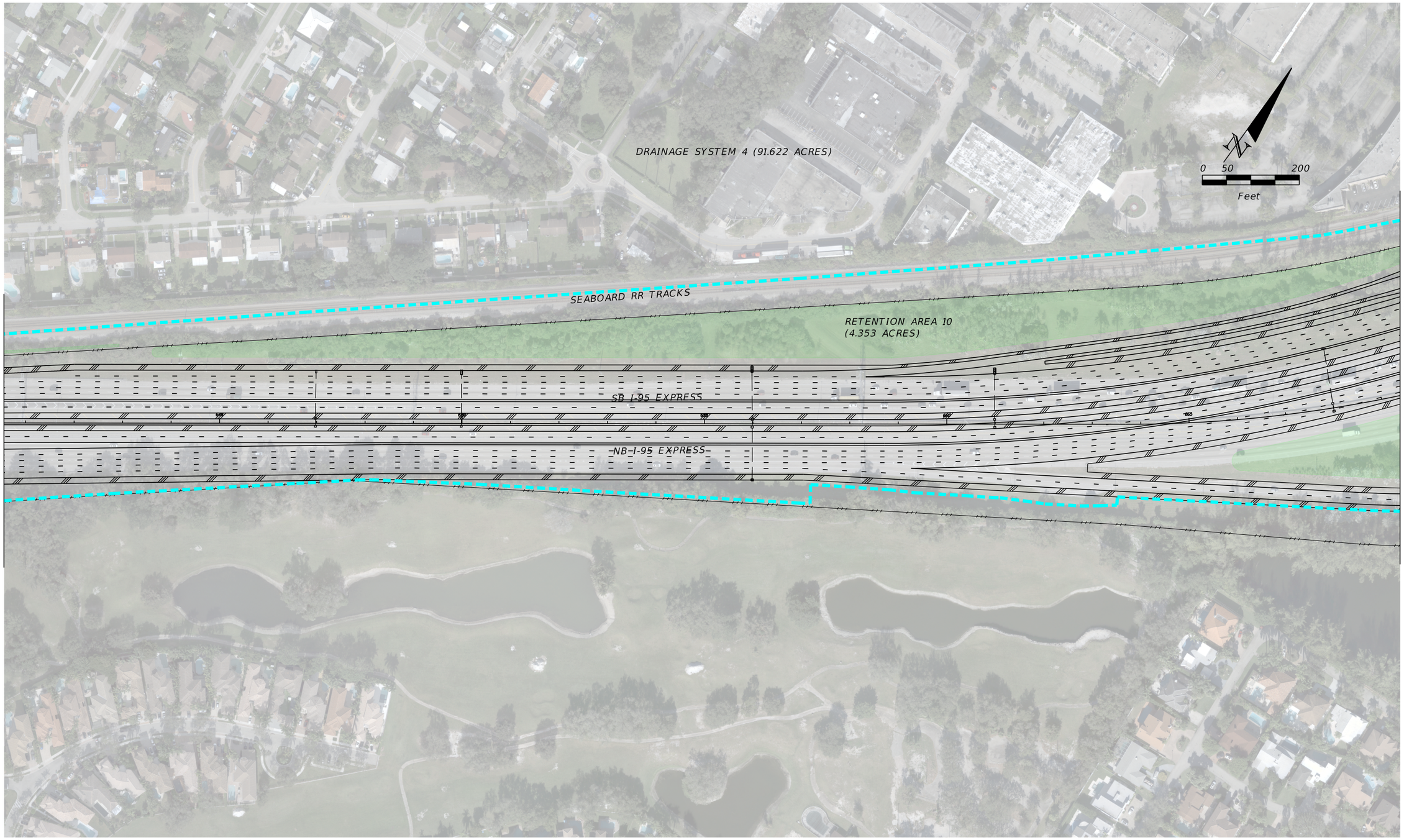
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 6

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

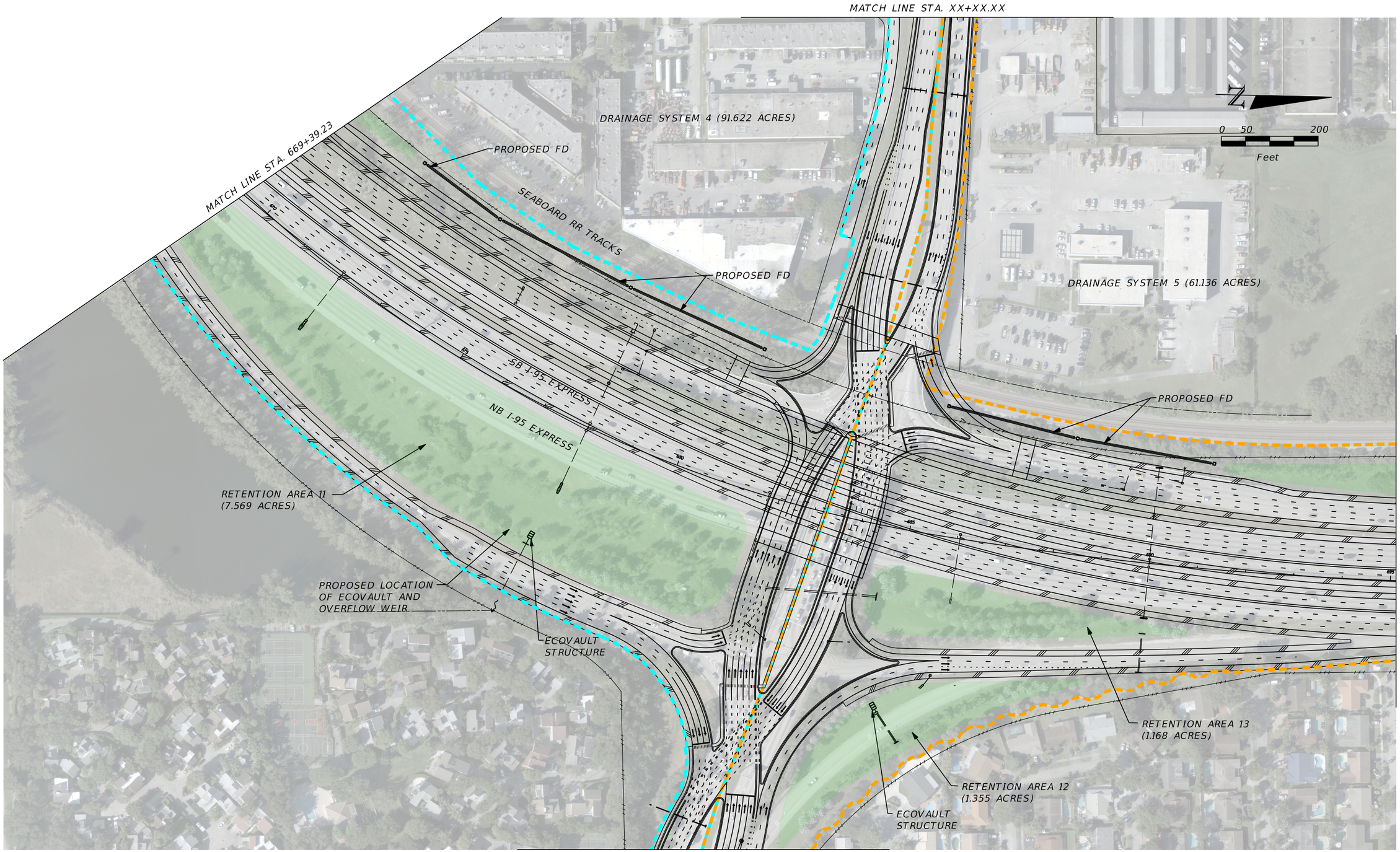
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 7

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 8

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

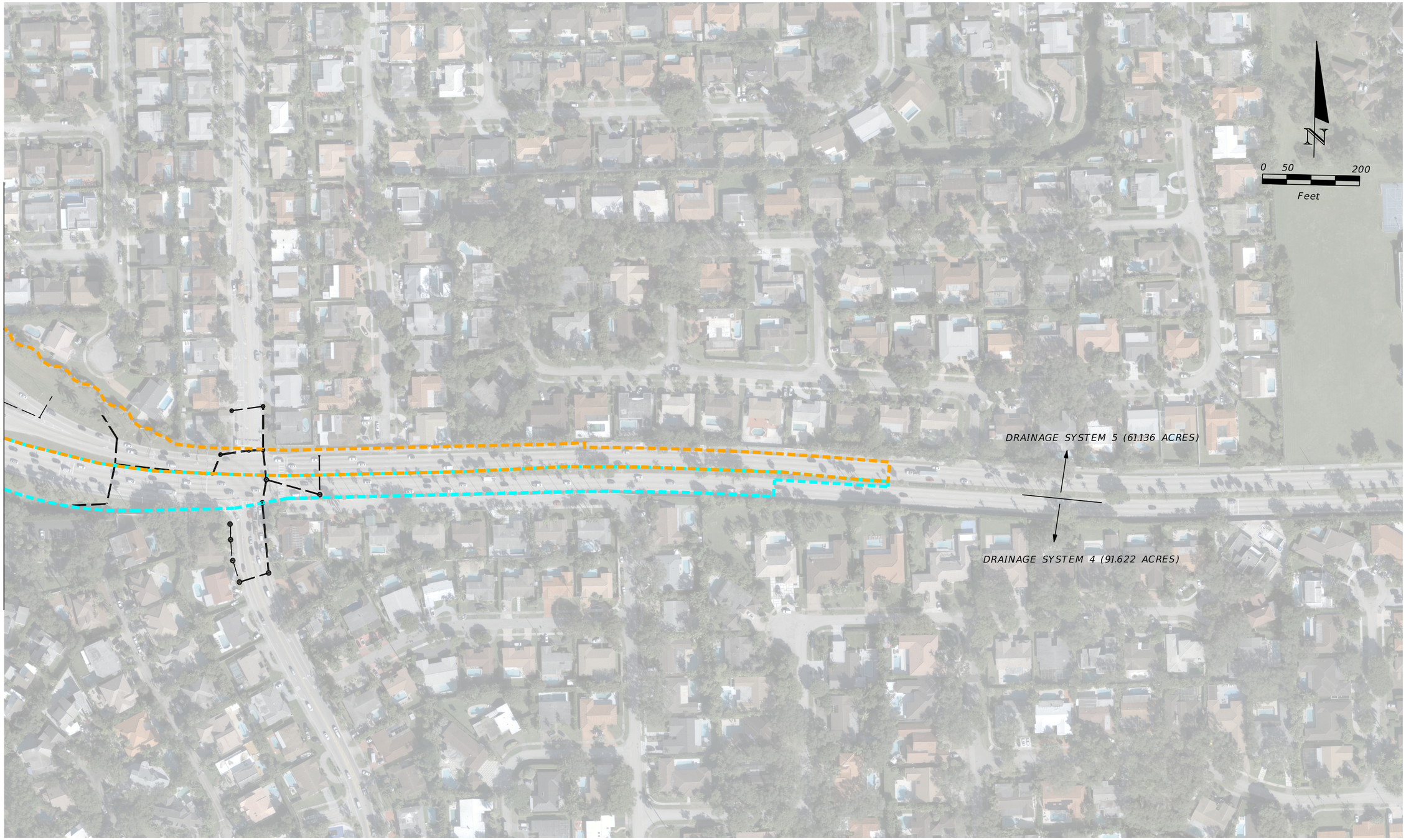
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 9

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

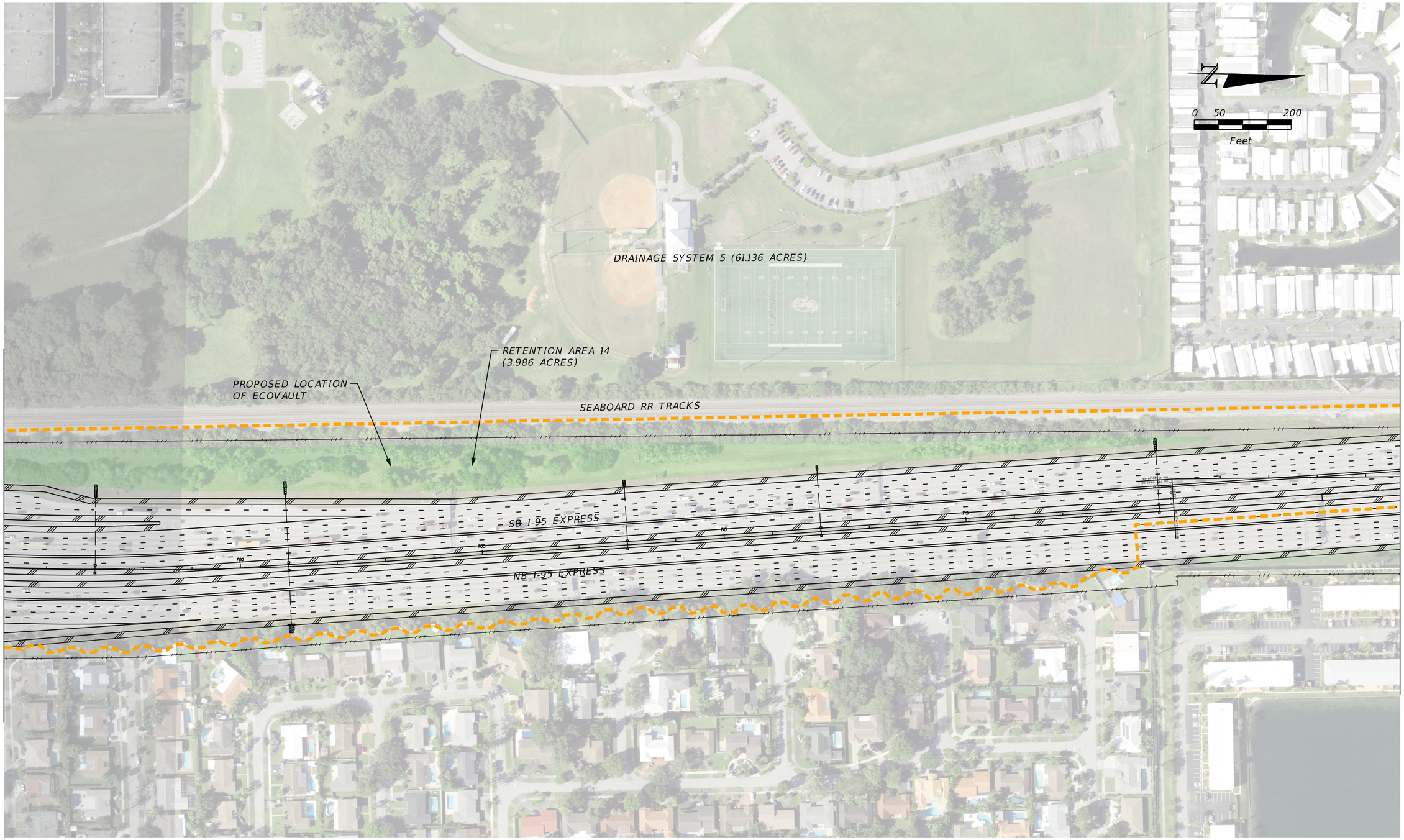
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 10

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

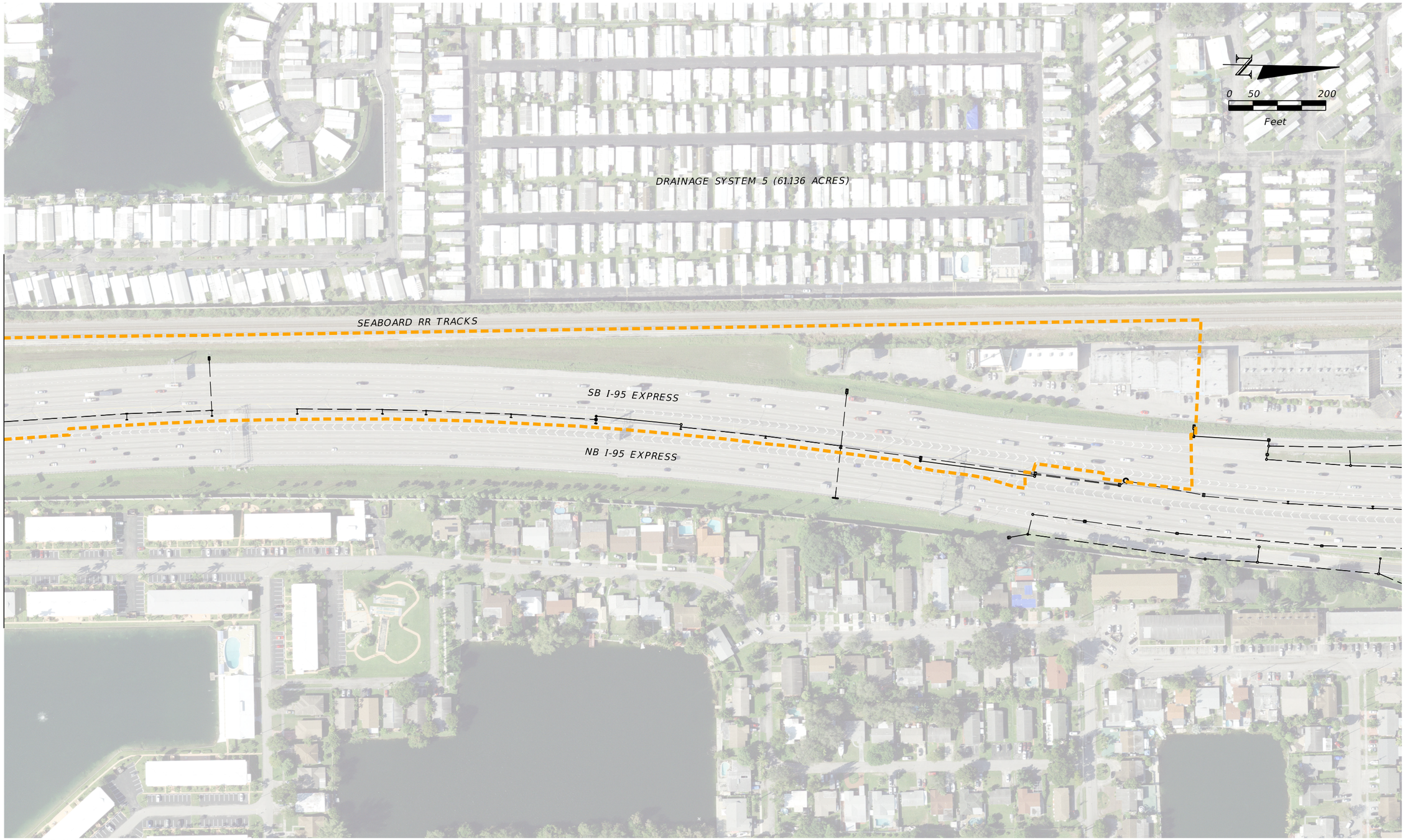
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 11

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

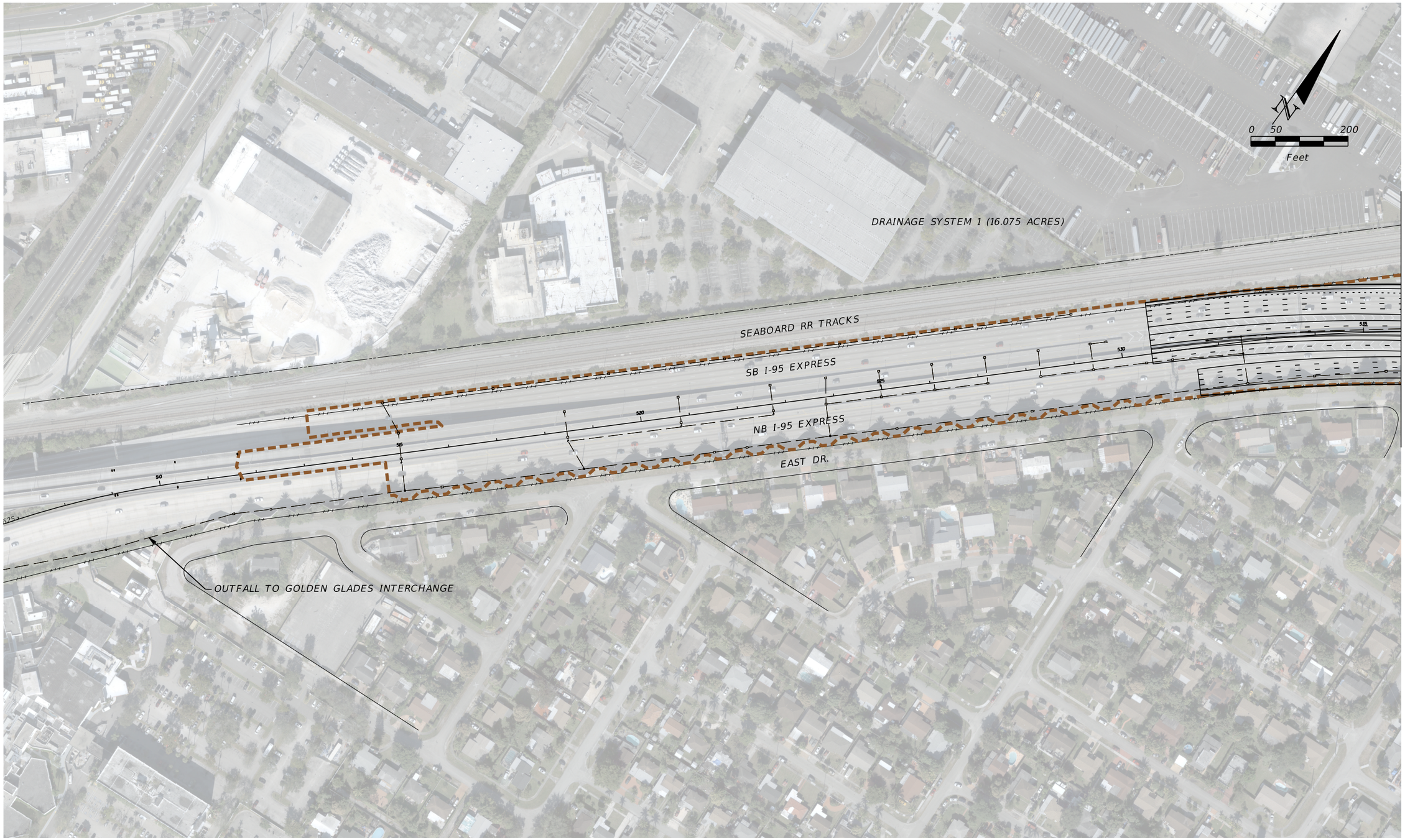
DRAINAGE MAP ALTERNATIVE 1

SHEET NO. 12

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$

APPENDIX C

Build Alternative #2 Drainage Maps



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 1

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

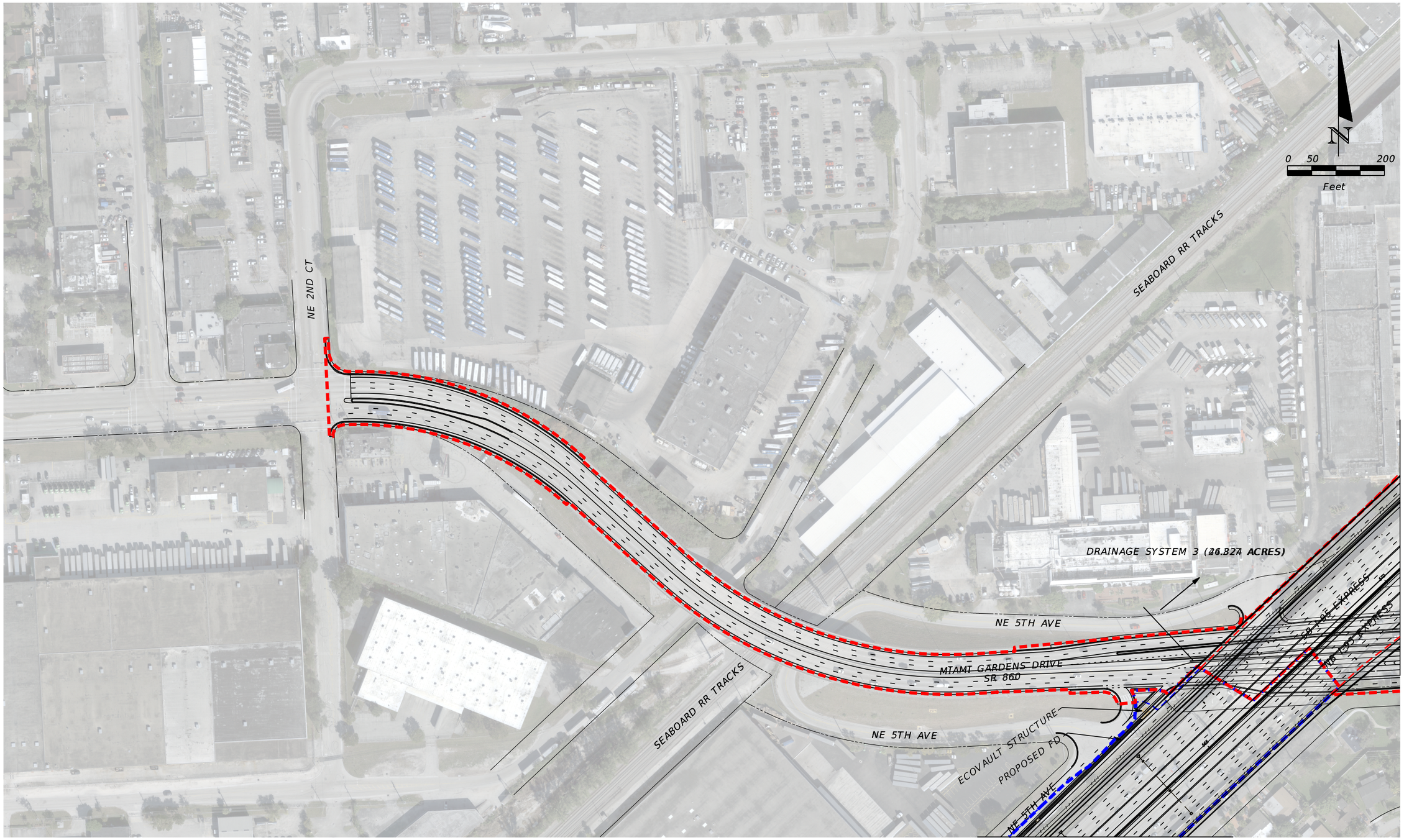
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 2

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

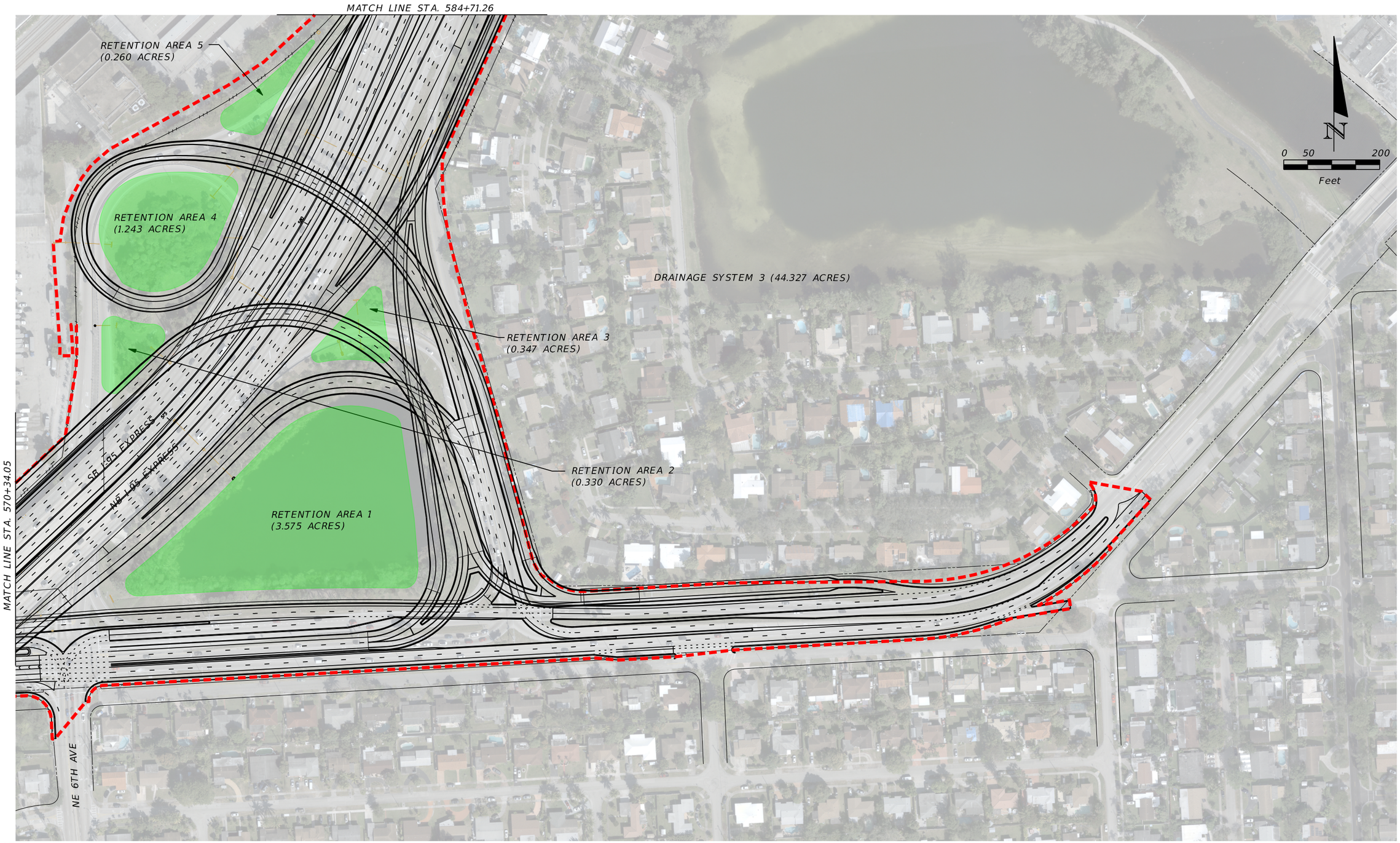
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 3

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

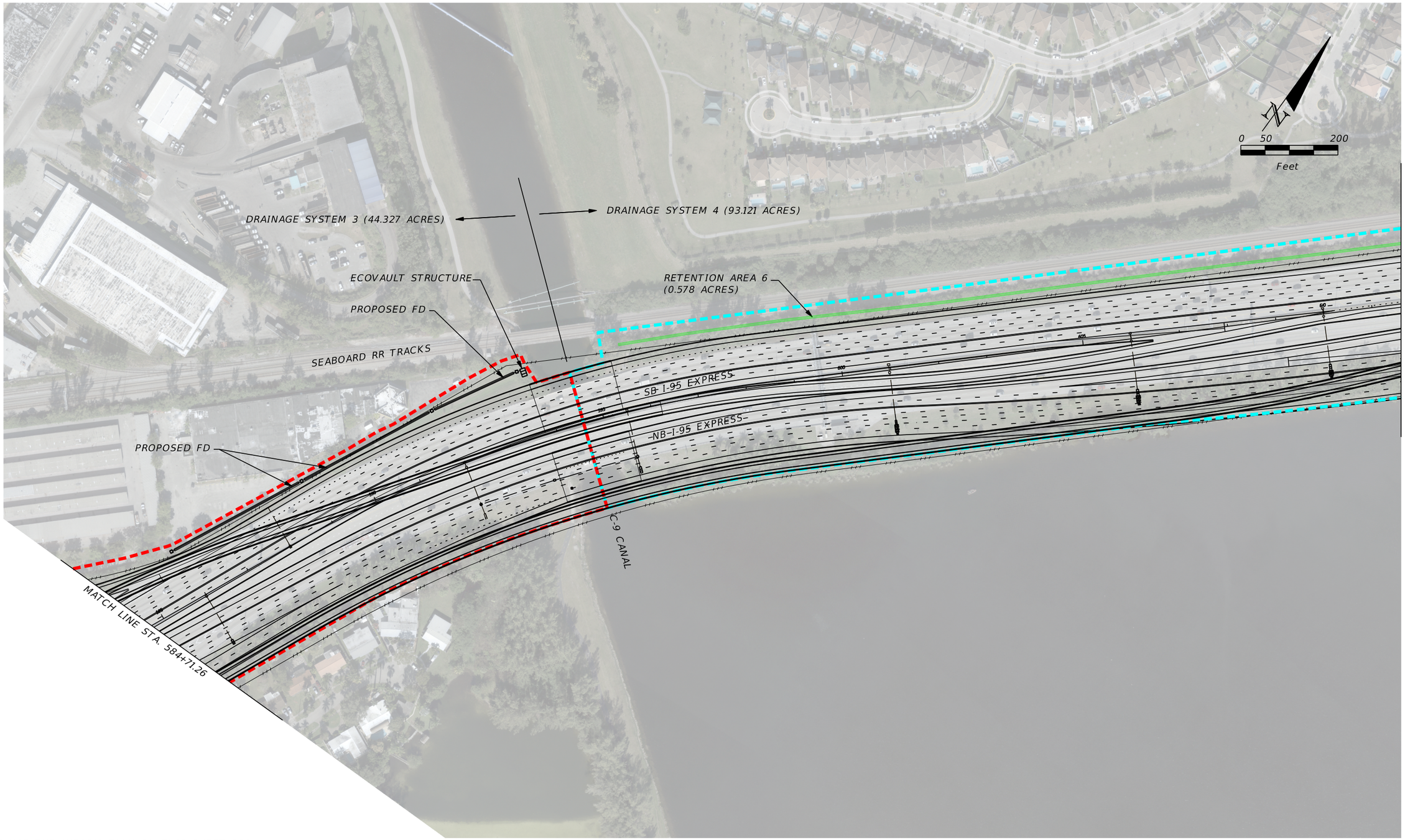
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 4

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

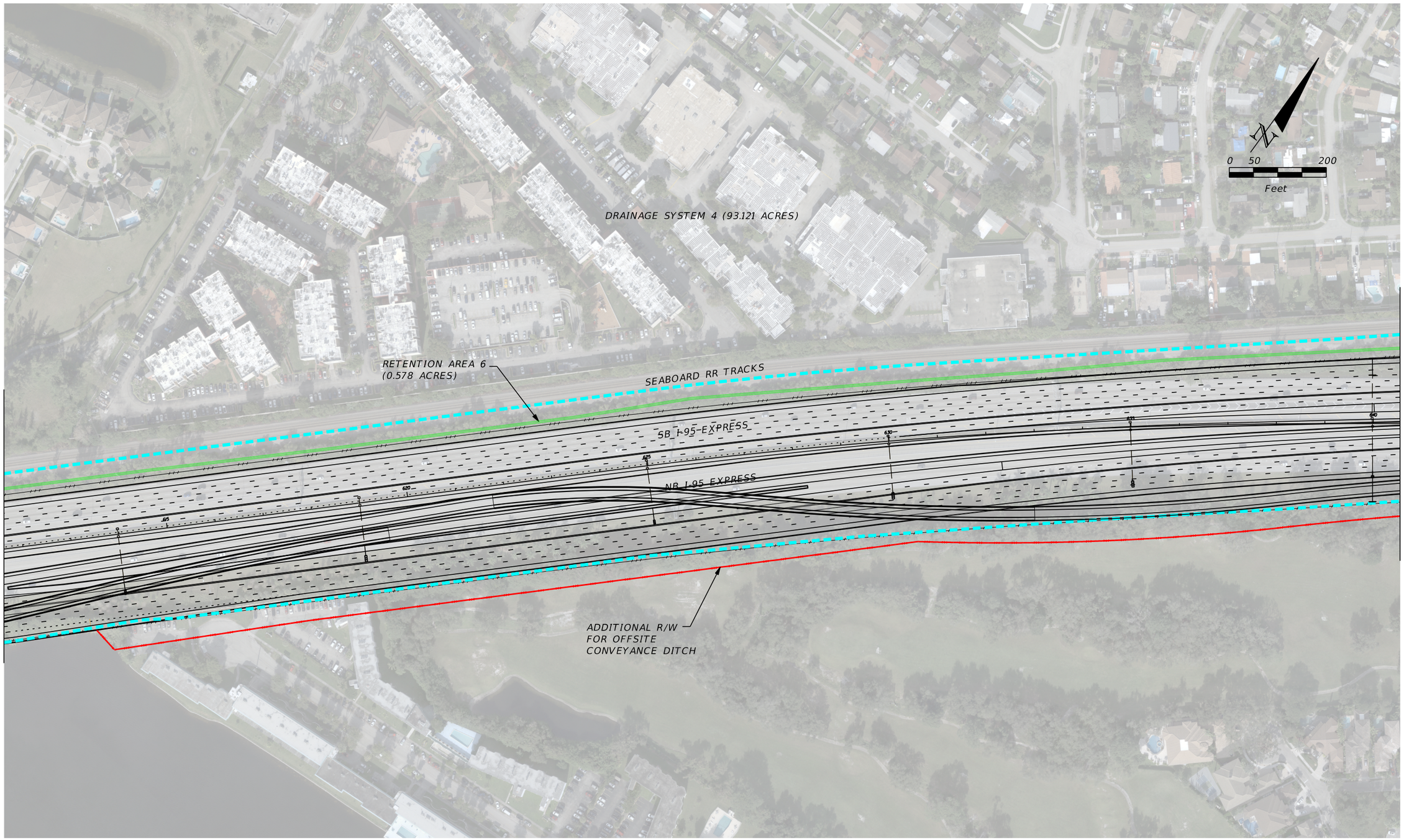
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 5

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

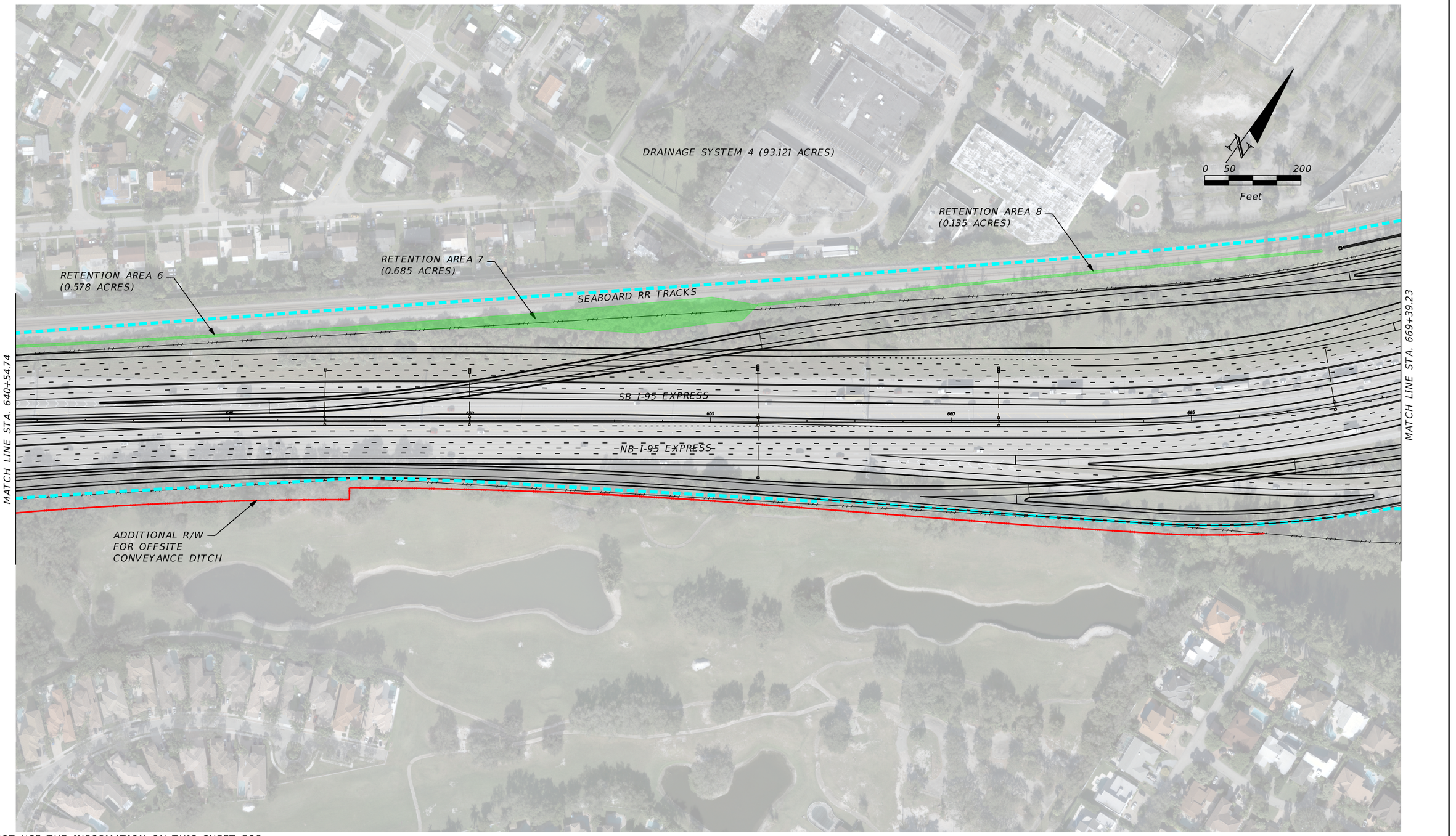
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 6

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

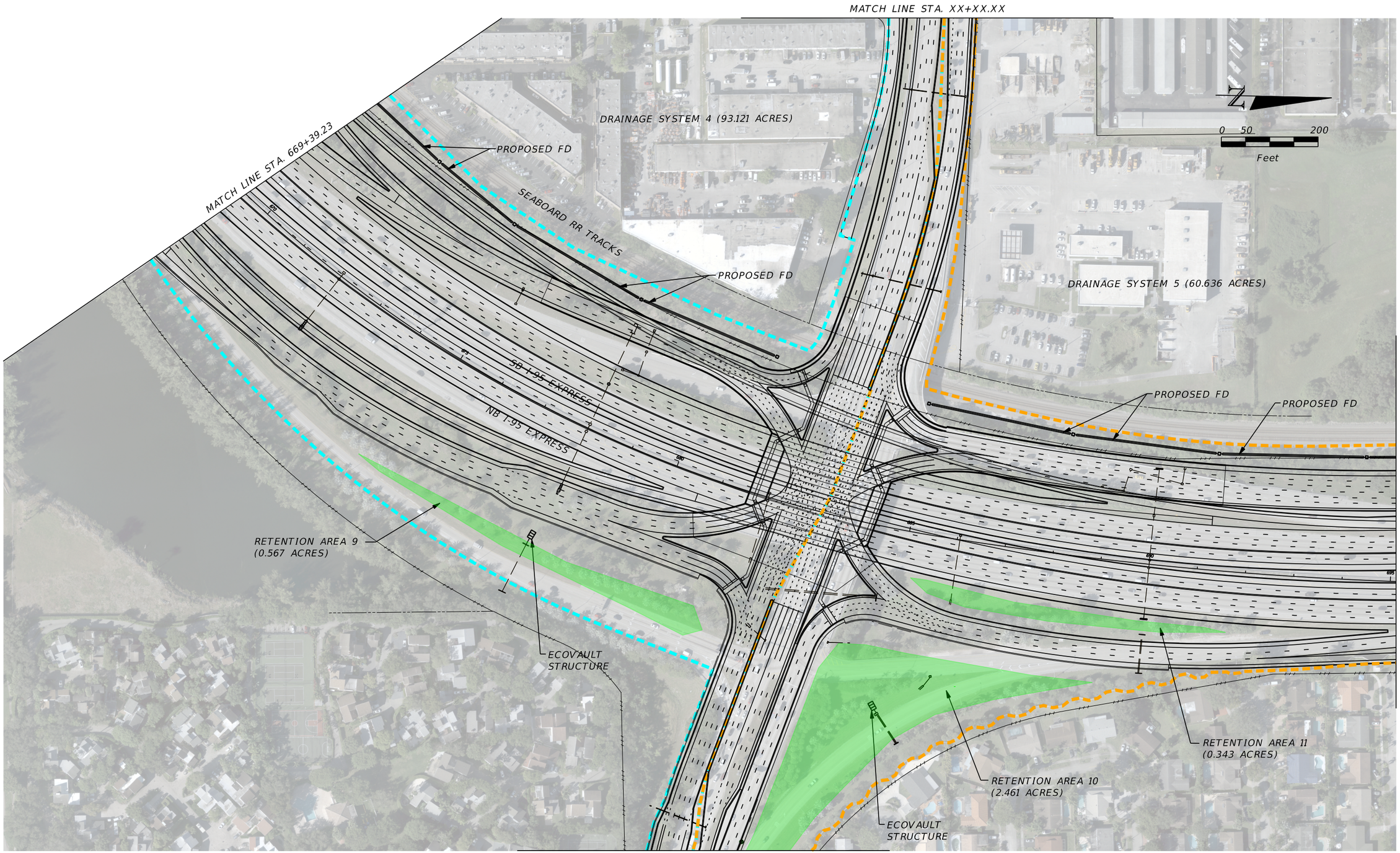
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 7

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 8

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 9

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

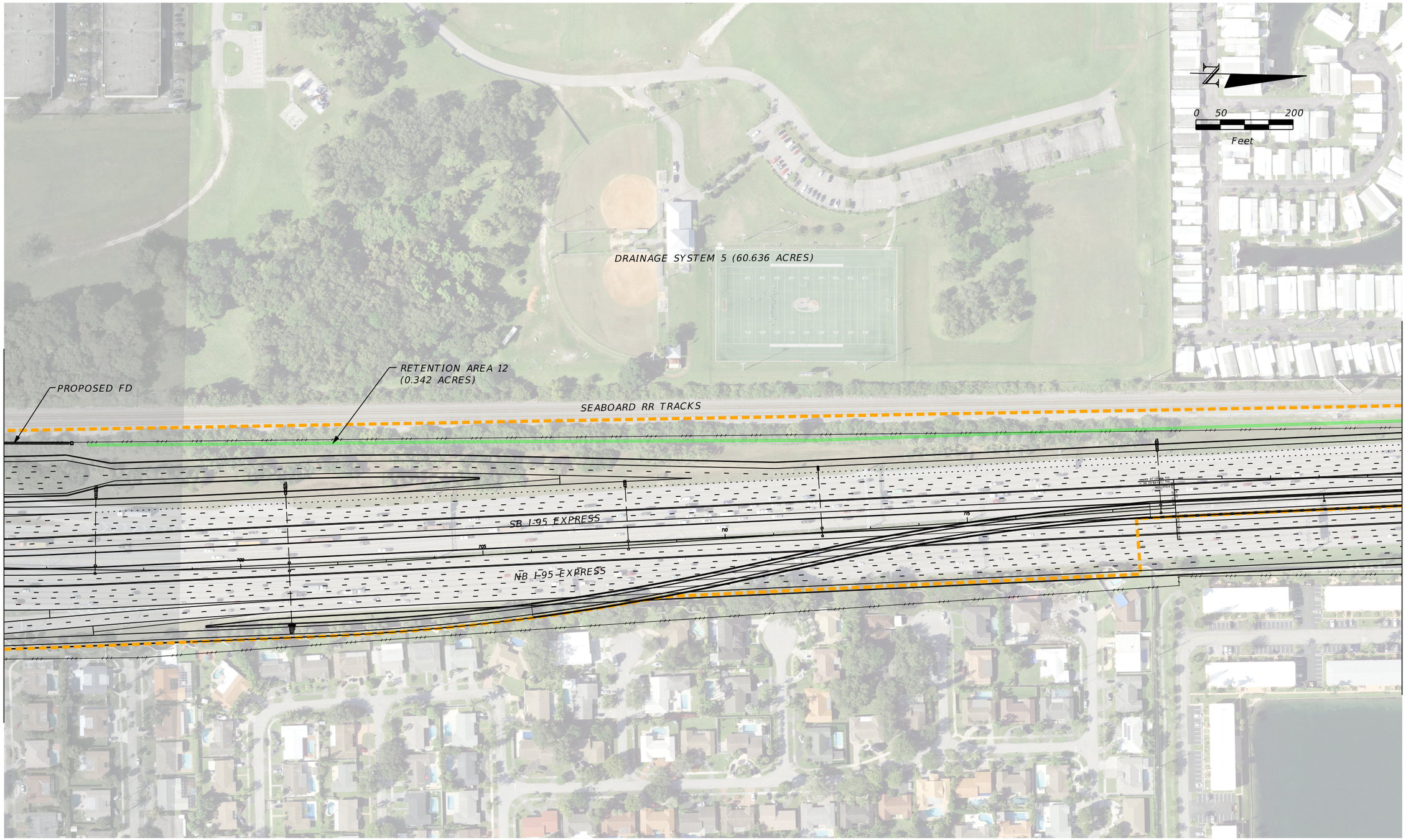
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 10

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

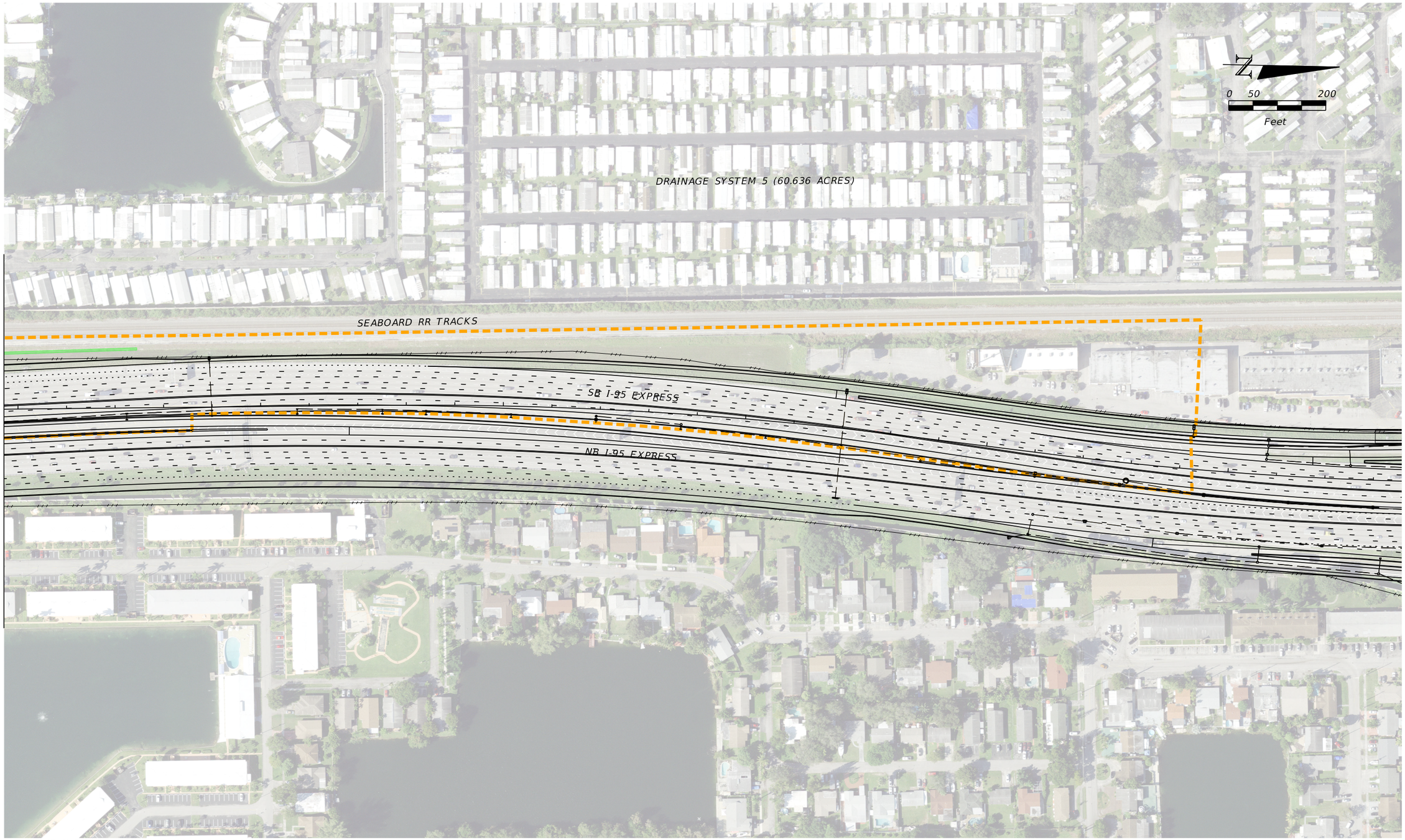
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 11

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

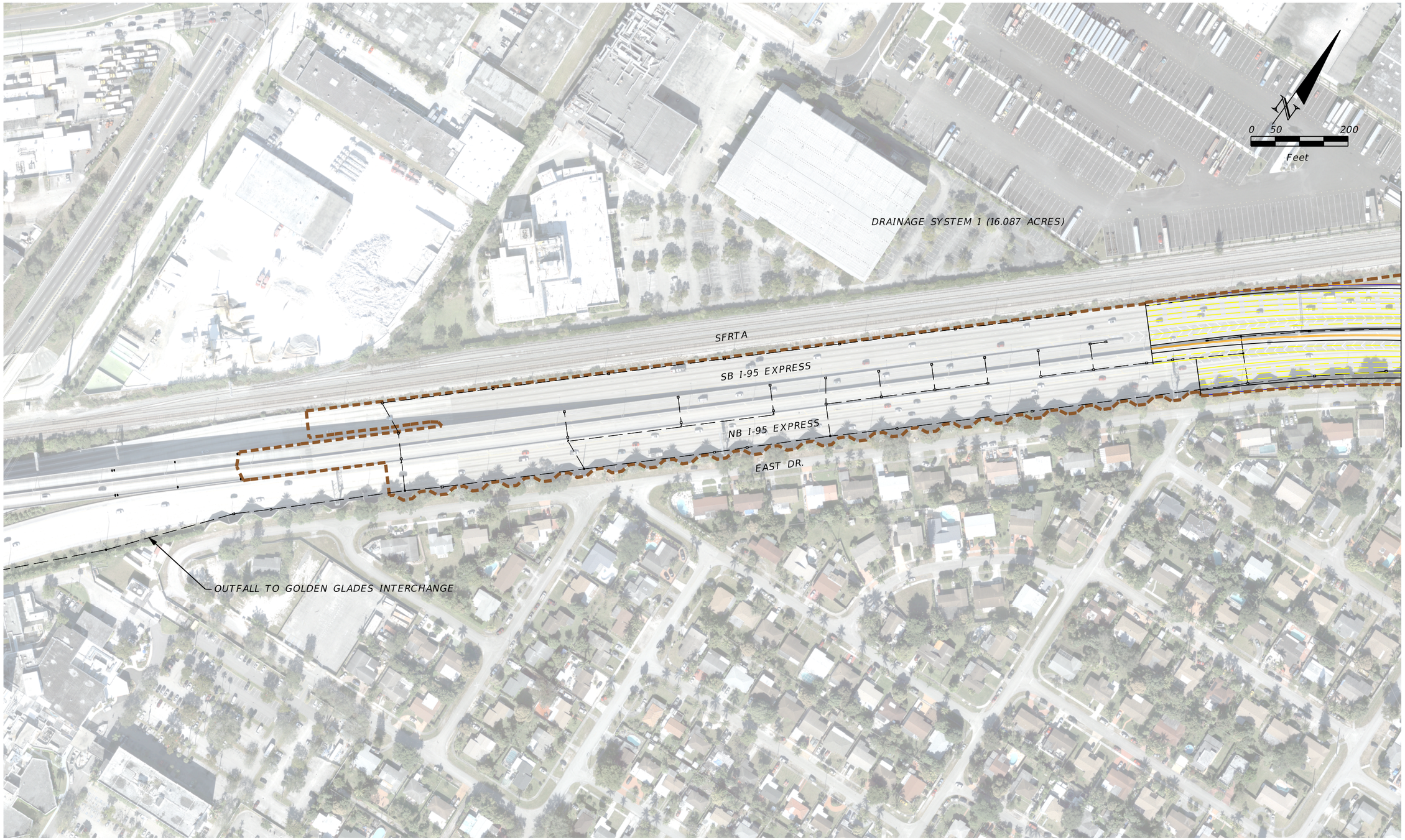
DRAINAGE MAP ALTERNATIVE 2

SHEET NO. 12

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$

APPENDIX D

Build Alternative #3 Drainage Maps



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO.
1

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

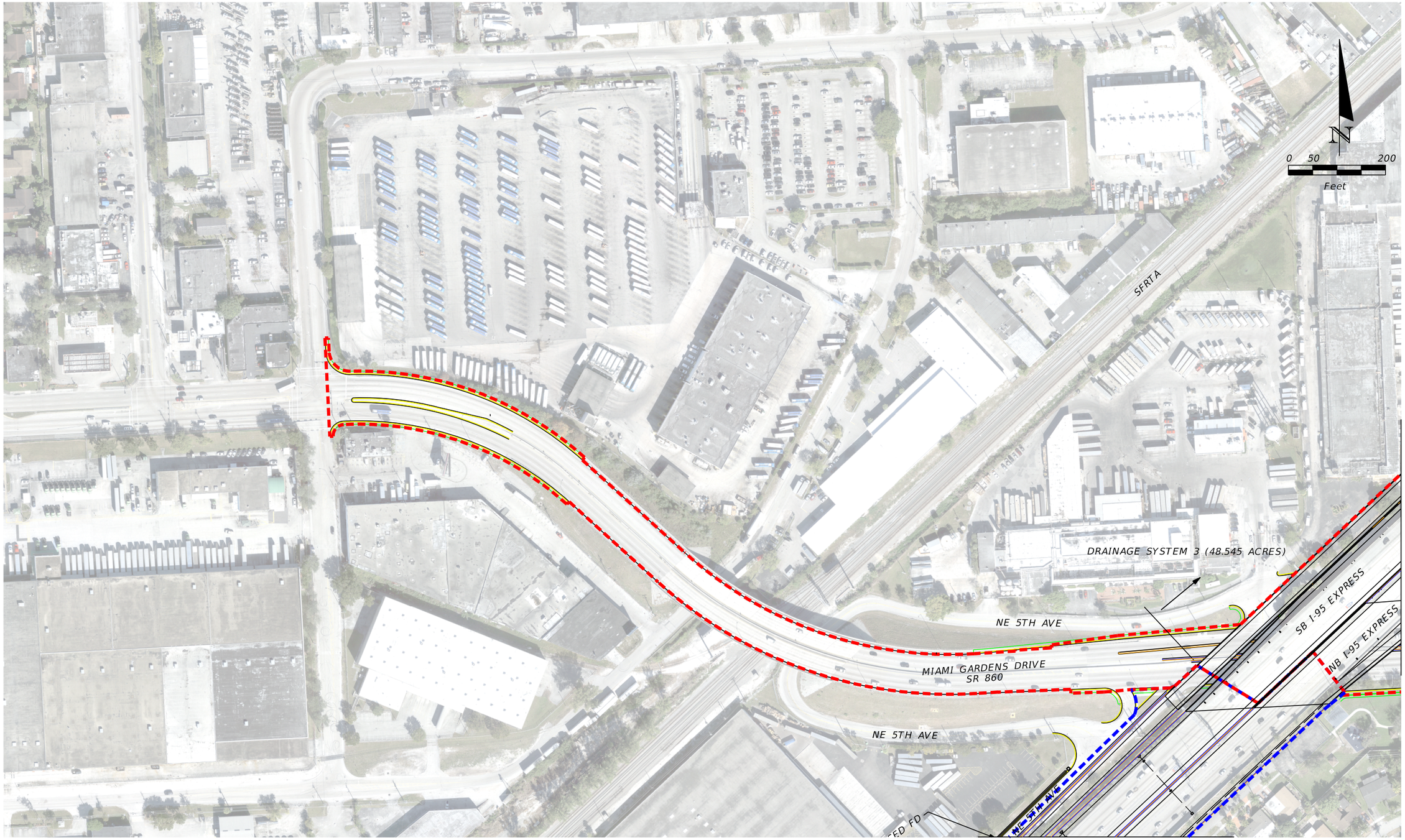
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 2

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

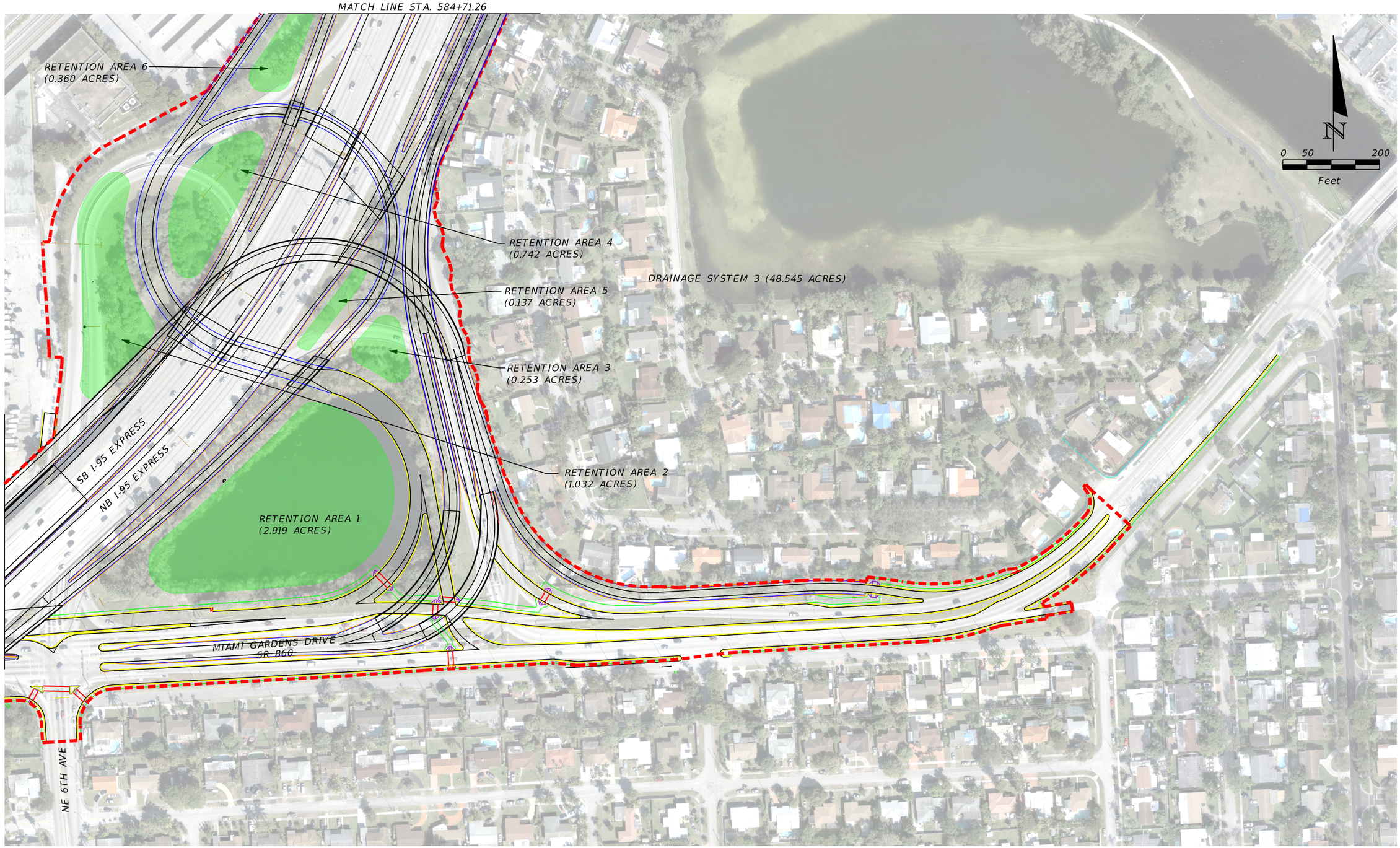
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 3

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

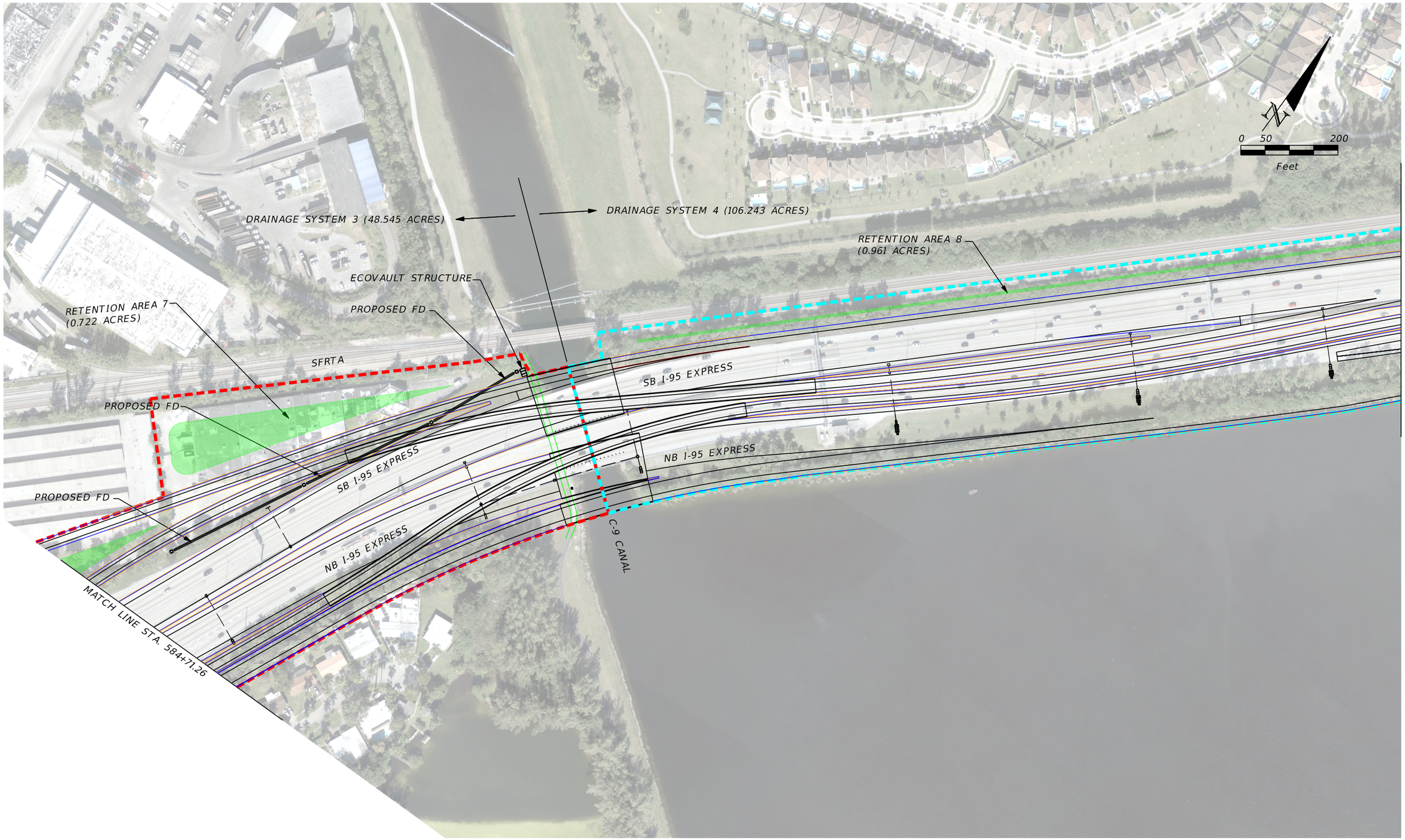
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 4

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

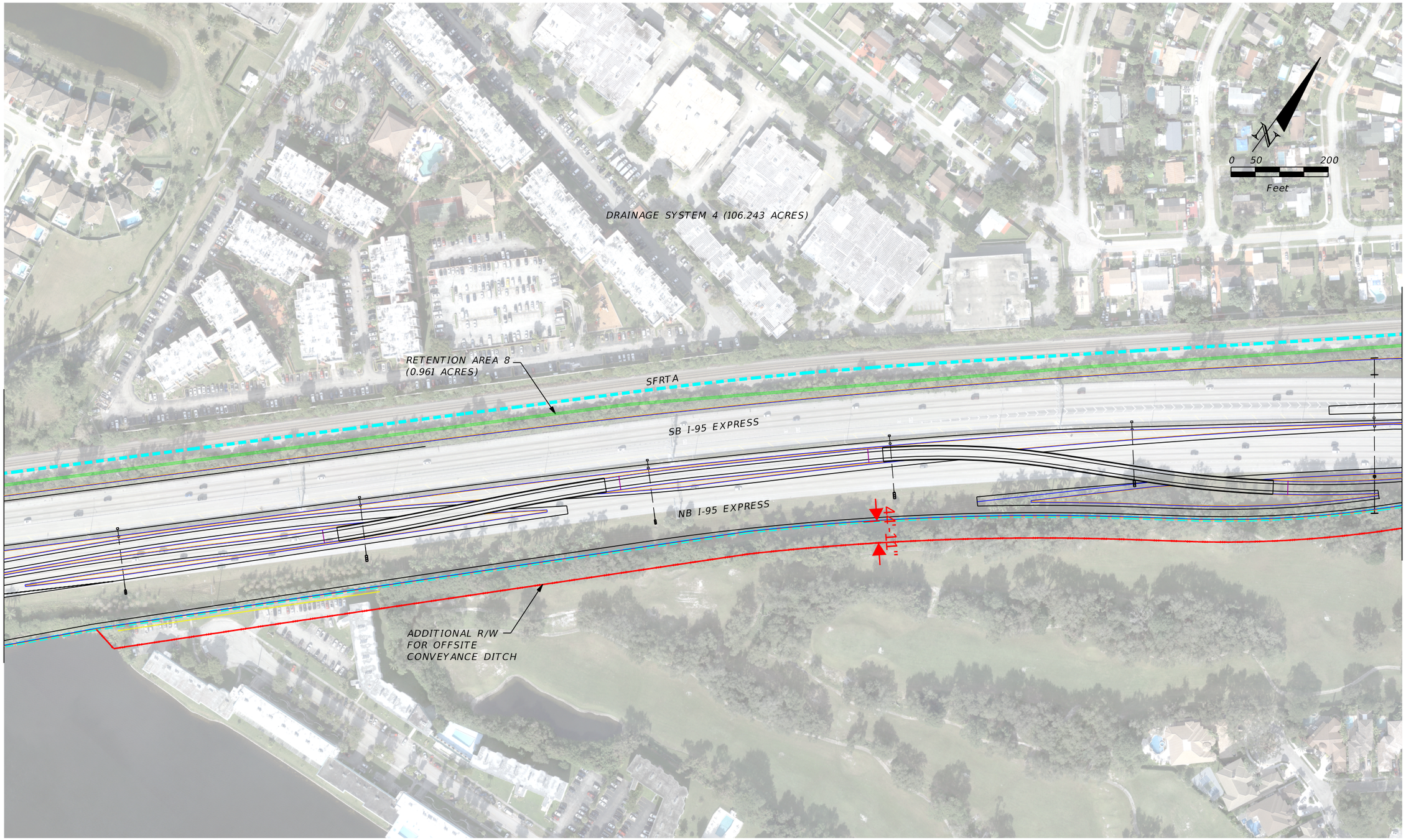
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 5

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

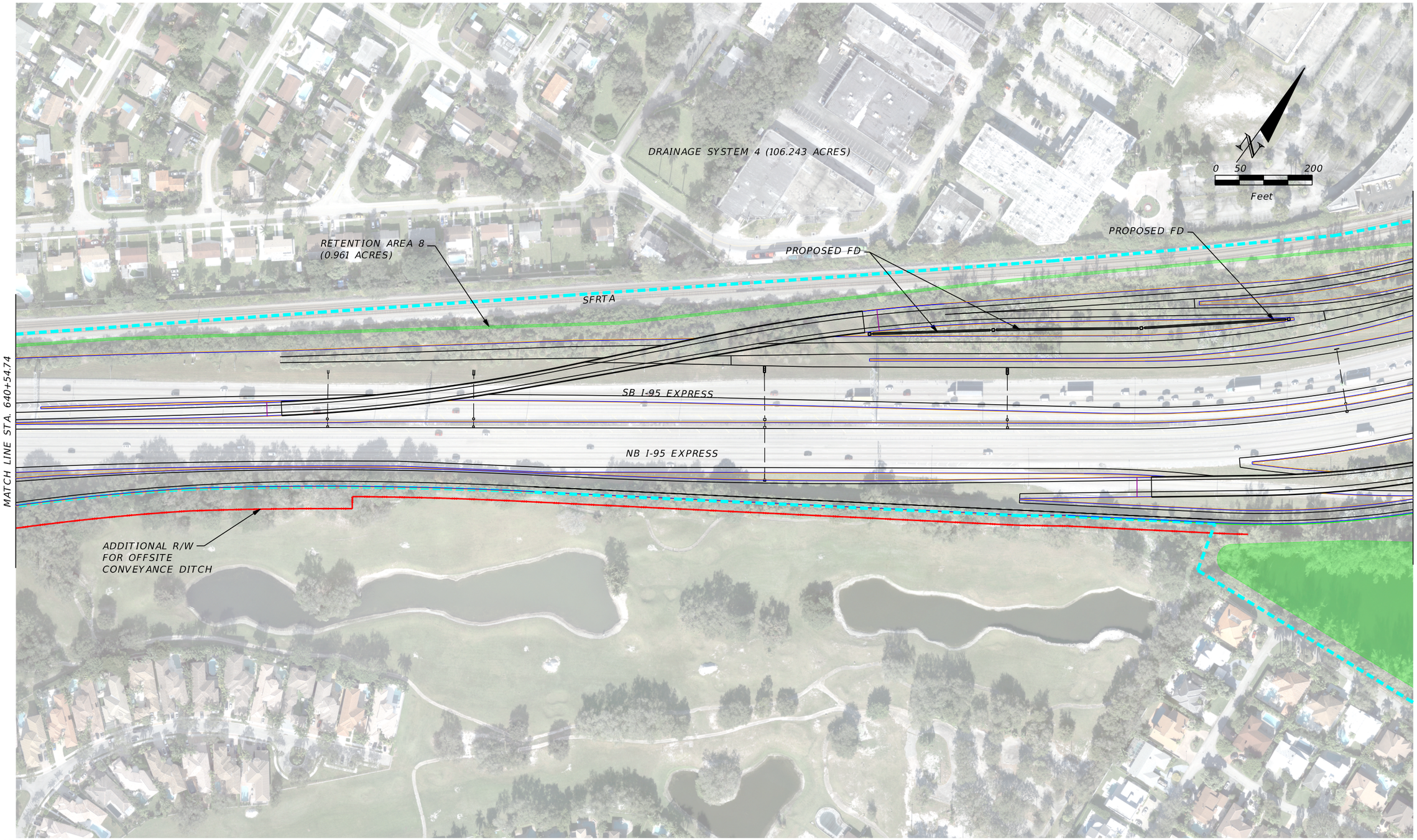
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 6

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

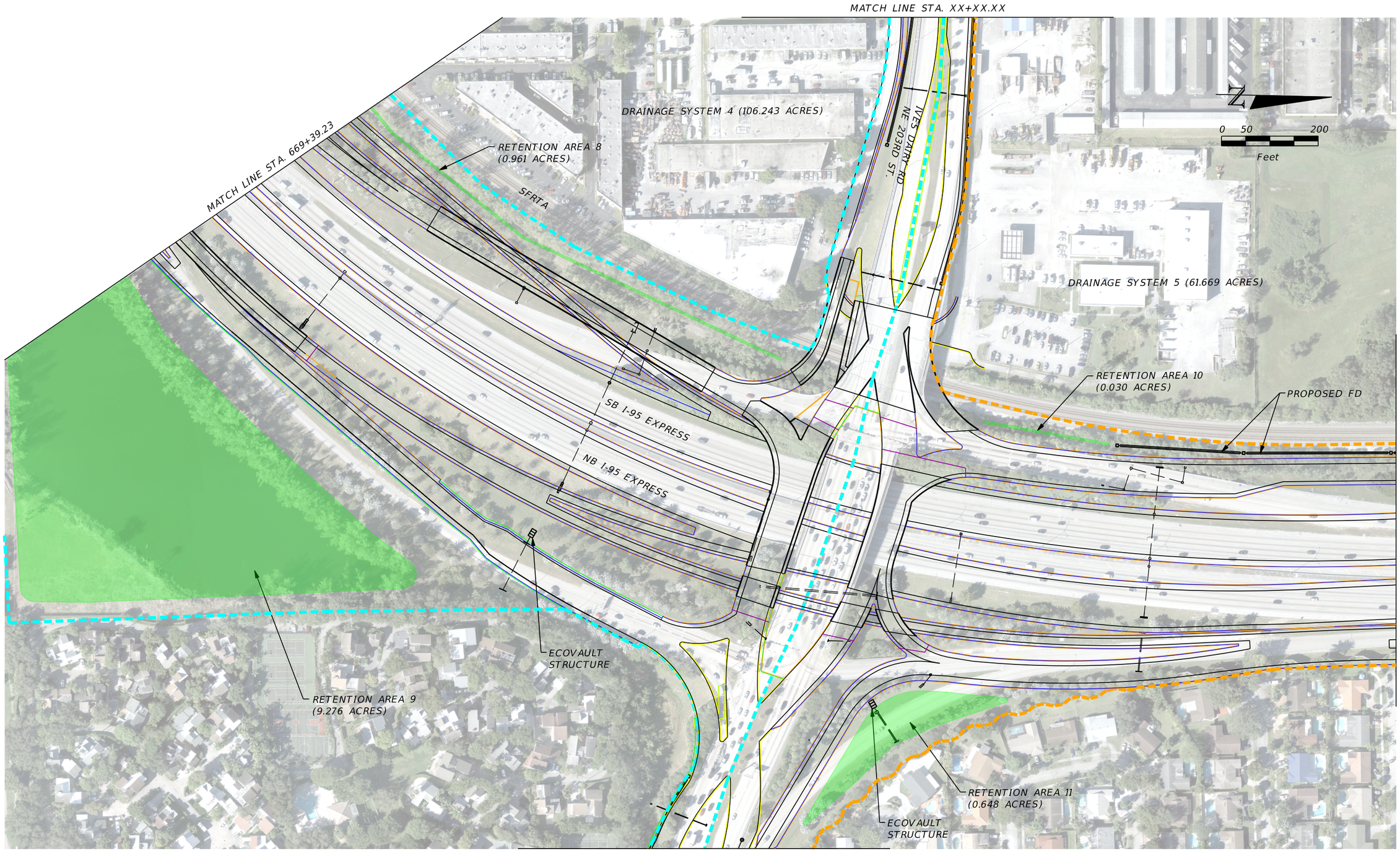
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 7

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 8

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 9



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

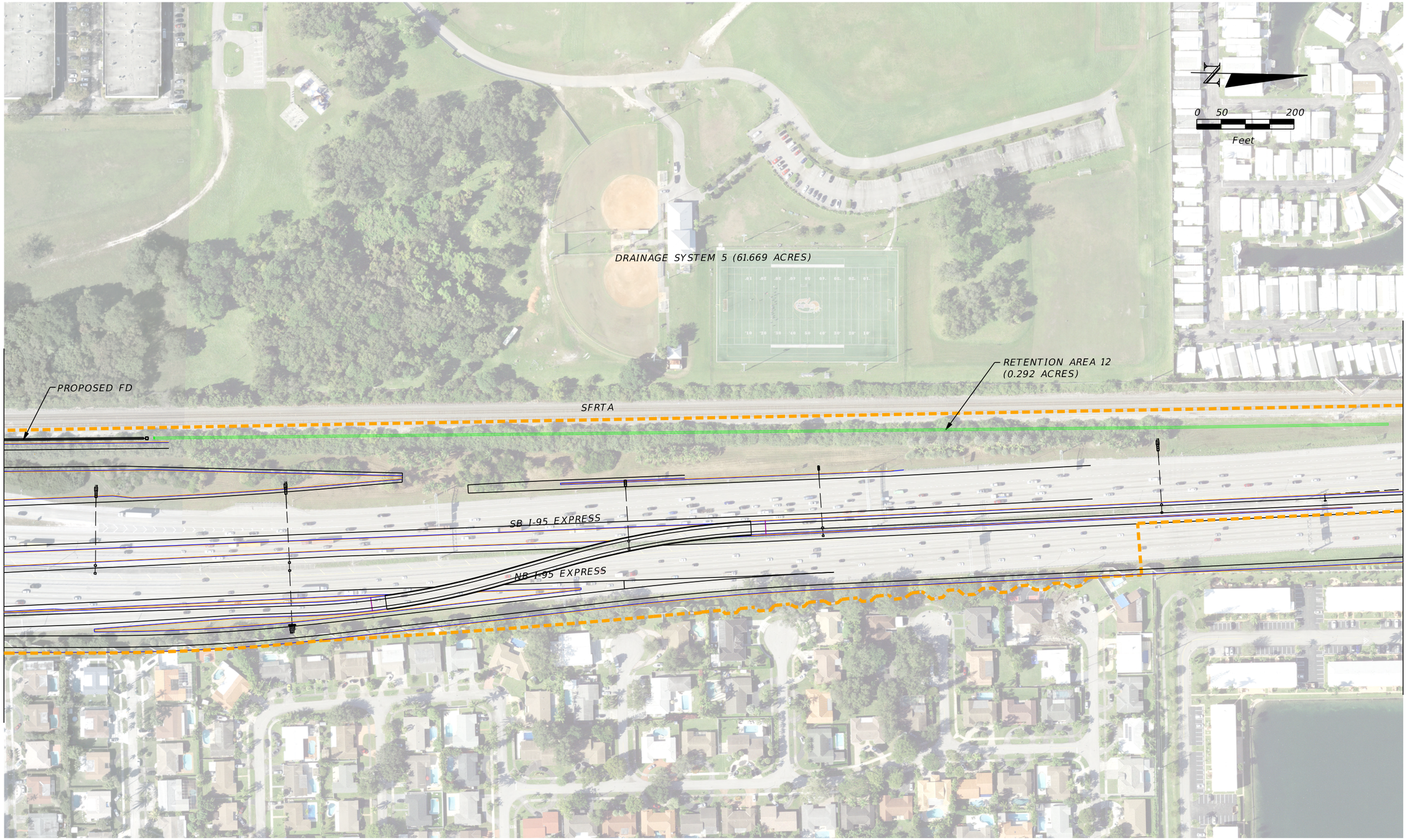
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 10

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

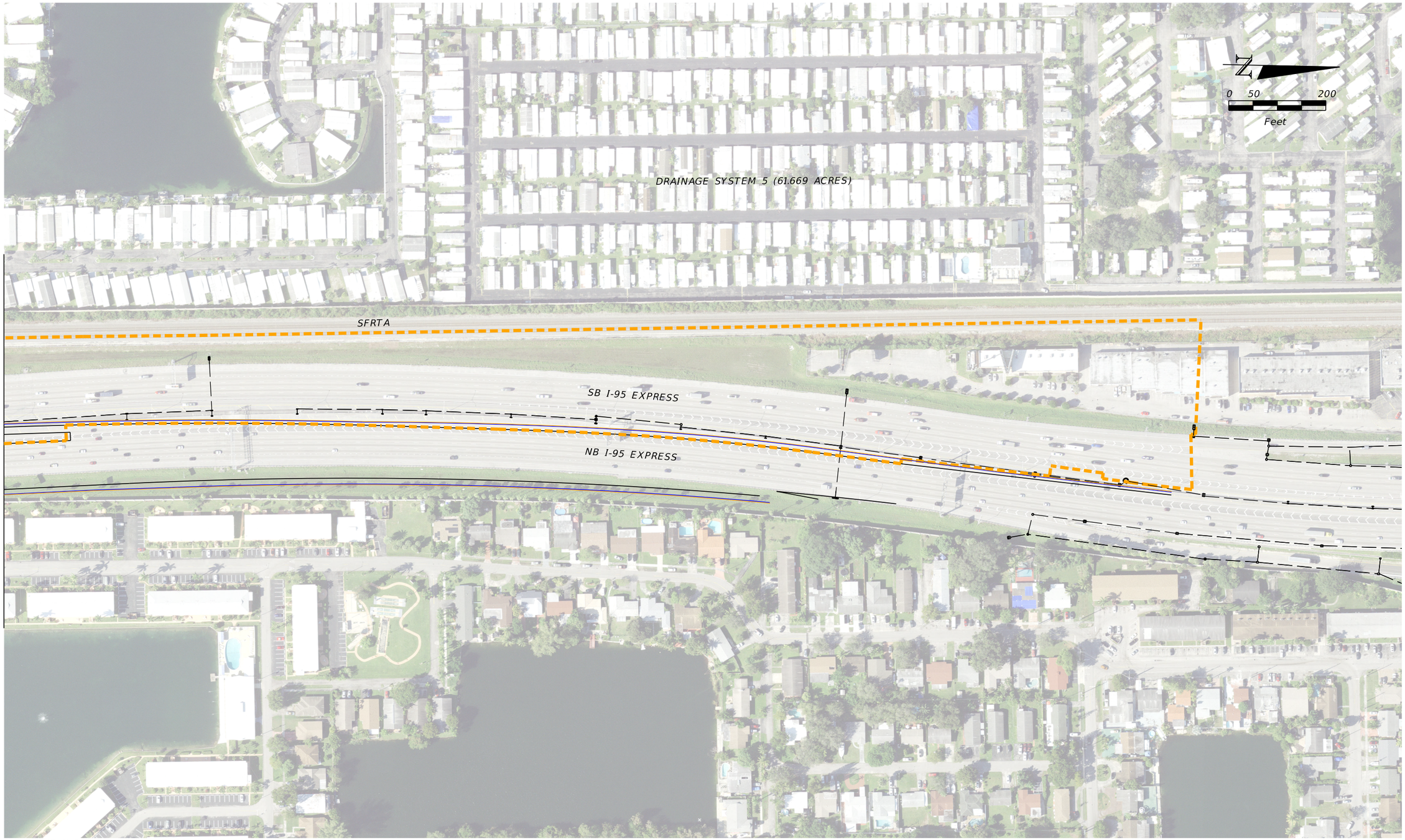
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 11

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$



DO NOT USE THE INFORMATION ON THIS SHEET FOR CONSTRUCTION PURPOSES. THIS SHEET IS IN THE PLANS FOR DOCUMENTATION AND TO ASSIST CONSTRUCTION PERSONNEL WITH DRAINAGE CONCERNS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

JUAN C. GARCIA, P.E.
P.E. No.: 46597
AECOM TECHNICAL SERVICES, INC
2 ALHAMBRA PLAZA, SUITE 900
CORAL GABLES, FL 33134

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID

DRAINAGE MAP ALTERNATIVE 3

SHEET NO. 12

$USER$ $DATE$ $TIME$ $MODELNAME$ $FILE$

APPENDIX E

Water Quality Calculations

WATER QUALITY SUMMARY

DRAINAGE SYSTEM	TOTAL AREA (AC)	TOTAL IMPER. AREA (AC)	TOTAL PERVIOUS AREA (AC)	ADDITIONAL IMPER. AREA (AC)	WATER MANAGEMENT AREA (AC)	% IMPER.	SFWMD CRITERIA			DRER CRITERIA	TREATMENT VOL. REQD. (AC-FT)	OUTFALL RECEIVING WATER BODY	SFWMD BASIN	TYPE TYPE OF TREATMENT PROVIDED	TREATMENT VOLUME PROVIDED BY PONDS (AC-FT)	TREATMENT VOLUME PROVIDED BY FRENCH DRAIN (AC.-FT.)
							TREATMENT VOL. REQD. WET DET. (AC-FT)	TREATMENT VOL. REQD. DRY DET. (AC-FT)	TREATMENT VOL. REQD. RETENTION (AC-FT)	TREATMENT VOL. REQD. (AC-FT)						
NO-BUILD ALTERNATIVE																
SYSTEM 1	15.607	13.371	2.236	0.000	0.000	85.67	2.7856	2.0892	1.3928	2.1452	2.7856	C-8 CANAL	C-8 BASIN	RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)	2.7856	0.0000
SYSTEM 2	9.671	7.683	1.988	0.000	0.000	79.44	1.6006	1.2005	0.8003	1.2912	1.6006	N/A - 100% RETENTION	C-9 EAST BASIN	N/A	0.0000	0.0000
SYSTEM 3	31.979	14.433	17.546	0.000	6.378	45.13	3.0069	2.2552	1.5034	3.5849	3.5849	C-9 CANAL	C-9 EAST BASIN	RETENTION PONDS	6.3790	0.0000
SYSTEM 4	82.923	35.814	47.109	0.000	12.523	43.19	7.4613	5.5959	3.7306	9.1974	9.1974	EXIST. LAKE	C-9 EAST BASIN	RETENTION PONDS	12.5220	0.0000
SYSTEM 5	56.037	29.401	26.636	0.000	5.027	52.47	6.1252	4.5939	3.0626	6.5349	6.5349	N/A - 100% RETENTION	C-9 EAST BASIN	RETENTION PONDS	5.0260	0.0000
SFWMD C-8 BASIN TOTALS:	**15.607**	**13.371**	**2.236**	**0.000**	**0.000**	**85.67**	**2.7856**	**2.0892**	**1.3928**	**2.1452**	**2.7856**	**C-8 CANAL**	**C-8 BASIN**	**RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)**	**2.7856**	**0.0000**
SFWMD C-9 EAST BASIN TOTALS:	**180.610**	**87.331**	**93.279**	**0.000**	**23.928**	**48.35**	**18.1940**	**13.6455**	**9.0970**	**20.6084**	**20.9179**	**C-9 CANAL**	**C-9 EAST BASIN**	**RETENTION PONDS**	**23.9270**	**0.0000**
BUILD ALTERNATIVE #1																
SYSTEM 1	15.977	14.918	1.059	1.547	0.000	93.37	3.1079	2.3309	1.5540	2.2741	3.1079	C-8 CANAL	C-8 BASIN	RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)	3.1079	0.0000
SYSTEM 2	10.490	9.935	0.555	2.252	0.000	94.71	2.0698	1.5523	1.0349	1.5020	2.0698	N/A - 100% RETENTION	C-9 EAST BASIN	FRENCH DRAINS	0.0000	0.3021
SYSTEM 3	26.824	18.546	8.278	4.113	5.675	69.14	3.8638	2.8978	1.9319	3.4071	3.8638	C-9 CANAL	C-9 EAST BASIN	RETENTION PONDS	7.3750	0.1964
SYSTEM 4	91.622	57.483	34.139	15.113	7.327	62.74	11.9756	8.9817	5.9878	11.2700	11.9756	EXIST. LAKE	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	12.8260	0.7086
SYSTEM 5	61.136	36.653	24.483	2.107	5.239	59.95	7.6360	5.7270	3.8180	7.4137	7.6360	N/A - 100% RETENTION	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	6.5090	0.2101
SFWMD C-8 BASIN TOTALS:	**15.977**	**14.918**	**1.059**	**1.547**	**0.000**	**93.372**	**3.108**	**2.331**	**1.554**	**2.274**	**3.108**	**C-8 CANAL**	**C-8 BASIN**	**RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)**	**3.1079**	**0.0000**
SFWMD C-9 EAST BASIN TOTALS:	**190.072**	**122.617**	**67.455**	**23.585**	**18.241**	**286.541**	**25.545**	**19.159**	**12.773**	**23.593**	**25.545**	**C-9 CANAL**	**C-9 EAST BASIN**	**RETENTION PONDS, FRENCH DRAINS, AND ECO VAULT STRUCTURE**	**26.7100**	**1.4172**
BUILD ALTERNATIVE #2																
SYSTEM 1	16.075	15.281	0.794	1.910	0.000	95.06	3.1835	2.3877	1.5918	2.3054	3.1835	C-8 CANAL	C-8 BASIN	RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)	3.1835	0.0000
SYSTEM 2	10.858	9.823	1.035	2.140	0.000	90.47	2.0465	1.5348	1.0232	1.5255	2.0465	N/A - 100% RETENTION	C-9 EAST BASIN	FRENCH DRAINS	0.0000	0.3429
SYSTEM 3	44.327	32.401	11.926	6.950	5.755	73.10	6.7502	5.0627	3.3751	5.7405	6.7502	C-9 CANAL	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	5.7550	0.3005
SYSTEM 4	93.121	71.802	21.319	29.163	1.965	77.11	14.9588	11.2191	7.4794	12.2950	14.9588	EXIST. LAKE	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	1.9650	0.4184
SYSTEM 5	60.636	43.023	17.613	9.092	3.147	70.95	8.9631	6.7223	4.4816	7.7708	8.9631	N/A - 100% RETENTION	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	3.1460	0.4180
SFWMD C-8 BASIN TOTALS:	**16.075**	**15.281**	**0.794**	**1.910**	**0.000**	**95.061**	**3.184**	**2.388**	**1.592**	**2.305**	**3.184**	**C-8 CANAL**	**C-8 BASIN**	**RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)**	**3.1835**	**0.0000**
SFWMD C-9 EAST BASIN TOTALS:	**208.942**	**157.049**	**51.893**	**47.345**	**10.866**	**311.622**	**32.719**	**24.539**	**16.359**	**27.332**	**32.719**	**C-9 CANAL**	**C-9 EAST BASIN**	**RETENTION PONDS, FRENCH DRAINS, AND ECO VAULT STRUCTURE**	**10.8660**	**1.4798**
BUILD ALTERNATIVE #3																
SYSTEM 1	16.087	15.344	0.743	1.973	0.000	95.38	3.1967	2.3975	1.5983	2.3104	3.1967	C-8 CANAL	C-8 BASIN	RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)	3.1967	0.0000
SYSTEM 2	11.403	10.421	0.982	2.738	0.000	91.39	2.1710	1.6283	1.0855	1.6087	2.1710	N/A - 100% RETENTION	C-9 EAST BASIN	FRENCH DRAINS	0.0000	0.4310
SYSTEM 3	48.545	35.420	13.125	9.104	6.165	72.96	7.3792	5.5344	3.6896	6.2827	7.3792	C-9 CANAL	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	6.1650	0.3005
SYSTEM 4	106.243	80.444	25.799	38.315	10.237	75.72	16.7592	12.5694	8.3796	13.9344	16.7592	EXIST. LAKE	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	10.2370	0.6358
SYSTEM 5	61.669	43.131	18.538	9.157	0.970	69.94	8.9856	6.7392	4.4928	7.8639	8.9856	N/A - 100% RETENTION	C-9 EAST BASIN	RETENTION PONDS AND FRENCH DRAINS	0.9700	1.1797
SFWMD C-8 BASIN TOTALS:	**16.087**	**15.344**	**0.743**	**1.973**	**0.000**	**95.381**	**3.197**	**2.398**	**1.598**	**2.310**	**3.197**	**C-8 CANAL**	**C-8 BASIN**	**RETENTION PONDS (WITHIN THE ADJACENT GOLDEN GLADES INTERCHANGE)**	**3.1967**	**0.0000**
SFWMD C-9 EAST BASIN TOTALS:	**227.860**	**169.416**	**58.444**	**59.314**	**17.372**	**310.008**	**35.295**	**26.471**	**17.648**	**29.690**	**35.295**	**C-9 CANAL**	**C-9 EAST BASIN**	**RETENTION PONDS, FRENCH DRAINS, AND ECO VAULT STRUCTURE**	**17.3720**	**2.5470**

NO-BUILD ALTERNATIVE
DRAINAGE SYSTEM 3
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
1	3.421	1	3.421
2	0.638	1	0.638
3	0.939	1	0.939
4	0.217	1	0.217
5	0.185	1	0.185
6	0.979	1	0.979

TOTAL: 6.379

NO-BUILD ALTERNATIVE
DRAINAGE SYSTEM 4
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
7	6.212	1	6.212
8	3.167	1	3.167
9	3.143	1	3.143

TOTAL: 12.522

NO-BUILD ALTERNATIVE
DRAINAGE SYSTEM 5
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
10	0.359	1	0.359
11	0.806	1	0.806
12	0.692	1	0.692
13	0.500	1	0.500
14	2.669	1	2.669

TOTAL: 5.026

BUILD ALTERNATIVE #1
DRAINAGE SYSTEM 3
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
1	3.056	1	3.056
2	2.676	1	2.676
3	1.328	1	1.328
4	0.158	1	0.158
5	0.111	1	0.111
6	0.046	1	0.046

TOTAL: 7.375

BUILD ALTERNATIVE #1
DRAINAGE SYSTEM 4
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
7	0.546	1	0.546
8	0.068	1	0.068
9	0.290	1	0.290
10	0.353	1	4.353
11	7.569	1	7.569

TOTAL: 12.826

BUILD ALTERNATIVE #1
DRAINAGE SYSTEM 5
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
12	1.355	1	1.355
13	1.168	1	1.168
14	3.986	1	3.986

TOTAL: 6.509

BUILD ALTERNATIVE #2
DRAINAGE SYSTEM 3
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
1	3.575	1	3.575
2	0.330	1	0.330
3	0.347	1	0.347
4	1.243	1	1.243
5	0.260	1	0.260

TOTAL: 5.755

BUILD ALTERNATIVE #2
DRAINAGE SYSTEM 4
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
6	0.578	1	0.578
7	0.685	1	0.685
8	0.135	1	0.135
9	0.567	1	0.567

TOTAL: 1.965

BUILD ALTERNATIVE #2
DRAINAGE SYSTEM 5
(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
10	2.461	1	2.461
11	0.343	1	0.343
12	0.342	1	0.342

TOTAL: 3.146

BUILD ALTERNATIVE #3

DRAINAGE SYSTEM 3

(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
1	2.919	1	2.919
2	1.032	1	1.032
3	0.253	1	0.253
4	0.742	1	0.742
5	0.137	1	0.137
6	0.360	1	0.360
7	0.722	1	0.722

TOTAL: 6.165

BUILD ALTERNATIVE #3

DRAINAGE SYSTEM 4

(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
8	0.961	1	0.961
9	9.276	1	9.276

TOTAL: 10.237

BUILD ALTERNATIVE #3

DRAINAGE SYSTEM 5

(RETENTION POND WATER QUALITY VOLUME)

RETENTION POND	STORAGE AREA (ACRES)	ASSUMED POND STORAGE DEPTH (FEET)	STORAGE VOLUME (AC.-FT.)
10	0.030	1	0.030
11	0.648	1	0.648
12	0.292	1	0.292

TOTAL: 0.970

AECOM

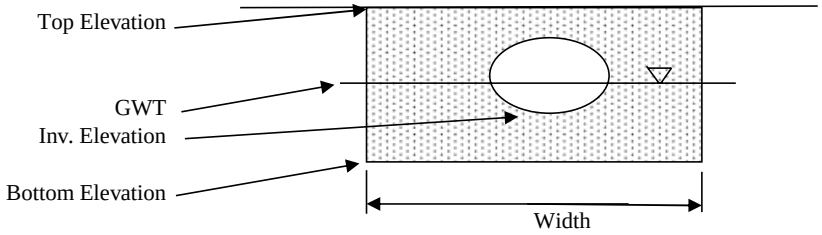
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #1)
DRAINAGE SYSTEM 2

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**10.490**	acres.			
Impervious Area =	**9.935**	acres.	(C =	**0.95**	)
Pervious Area =	**0.555**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**792**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	3.105	ac.-ft. or	0.383	hectare-meters.
1 inch VOLUME =	1.311	ac.-ft. or	0.162	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**3.105**	**ac.-ft. or**	**0.383**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**2.329**	**ac.-ft. or**	**0.287**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**1.552**	**ac.-ft. or**	**0.192**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**1.552**	**ac.-ft. or**	**0.192**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**4.245**	hectares or	**10.490**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**4.021**	hectares or	**9.935**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**0.225**	hectares or	**0.555**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**4.245**	hectares or	**10.490**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**4.021**	hectares or	**9.935**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**0.225**	hectares or	**0.555**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

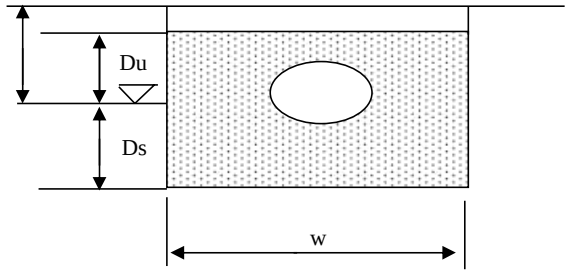
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**9.79**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**19.79**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**1 852.827**	**cu. meters or**	**65,432**	**cu. ft.**
Vtrmt =	**0.185**	**hectare-meters or**	**1.502**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**792.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.3021 ac.-ft.**

AECOM

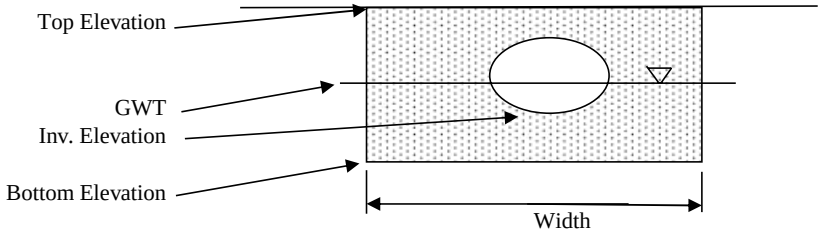
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #1)
DRAINAGE SYSTEM 3

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**26.824**	acres.			
Impervious Area =	**18.546**	acres.	(C =	**0.95**	)
Pervious Area =	**8.278**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**515**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	5.796	ac.-ft. or	0.715	hectare-meters.
1 inch VOLUME =	3.353	ac.-ft. or	0.414	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**5.796**	**ac.-ft. or**	**0.715**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**4.347**	**ac.-ft. or**	**0.536**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**2.898**	**ac.-ft. or**	**0.358**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**2.898**	**ac.-ft. or**	**0.358**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**10.856**	hectares or	**26.824**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**7.505**	hectares or	**18.546**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**3.350**	hectares or	**8.278**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**10.856**	hectares or	**26.824**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**7.505**	hectares or	**18.546**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**3.350**	hectares or	**8.278**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

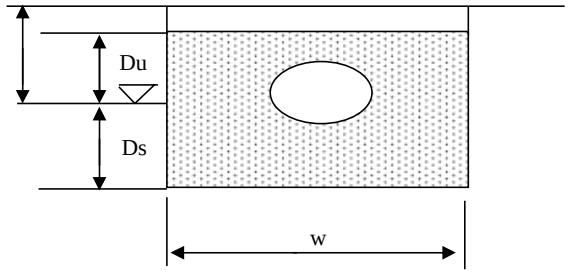
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**12.83**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**22.83**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**4 202.747**	**cu. meters or**	**148,418**	**cu. ft.**
Vtrmt =	**0.420**	**hectare-meters or**	**3.407**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**515.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.1964 ac.-ft.**

AECOM

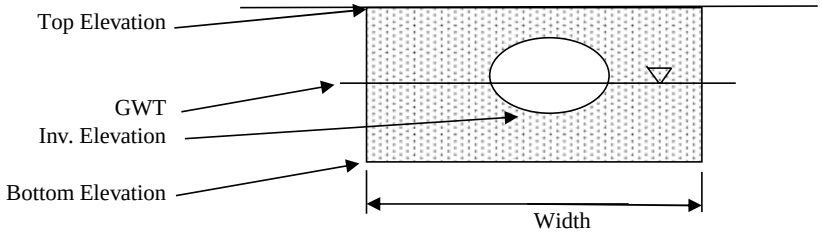
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #1)
DRAINAGE SYSTEM 4

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**91.622**	acres.			
Impervious Area =	**57.483**	acres.	(C =	**0.95**	)
Pervious Area =	**34.139**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**1858**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	17.963	ac.-ft. or	2.217	hectare-meters.
1 inch VOLUME =	11.453	ac.-ft. or	1.413	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**17.963**	**ac.-ft. or**	**2.217**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**13.473**	**ac.-ft. or**	**1.663**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**8.982**	**ac.-ft. or**	**1.108**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**8.982**	**ac.-ft. or**	**1.108**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**37.079**	hectares or	**91.622**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**23.263**	hectares or	**57.483**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**13.816**	hectares or	**34.139**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**37.079**	hectares or	**91.622**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**23.263**	hectares or	**57.483**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**13.816**	hectares or	**34.139**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

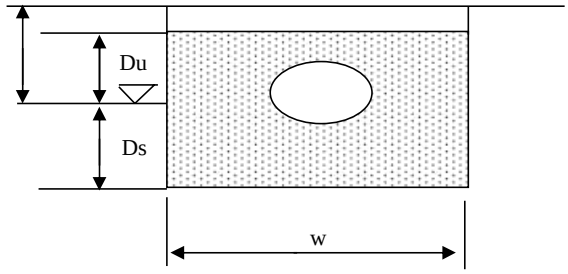
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**13.92**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**23.92**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**########**	**cu. meters or**	**490,941**	**cu. ft.**
Vtrmt =	**1.391**	**hectare-meters or**	**11.270**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**1858.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$* L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.7086 ac.-ft.**

AECOM

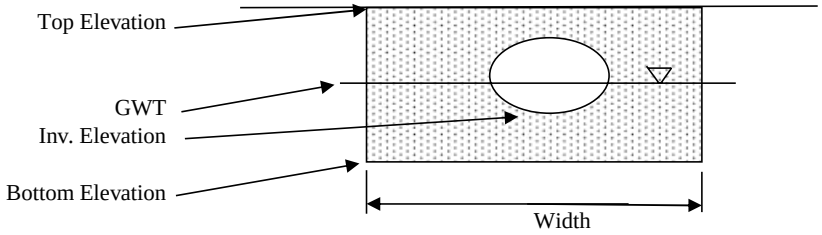
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #1)
DRAINAGE SYSTEM 5

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**61.136**	acres.			
Impervious Area =	**36.653**	acres.	(C =	**0.95**	)
Pervious Area =	**24.483**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**551**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	11.454	ac.-ft. or	1.413	hectare-meters.
1 inch VOLUME =	7.642	ac.-ft. or	0.943	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**11.454**	**ac.-ft. or**	**1.413**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**8.591**	**ac.-ft. or**	**1.060**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**5.727**	**ac.-ft. or**	**0.707**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**5.727**	**ac.-ft. or**	**0.707**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**24.741**	hectares or	**61.136**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**14.833**	hectares or	**36.653**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**9.908**	hectares or	**24.483**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**24.741**	hectares or	**61.136**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**14.833**	hectares or	**36.653**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**9.908**	hectares or	**24.483**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

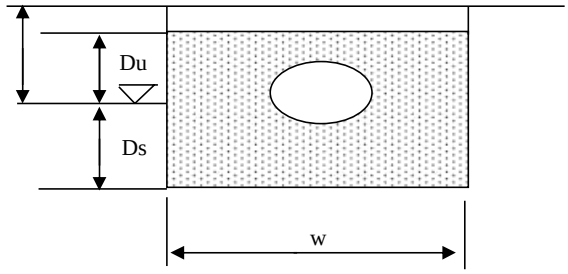
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**14.45**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**24.45**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**9 145.136**	**cu. meters or**	**322,956**	**cu. ft.**
Vtrmt =	**0.915**	**hectare-meters or**	**7.414**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**551.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.2101 ac.-ft.**

AECOM

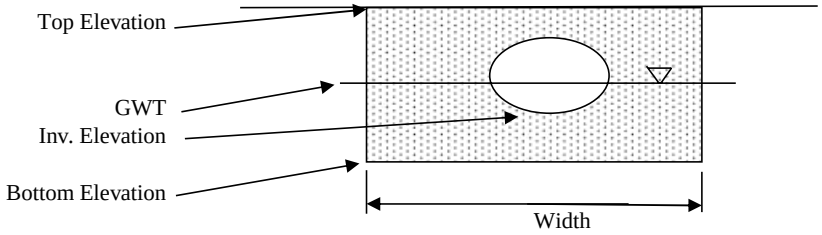
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #2)
DRAINAGE SYSTEM 2

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**10.858**	acres.			
Impervious Area =	**9.823**	acres.	(C =	**0.95**	)
Pervious Area =	**1.035**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**899**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	3.070	ac.-ft. or	0.379	hectare-meters.
1 inch VOLUME =	1.357	ac.-ft. or	0.167	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**3.070**	**ac.-ft. or**	**0.379**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**2.302**	**ac.-ft. or**	**0.284**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**1.535**	**ac.-ft. or**	**0.189**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**1.535**	**ac.-ft. or**	**0.189**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**4.394**	hectares or	**10.858**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**3.975**	hectares or	**9.823**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**0.419**	hectares or	**1.035**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**4.394**	hectares or	**10.858**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**3.975**	hectares or	**9.823**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**0.419**	hectares or	**1.035**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

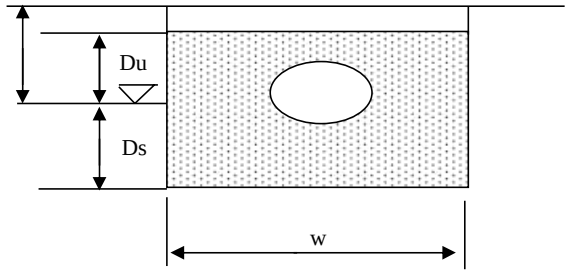
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**10.19**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**20.19**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**1 881.722**	**cu. meters or**	**66,452**	**cu. ft.**
Vtrmt =	**0.188**	**hectare-meters or**	**1.526**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**899.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.3429 ac.-ft.**

AECOM

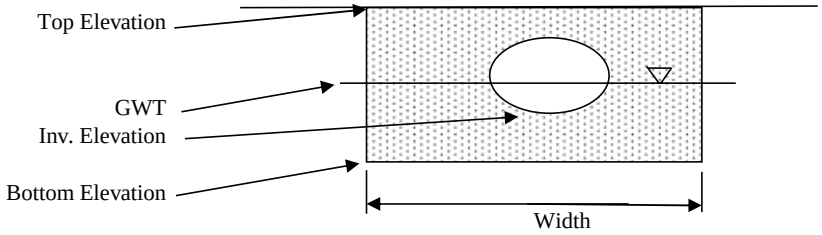
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #2)
DRAINAGE SYSTEM 3

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**44.327**	acres.			
Impervious Area =	**32.401**	acres.	(C =	**0.95**	)
Pervious Area =	**11.926**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**788**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	10.125	ac.-ft. or	1.249	hectare-meters.
1 inch VOLUME =	5.541	ac.-ft. or	0.684	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**10.125**	**ac.-ft. or**	**1.249**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**7.594**	**ac.-ft. or**	**0.937**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**5.063**	**ac.-ft. or**	**0.625**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**5.063**	**ac.-ft. or**	**0.625**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**17.939**	hectares or	**44.327**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**13.113**	hectares or	**32.401**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**4.826**	hectares or	**11.926**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**17.939**	hectares or	**44.327**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**13.113**	hectares or	**32.401**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**4.826**	hectares or	**11.926**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

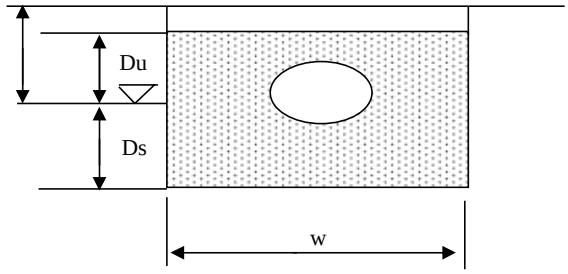
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**12.25**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**22.25**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**7 081.118**	**cu. meters or**	**250,066**	**cu. ft.**
Vtrmt =	**0.708**	**hectare-meters or**	**5.741**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**788.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.3005 ac.-ft.**

AECOM

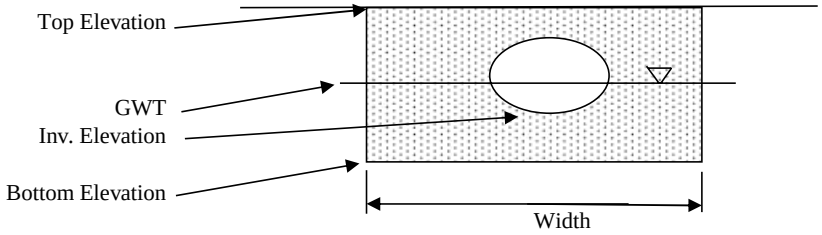
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #2)
DRAINAGE SYSTEM 4

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**93.121**	acres.			
Impervious Area =	**71.802**	acres.	(C =	**0.95**	)
Pervious Area =	**21.319**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**1097**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	22.438	ac.-ft. or	2.769	hectare-meters.
1 inch VOLUME =	11.640	ac.-ft. or	1.436	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**22.438**	**ac.-ft. or**	**2.769**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**16.829**	**ac.-ft. or**	**2.077**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**11.219**	**ac.-ft. or**	**1.384**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**11.219**	**ac.-ft. or**	**1.384**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**37.686**	hectares or	**93.121**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**29.058**	hectares or	**71.802**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**8.628**	hectares or	**21.319**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**37.686**	hectares or	**93.121**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**29.058**	hectares or	**71.802**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**8.628**	hectares or	**21.319**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

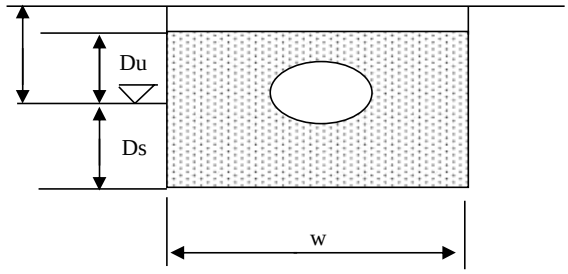
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**11.70**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**21.70**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**########**	**cu. meters or**	**535,588**	**cu. ft.**
Vtrmt =	**1.517**	**hectare-meters or**	**12.295**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**1097.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.4184 ac.-ft.**

AECOM

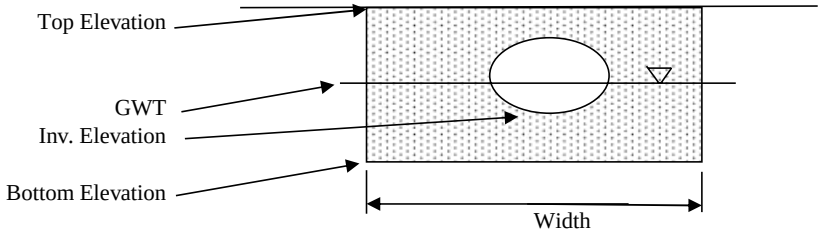
Made by: JCG **Date:** 8/10/2023
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #2)
DRAINAGE SYSTEM 5

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**60.636**	acres.			
Impervious Area =	**43.023**	acres.	(C =	**0.95**	)
Pervious Area =	**17.613**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**1096**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	13.445	ac.-ft. or	1.659	hectare-meters.
1 inch VOLUME =	7.580	ac.-ft. or	0.935	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**13.445**	**ac.-ft. or**	**1.659**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**10.084**	**ac.-ft. or**	**1.244**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**6.722**	**ac.-ft. or**	**0.830**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**6.722**	**ac.-ft. or**	**0.830**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**24.539**	hectares or	**60.636**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**17.411**	hectares or	**43.023**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**7.128**	hectares or	**17.613**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**24.539**	hectares or	**60.636**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**17.411**	hectares or	**43.023**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**7.128**	hectares or	**17.613**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

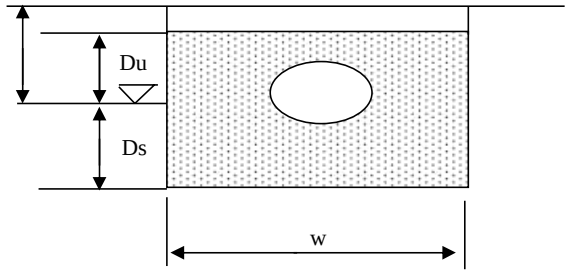
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**12.56**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**22.56**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**9 585.598**	**cu. meters or**	**338,510**	**cu. ft.**
Vtrmt =	**0.959**	**hectare-meters or**	**7.771**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**1096.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.4180 ac.-ft.**

AECOM

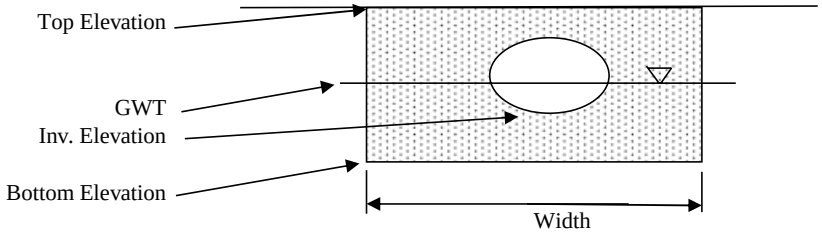
Made by: JCG **Date:** 1/6/2025
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #3)
DRAINAGE SYSTEM 2

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**11.403**	acres.			
Impervious Area =	**10.421**	acres.	(C =	**0.95**	)
Pervious Area =	**0.982**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**1130**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	3.257	ac.-ft. or	0.402	hectare-meters.
1 inch VOLUME =	1.425	ac.-ft. or	0.176	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**3.257**	**ac.-ft. or**	**0.402**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**2.442**	**ac.-ft. or**	**0.301**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**1.628**	**ac.-ft. or**	**0.201**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**1.628**	**ac.-ft. or**	**0.201**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**4.615**	hectares or	**11.403**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**4.217**	hectares or	**10.421**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**0.397**	hectares or	**0.982**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**4.615**	hectares or	**11.403**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**4.217**	hectares or	**10.421**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**0.397**	hectares or	**0.982**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

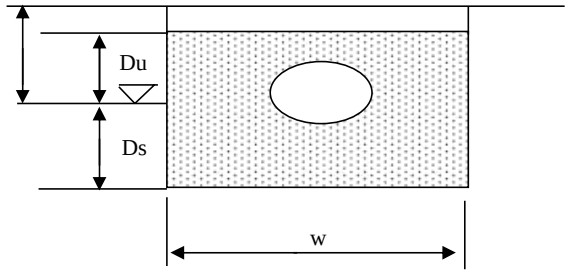
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**10.10**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**20.10**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**1 984.395**	**cu. meters or**	**70,078**	**cu. ft.**
Vtrmt =	**0.199**	**hectare-meters or**	**1.609**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**1130.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.4310 ac.-ft.**

AECOM

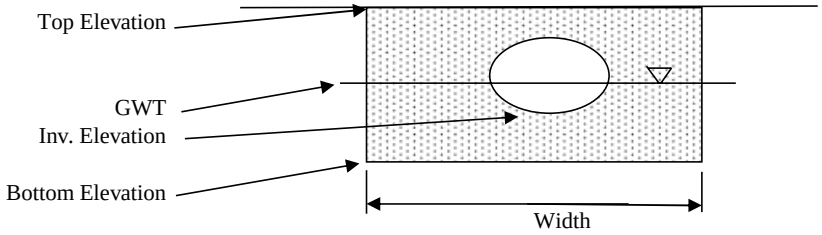
Made by: JCG **Date:** 1/6/2025
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #3)
DRAINAGE SYSTEM 3

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**48.545**	acres.			
Impervious Area =	**35.420**	acres.	(C =	**0.95**	)
Pervious Area =	**13.125**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**788**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	11.069	ac.-ft. or	1.366	hectare-meters.
1 inch VOLUME =	6.068	ac.-ft. or	0.749	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**11.069**	**ac.-ft. or**	**1.366**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**8.302**	**ac.-ft. or**	**1.024**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**5.534**	**ac.-ft. or**	**0.683**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**5.534**	**ac.-ft. or**	**0.683**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**19.646**	hectares or	**48.545**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**14.334**	hectares or	**35.420**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**5.312**	hectares or	**13.125**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**19.646**	hectares or	**48.545**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**14.334**	hectares or	**35.420**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**5.312**	hectares or	**13.125**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

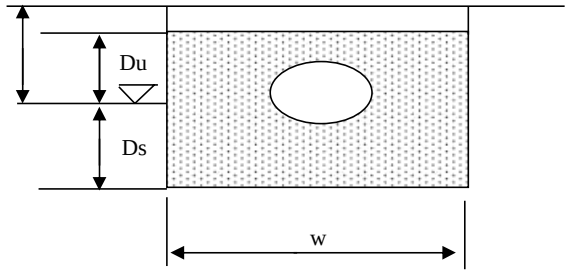
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**12.27**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**22.27**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**7 749.948**	**cu. meters or**	**273,685**	**cu. ft.**
Vtrmt =	**0.775**	**hectare-meters or**	**6.283**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**788.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.3005 ac.-ft.**

AECOM

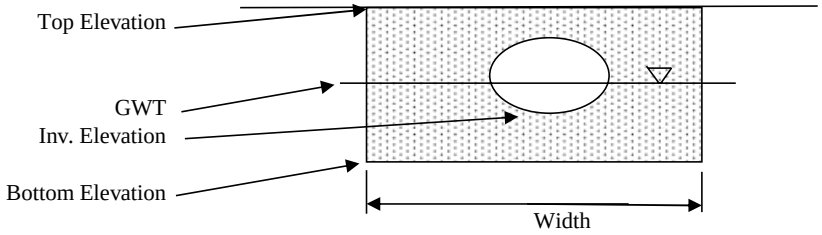
Made by: JCG **Date:** 1/6/2025
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #3)
DRAINAGE SYSTEM 4

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**106.243**	acres.			
Impervious Area =	**80.444**	acres.	(C =	**0.95**	)
Pervious Area =	**25.799**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**1667**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	25.139	ac.-ft. or	3.102	hectare-meters.
1 inch VOLUME =	13.280	ac.-ft. or	1.639	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**25.139**	**ac.-ft. or**	**3.102**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**18.854**	**ac.-ft. or**	**2.327**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**12.569**	**ac.-ft. or**	**1.551**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**12.569**	**ac.-ft. or**	**1.551**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**42.996**	hectares or	**106.243**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**32.555**	hectares or	**80.444**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**10.441**	hectares or	**25.799**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**42.996**	hectares or	**106.243**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**32.555**	hectares or	**80.444**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**10.441**	hectares or	**25.799**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

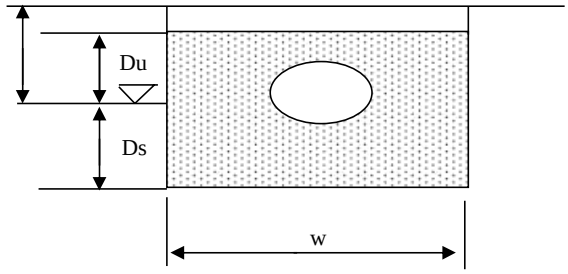
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**11.89**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**21.89**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**########**	**cu. meters or**	**607,004**	**cu. ft.**
Vtrmt =	**1.720**	**hectare-meters or**	**13.935**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**1667.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **0.6358 ac.-ft.**

AECOM

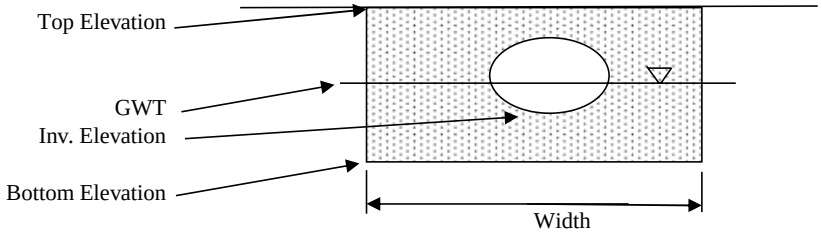
Made by: JCG **Date:** 1/6/2025
Checked by: **Time:** 8:00 AM

I-95 (BUILD ALTERNATIVE #3)
DRAINAGE SYSTEM 5

FRENCH DRAIN WATER QUALITY CALCULATIONS

Total Drainage Area =	**61.669**	acres.			
Impervious Area =	**43.131**	acres.	(C =	**0.95**	)
Pervious Area =	**18.538**	acres.	(C =	**0.25**	)

Lowest Inlet Elev. = **3.00** ft. NAVD. (= assumed lowest drainage structure elevation)



Proposed Exfiltration Trench:

Top Elevation =	**2.50**	ft. NAVD
GWT =	**0.97**	ft. NAVD
Pipe Diameter=	**36**	inches
Inv. Elevation =	**-3.83**	ft. NAVD
Bottom Elevation =	**-12.00**	ft. NAVD
Width =	**5.00**	feet.
Length =	**3093**	feet.

Weighted k (0'-10') =	**8.00E-05**	cfs/sf-ft of head (Percolation Test P-1)
Weighted k (10'-15') =	**3.03E-05**	cfs/sf-ft of head (Percolation Test P-1)
Safety Factor =	**1.0**	
Design Storm Frequency (Years)=	**10**	
Minimum Time of Concentration (Minutes)=	**10.00**	

WATER QUALITY CALCULATIONS per SFWMD

WET-DETENTION TREATMENT VOLUME = (2.5" x %impervious AREA or 1" x AREAtotal) + Additional 50%

2.50 inch VOLUME =	13.478	ac.-ft. or	1.663	hectare-meters.
1 inch VOLUME =	7.709	ac.-ft. or	0.951	hectare-meters.
WET-DETENTION VOLUMEtrmt =	**13.478**	**ac.-ft. or**	**1.663**	**hectare-meters.**

DRY-DETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **75.00%**

DRY-DETENTION VOLUMEtrmt =	**10.109**	**ac.-ft. or**	**1.247**	**hectare-meters.**

RETENTION VOLUMEtrmt = WET-DETENTION VOLUME x **50.00%**

RETENTION VOLUMEtrmt =	**6.739**	**ac.-ft. or**	**0.832**	**hectare-meters.**

TREATMENT VOLUME REQUIRED:

Vtrmt =	**6.739**	**ac.-ft. or**	**0.832**	**hectare-meters.**

BASIN DESIGN INFORMATION per DRER

TOTAL DRAINAGE AREA =	**24.957**	hectares or	**61.669**	acres.
TOTAL IMPERVIOUS DRAINAGE AREA =	**17.455**	hectares or	**43.131**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
TOTAL PERVIOUS DRAINAGE AREA =	**7.502**	hectares or	**18.538**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN DRAINAGE AREA =	**24.957**	hectares or	**61.669**	acres.
SUB-BASIN IMPERVIOUS DRAINAGE AREA =	**17.455**	hectares or	**43.131**	acres.
IMPERVIOUS RUNOFF COEFFICIENT =	**0.95**			
SUB-BASIN PERVIOUS DRAINAGE AREA =	**7.502**	hectares or	**18.538**	acres.
PERVIOUS RUNOFF COEFFICIENT =	**0.25**			
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes		
DESIGN STORM FREQUENCY =	**10**	years		

WATER QUALITY CALCULATIONS per DRER Criteria

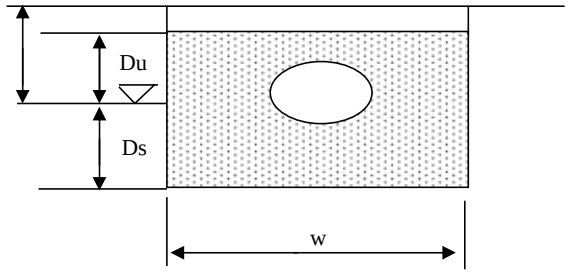
SUB-BASIN TIME OF CONCENTRATION =	**10.00**	minutes
SUB-BASIN TIME FOR FIRST INCH OF RUNOFF =	**12.71**	minutes
REQUIRED WATER QUALITY TREATMENT TIME =	**22.71**	minutes

TREATMENT VOLUME REQUIRED:

Vtrmt =	**9 700.441**	**cu. meters or**	**342,566**	**cu. ft.**
Vtrmt =	**0.970**	**hectare-meters or**	**7.864**	**ac.-ft.**

PROPOSED EXFILTRATION TRENCH DESIGN

k10 = Hyd. Conductivity 0'-10' (cfs/sf - ft)
k15 = Hyd. Conductivity 10'-15' (cfs/sf - ft)
H2 = Depth to the Water Table (ft)
W = Trench width (ft)
Du = Non-Saturated Trench Depth (ft)
Ds = Saturated Trench Depth (ft)
L = Trench Length (ft)



k10 =	**8.00E-05**	cfs/sf-ft
k15 =	**3.03E-05**	cfs/sf-ft
H2 =	**2.03**	ft.
W =	**5.00**	ft.
Du =	**1.53**	ft.
Ds =	**12.97**	ft.
SF =	**1.00**	
L =	**3093.00**	ft.

***Provided Water Quality Treatment is calculated based upon the formulas presented in Appendix F from the SFWMD Permit Information Manual Volume IV for French Drains, where the saturated depth of trench is greater than the non-saturated depth of trench.**

$$^{*}L = \frac{V}{K(2H_2D_u - D_u^2 + 2H_2D_S) + (1.39 \times 10^{-4})WD_u}$$

PROVIDED WATER QUALITY TREATMENT* = **1.1797 ac.-ft.**

APPENDIX F

EcoVault

EcoVault®

Designed and Manufactured by

EcoSense International

EcoVault® At a Glance

Second-generation (Type II) baffle box

Precast stormwater filtration system

Proven effective[1]

Exceptional nutrient removal rates:
57% Total Phosphorus
77% Fecal Coliform
79% Zinc
91% TSS

Multi-stage filtration:
Separation
Screening
Filtration

Custom-fit sizing for every project

Hydraulically checked

Side bypasses available

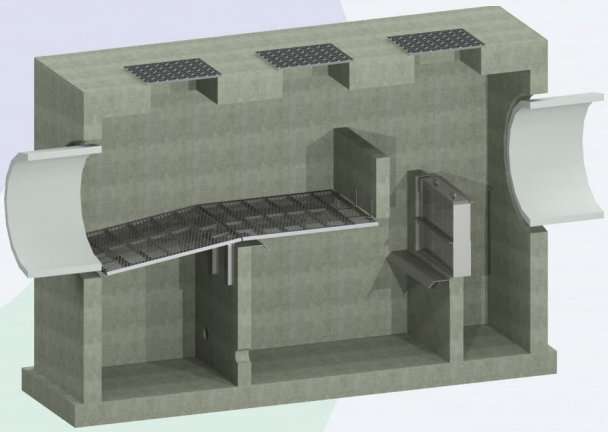
About the EcoVault®

The EcoVault® is a second-generation baffle box stormwater treatment system that demonstrates exceptional nutrient removal efficiency.

A 2014 independent study demonstrated that the EcoVault® easily exceeds the Florida Department of Environmental Protection minimum load reduction standards, and outperforms competitors' Gross Pollutant Separators.[1]

Multi-Stage Filtration

The EcoVault® multi-stage system provides separation, screening, and filtration. Unique design features allow for a quicker settling velocity, ensuring maximum particulate capture.



A 3D cutaway rendering of a typical EcoVault

The EcoVault® will remove coarse organic materials and debris, e.g. grass clippings, leaves, litter, etc. and will trap and store them above the static water line, greatly reducing decomposition and nutrient leeching. The standard debris screen configuration spans the width of the vault, creating large storage volume. Where hydraulic conditions don't allow, the screen system may be designed in a basket configuration to reduce staging in the event of impaction. The EcoVault® will also remove sediments, heavy metals, nitrogen, phosphorous, oil, and grease.

Maintaining an EcoVault®

Servicing the EcoVault® is simple with unique access hatches, and requires a vacuum truck. Quarterly inspection is recommended , and servicing should be performed on an as-needed basis.

Filter maintenance for the EcoVault® is simple, as well. It is recommended that filters should be replaced either annually, or semi-annually, depending on the local conditions. The cassettes are reusable, lowering the cost of replacement.

EcoSense International, Inc. • 1800 Huntington Lane, Rockledge, FL 32955 • Phone: 321-636-6708 • www.ecosenseint.com

Internal Components

The Baffle Buddy™ Cassette Filter is a high-flow filter integrated into the last baffle wall of the EcoVault®. It becomes the final internal weir.

Baffle Buddy™ Cassette Filters are replaceable, and contain ESI MZ Filter media, a patented modified aluminosilicate, which is designed to absorb cations and anions such as: mobile phosphorus, ammonia, chromate, selenite, sulfate, hydrocarbons (e.g. benzene, toluene, xylene), heavy metals (e.g. lead and cadmium), and various petroleum products from aqueous waste.



A Baffle Buddy™ Cassette Filter

Structure

Typically precast, though it may be cast in place, the EcoVault® is constructed of reinforced concrete to provide strength and durability. Its multi-piece construction minimizes shipping and lifting requirements, and features a slab top. Access hatches and an H-20 Load rating are standard features.

Internally, the EcoVault® features cast-integrated concrete baffles and full-width debris screens. Debris screens are expanded stainless steel with a heavy frame, and have hatches for full sump access. The elevation of debris screens may be adjusted in the field, and a self-adjusting system is available.

Sizing

Model Size length x width (ft x ft)	Typical Pipe Size (in)	80% TSS Removal Efficiency Flow (ft^3/s)	Screen Storage Capacity (ft^3)	Sediment Chamber Capacity (ft^3)	Total Containment Capacity (ft^3)
5 x 11	12 - 30	15	87	150	237
6 x 12	18 - 36	24	144	201	345
8 x 14	30 - 54	32	324	321	645
8 x 16	36 - 54	40	360	369	729
10 x 16	42 - 66	45	550	465	1015
12 x 20	54 - 72	55	1000	945	1953

Sizing may vary depending on the specific site conditions and requirements

Optional Features

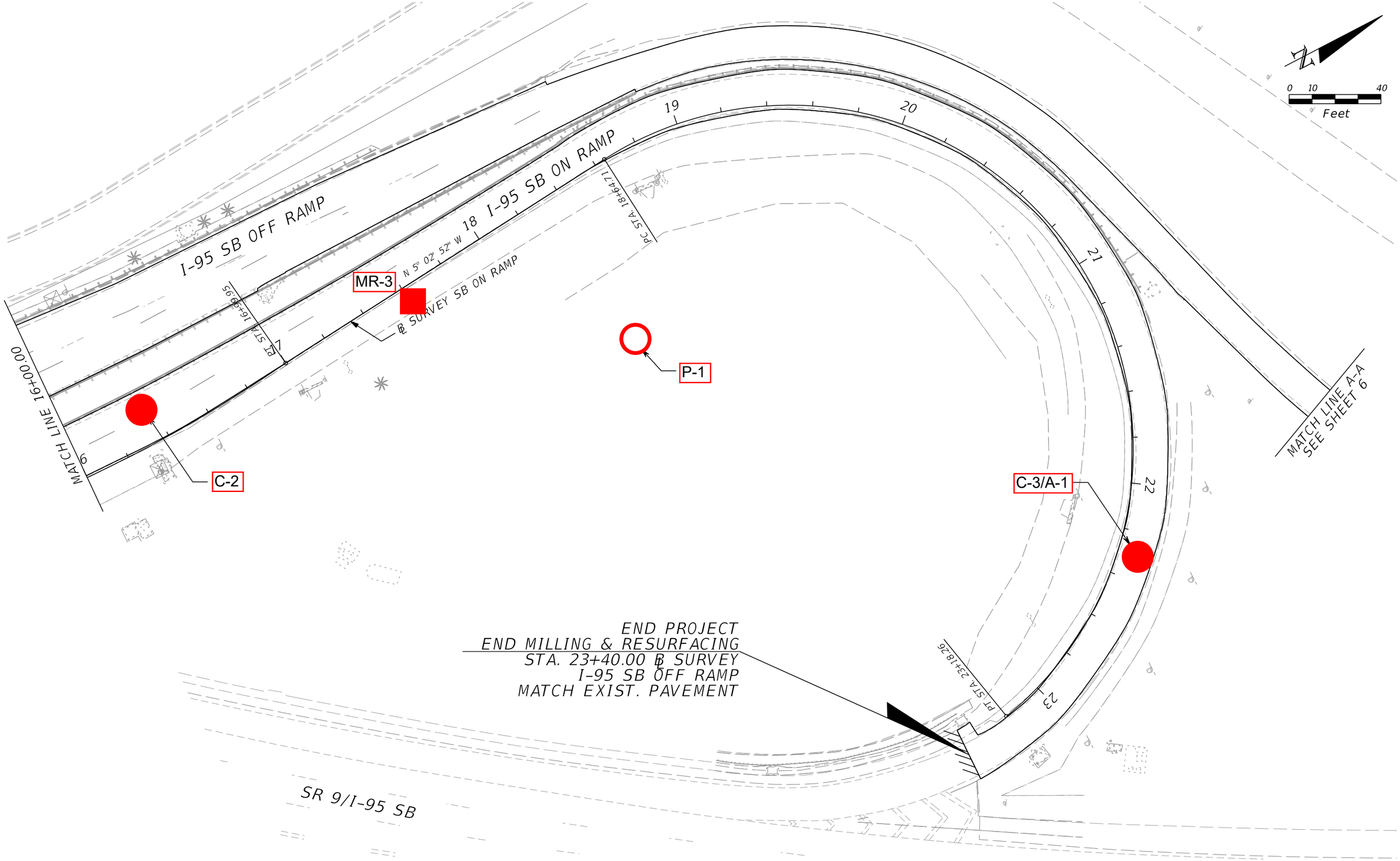
- VaultOx Static Stormwater Remediation modules
- Lakbotec Sensor Systems
- Side bypasses
- Material choice: Concrete or Fiberglass
- EcoView clear hatches

1. City of Casselberry, F. (2014). Baffle Box with Media Filtration Installation, Effectiveness Evaluation, and Associated Education for the Lake Jesup Watershed. Casselberry, FL: City of Casselberry.

To learn more about the EcoVault® and other EcoSense products, visit us at ecosenseint.com

APPENDIX G

Geotechnical Test Data



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

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ALLAN B. SEQUEIRA, P.E.
P.E. License No. 60737
AES ENGINEERING, INC
13500 S.W. 88th STREET, SUITE 265
MIAMI, FLORIDA 33186
TEL. (305) 303-8477
Certificate of Authorization No. 29369

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
9	MIAMI-DADE	425216-2-52-01

TEST LOCATION PLANS

SHEET NO. 4

TABLE 3 - SUMMARY OF ENVIRONMENTAL CLASSIFICATION TEST RESULTS
SR 9 / I-95 RAMPS ROADWAY IMPROVEMENTS
AT MIAMI GARDENS DRIVE
MIAMI-DADE COUNTY, FLORIDA
GEOSOL Project No.: 214195

Sample Location	Sample Type	Depth (ft)	pH	Resistivity (ohm-cm)	Chloride (ppm)	Sulfate (ppm)	FDOT ENVIRONMENTAL CLASSIFICATION	
							Steel	Concrete
P-1	WATER	3.1	7.6	3,110	10	6	MA	SA

NOTES: (1) The following FDOT laboratory test methods were utilized.

FM5-550: pH FM5-552: Chlorides

FM5-551: Resistivity FM5-553: Sulfates

(2) SA: SLIGHTLY AGGRESSIVE

(3) MA: MODERATELY AGGRESSIVE

(4) EA: EXTREMELY AGGRESSIVE

FDOT Criteria for Substructure Environmental Classification (FDOT *Structures Design Guidelines* 2014)

Classification	Environmental Condition	Units	Steel		Concrete	
			Water	Soil	Water	Soil
Extremely Aggressive (If any of these conditions exist)	pH		< 6.0		< 5.0	
	Cl	ppm	> 2000		> 2000	
	SO_4	ppm	N.A.		> 1500	> 2000
	Resistivity	Ohm-cm	< 1000		< 500	
Slightly Aggressive (If all of these conditions exist)	pH		> 7.0		> 6.0	
	Cl	ppm	< 500		< 500	
	SO_4	ppm	N.A.		< 150	< 1000
	Resistivity	Ohm-cm	> 5000		> 3000	
Moderately Aggressive	This classification must be used at all sites not meeting requirements for either slightly aggressive or extremely aggressive environments.					
pH = acidity ($-\log_{10}H^+$; potential of Hydrogen), Cl = chloride content, SO_4 = Sulfate content.						

Pace Analytical Services, Inc.
3610 Park Central Blvd N
Pompano Beach, FL 33064
954-582-4300

ANALYTICAL RESULTS

Project: Ramos at Miami Gardens 214195
Pace Project No.: 35171246

Sample: P-1 **Lab ID: 35171246001** Collected: 01/13/15 17:00 Received: 01/14/15 16:00 Matrix: Water

Parameters	Results	Units	PQL	MDL	DF	Prepared	Analyzed	CAS No.	Qual
4500H+ pH, Electrometric	Analytical Method: SM 4500-H+B								
Temperature, Water (C)	**24.5**	deg C	0.010	0.010	1		01/16/14 12:35		
pH at 25 Degrees C	**7.6**	Std. Units	0.10	0.10	1		01/16/14 12:35		Q
Resistivity	Analytical Method: EPA 120.1 Resistivity								
Resistivity	**3110**	ohms-cm			1		01/19/15 12:25		
300.0 IC Anions 28 Days	Analytical Method: EPA 300.0								
Chloride	**9.9**	mg/L	5.0	2.5	1		01/16/15 22:44	16887-00-6	
Sulfate	**6.4**	mg/L	5.0	2.5	1		01/16/15 22:44	14808-79-8	

This report shall not be reproduced, except in full,
without the written consent of Pace Analytical Services, Inc..

TABLE 4 - SUMMARY OF CONSTANT HEAD EXFILTRATION TEST RESULTS

SR 9 / I-95 RAMPS ROADWAY IMPROVEMENTS
AT MIAMI GARDENS DRIVE
MIAMI-DADE COUNTY, FLORIDA
FPID NO.: 425216-2-52-01
GEOSOL PROJECT No. 214195

Test No.	Date Performed	Diameter		Depth of Hole (Feet)	Depth to Groundwater Level Below Ground Surface (Feet)		SATURATED HOLE DEPTH Ds (Feet)	Corrected Depth of Hole (Feet)	Average Flow Rate (gpm)	K, Hydraulic Conductivity (cfs/ft^2-Ft Head)
		Casing (Inches)	Hole (Inches)		Prior to Test	During Test				
P-1	01/12/15	6.00	6.75	10	3.1	0.00	6.90	10.00	1.5	8.00E-05
	01/12/15	6.00	6.75	15	3.1	0.00	11.90	15.00	0.9	3.03E-05
	01/12/15	6.00	6.75	20	3.1	0.00	16.90	20.00	0.6	1.48E-05

NOTES:

(1) The above hydraulic conductivity values are for a French drain installed to the same depth as the borehole tests. The values represent an ultimate value. The designer should decide on the required factor of safety.

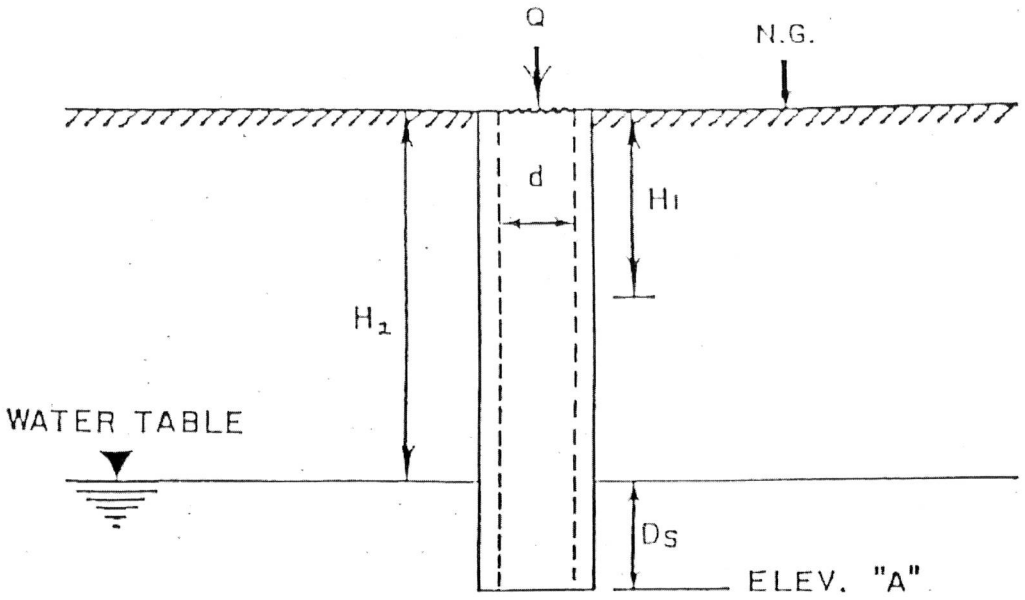
(2) The hydraulic conductivity values were calculated based on the South Florida Water Management Districts's USUAL OPEN HOLE CONSTANT HEAD exfiltration test procedure as shown on the following page.

(3) The diameter of the CASING was used in the computation of the hydraulic conductivity values presented in the above table.

SUBSURFACE STRATIFICATION

TEST No.	TEST LOCATION (FEET)			DEPTH (FEET)		GENERAL MATERIAL DESCRIPTION
	STATION	OFFSET	REFERENCE	FROM	TO	
P-1	18+35	75'RT	B/L SURVEY I-95 SB ON RAMP	0.00	0.17	Dark Brown Organic Silty Fine SAND with Grass (TOPSOIL)
				0.17	1.50	Brown Slightly Silty Fine to Medium SAND with Trace of Limerock Fragments (FILL)
				1.50	2.50	Brown Fine to Medium SAND (FILL)
				2.50	6.80	Brown Fine to Medium SAND with Some Limestone Fragments
				6.80	20.00	Brown Fine to Medium SAND

USUAL OPEN - HOLE TEST



$$K = \frac{4Q}{\pi d(2H_2^2 + 4H_2 D_S + H_2 d)}$$

K = HYDRAULIC CONDUCTIVITY (CFS/FT.^{2} - FT. HEAD)

Q = "STABILIZED" FLOW RATE (CFS)

d = DIAMETER OF TEST HOLE (FEET)

H_2 = DEPTH TO WATER TABLE (FEET)

D_S = SATURATED HOLE DEPTH (FEET)

ELEV. "A" = PROPOSED TRENCH BOTTOM ELEV.

H_1 = AVERAGE HEAD ON UNSATURATED HOLE SURFACE (FT. HEAD)

Reference: SFWMD Management and Storage of Surface Waters
Permit Information Manual Vol. IV, Figure 3, Page 12.

APPENDIX H

Design Aids

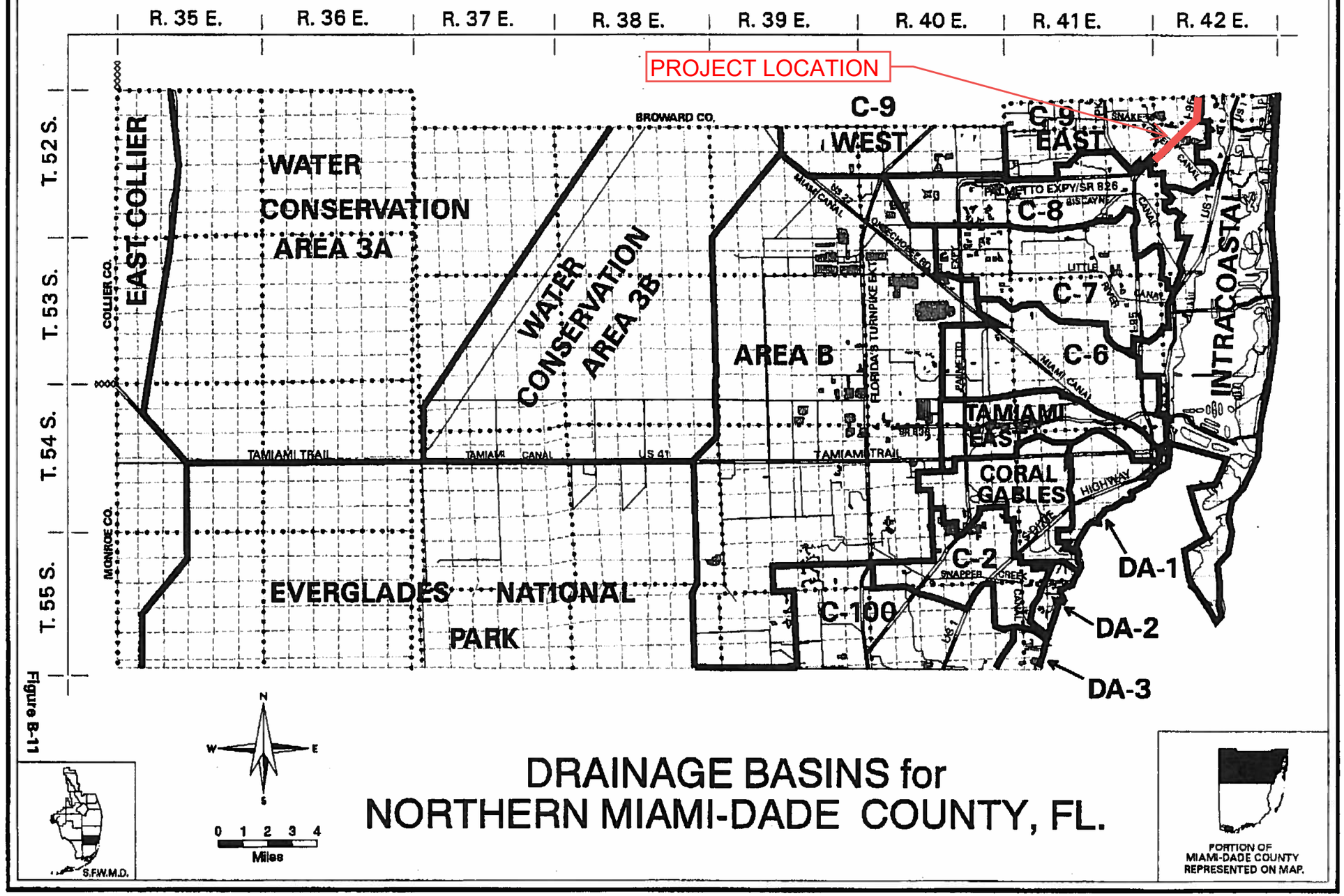


Figure B-11

DRAINAGE BASINS for NORTHERN MIAMI-DADE COUNTY, FL.

Table T-6
Definitions of Four SCS Hydrologic Soil Groups

Hydrologic Soil Group	Definition
A	Low Runoff Potential Soils having high infiltration rates even when thoroughly wetted, consisting chiefly of deep, well-to-excessively-drained sands or gravels. These soils have a high rate of water transmission.
B	Moderately Low Runoff Potential Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep, to deep, moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.
C	Moderately High Runoff Potential Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, soils with moderate fine to fine texture, or soils with moderate water tables. These soils have a slow rate of water transmission.
D	High Runoff Potential Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material. These soils have a very slow rate of water transmission.

Reference: USDA, SCS, NEH-4 (1972).

Table T-7
SCS Runoff Curve Numbers for Selected Agricultural, Suburban, and Urban Land Use

Land Use Description		Hydrologic Soil Group A	B	C	D
Cultivated Land[a]:					
Without conservation treatment		72	81	88	91
With conservation treatment		62	71	78	81
Pasture or range land:					
Poor condition		68	79	86	89
Good condition		39	61	74	80
Meadow: good condition		30	58	71	78
Wood or Forest Land:					
Thin stand, poor cover, no mulch		45	66	77	83
Good cover [b]		25	55	70	77
Open Spaces, Lawns, Parks, Golf Courses, Cemeteries:					
Good condition: grass cover on 75% or more of the area		39	61	74	80
Fair condition: grass cover on 50% to 75% of the area		49	69	79	84
Poor condition: grass cover on 50% or less of the area		68	79	86	89
Commercial and Business Areas (85% impervious)		89	92	94	95
Industrial Districts (72% impervious)		81	88	91	93
Residential [c]					
Average lot size	Average % Impervious [d]				
1/8 acre or less	65	77	85	90	92
1/4 acre	38	61	75	83	87
1/3 acre	30	57	72	81	86
1/2 acre	25	54	70	80	85
1 acre	20	51	68	79	84
Paved Parking Lots, Roofs, Driveways [e]:		98	98	98	98
Streets and Roads:					
Paved with curbs and storm sewers [e]		98	98	98	98
Gravel		76	85	89	91
Dirt		72	82	87	89
Paved with open ditches		83	89	92	93
Newly graded area (no vegetation established)[f]		77	86	91	94

[a] For a more detailed description of agricultural land use curve numbers, refer to Table T-8.
[b] Good cover is protected from grazing and litter and brush cover soil.
[c] Curve numbers are computed assuming the runoff from the house and driveway is directed toward the street with a minimum of roof water directed to lawns where additional infiltration could occur, which depends on the depth and degree of the permeability of the underlying strata.
[d] The remaining pervious areas (lawn) are considered to be in good pasture condition for these curve numbers.
[e] In some warmer climates of the country, a curve number of 96 may be used.
[f] Use for temporary conditions during grading and construction.
Note: These values are for Antecedent Moisture Condition II, and $I_a = 0.2S$.

Reference: USDA, SCS, TR-55 (1984).

RUNOFF COEFFICIENTS [a]

Slope	Land Use	Sandy Soils Min.	Sandy Soils Max.	Clay Soils Min.	Clay Soils Max.
Flat (0-2%)	Woodlands	0.10	0.15	0.15	0.20
	Pasture, grass, and farmland [b]	0.15	0.20	0.20	0.25
	Bare Earth	0.30	0.50	0.50	0.60
	Rooftops and pavement	0.95	0.95	0.95	0.95
	Pervious pavements[c]	0.75	0.95	0.90	0.95
	SFR: 1/2-acre lots and larger	0.30	0.35	0.35	0.45
	Smaller lots	0.35	0.45	0.40	0.50
	Duplexes	0.35	0.45	0.40	0.50
	MFR: Apartments, townhouses, and condominiums	0.45	0.60	0.50	0.70
	Commercial and Industrial	0.50	0.95	0.50	0.95
Rolling (2-7%)	Woodlands	0.15	0.20	0.20	0.25
	Pasture, grass, and farmland [b]	0.20	0.25	0.25	0.30
	Bare Earth	0.40	0.60	0.60	0.70
	Rooftops and pavement	0.95	0.95	0.95	0.95
	Pervious pavements [c]	0.80	0.95	0.90	0.95
	SFR: 1/2-acre lots and larger	0.35	0.50	0.40	0.55
	Smaller lots	0.40	0.55	0.45	0.60
	Duplexes	0.40	0.55	0.45	0.60
	MFR: Apartments, townhouses, and condominiums	0.50	0.70	0.60	0.80
	Commercial and Industrial	0.50	0.95	0.50	0.95
Steep (7%+)	Woodlands	0.20	0.25	0.25	0.30
	Pasture, grass, and farmland [b]	0.25	0.35	0.30	0.40
	Bare Earth	0.50	0.70	0.70	0.80
	Rooftops and pavement	0.95	0.95	0.95	0.95
	Pervious pavements [c]	0.85	0.95	0.90	0.95
	SFR: 1/2-acre lots and larger	0.40	0.55	0.50	0.65
	Smaller lots	0.45	0.60	0.55	0.70
	Duplexes	0.45	0.60	0.55	0.70
	MFR: Apartments, townhouses, and condominiums	0.60	0.75	0.65	0.85
	Commercial and Industrial	0.60	0.95	0.65	0.95

a. Weighted coefficient based on percentage of impervious surfaces and green areas must be selected for each site.

b. Coefficients assume good ground cover and conservation treatment.

c. Depends on depth and degree of permeability of underlying strata.

Note: SFR = Single Family Residential, MFR = Multi-Family Residential

Table 2-2

INLET TYPE	SLOT TYPE	PIPE LOCATION		RECOMMENDED MIN. DISTANCE (Ft.) FROM GRATE (INLET) ELEVATION TO PIPE FLOW LINE															
		Wall		15" Pipe		18" Pipe		24" Pipe		30" Pipe		36" Pipe		42" Pipe		48" Pipe		54" Pipe		60" Pipe	
Type A		Short	2'-0"	2.2	(1)	2.5	(1)	4.8	(5)	5.4	(5)	5.9	(5)	6.5	(5)	7.0	(5)	7.5	(5)	8.1	(5)
		Long	3'-1"	2.5	(2)	2.8	(2)	4.8	(5)	5.4	(5)	5.9	(5)	6.5	(5)	7.0	(5)	7.5	(5)	8.1	(5)
Type B (Note 3)	Travers	Short	No Slot	2.6	(2)	2.9	(2)	3.4	(2)	4.0	(2)	6.9	(4)	7.5	(4)	8.0	(4)	8.5	(4)	9.1	(4)
			Under Slot	3.4	(3)	3.6	(3)	4.2	(3)	4.7	(3)	6.9	(4)	7.5	(4)	8.0	(4)	8.5	(4)	9.1	(4)
		Long		2.6	(2)	2.9	(2)	3.4	(2)	4.0	(2)	4.5	(2)	7.5	(4)	8.0	(4)	8.5	(4)	9.1	(4)
Type C (Note 3)	None	Short	2'-0"	2.2	(1)	2.5	(1)	4.7	(5)	5.2	(5)	5.8	(5)	6.3	(5)	6.8	(5)	7.4	(5)	7.9	(5)
		Long	3'-1"	2.4	(2)	2.6	(2)	4.7	(5)	5.2	(5)	5.8	(5)	6.3	(5)	6.8	(5)	7.4	(5)	7.9	(5)
	Travers	Short	No Slot	2.2	(1)	2.5	(1)	5.3	(4)	5.8	(4)	6.3	(4)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
			Under Slot	2.8	(3)	3.0	(3)	5.3	(4)	5.8	(4)	6.3	(4)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
		Long		2.4	(2)	2.6	(2)	5.3	(4)	5.8	(4)	6.3	(4)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
	Non-Trav 12" Std.	Short	No Slot	2.2	(1)	2.5	(1)	5.7	(4)	6.2	(4)	6.8	(4)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
			Under Slot	3.2	(3)	3.5	(3)	5.7	(4)	6.2	(4)	6.8	(4)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
		Long		2.4	(2)	2.6	(2)	5.7	(4)	6.2	(4)	6.8	(4)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
Type D (Note 3)	None	Short	3-1"	2.4	(2)	2.6	(2)	3.2	(2)	5.2	(5)	5.8	(5)	6.3	(5)	6.8	(5)	7.4	(5)	7.9	(5)
		Long	4'-1"	2.2	(1)	2.5	(1)	3.0	(1)	3.5	(1)	4.1	(1)	6.3	(5)	6.8	(5)	7.4	(5)	7.9	(5)
	Travers	Short		2.4	(2)	2.6	(2)	3.2	(2)	5.8	(4)	6.3	(4)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
		Long	No Slot	2.2	(1)	2.5	(1)	3.0	(1)	3.5	(1)	4.1	(1)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
			Under Slot	2.8	(3)	3.0	(3)	3.6	(3)	4.1	(3)	4.7	(3)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
	Non-Trav 12" Std.	Short		2.4	(2)	2.6	(2)	3.2	(2)	6.2	(4)	6.8	(4)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
		Long	No Slot	2.2	(1)	2.5	(1)	3.0	(1)	3.5	(1)	4.1	(1)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
			Under Slot	3.2	(3)	3.5	(3)	4.0	(3)	4.5	(3)	5.1	(3)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
Type E (Note 3)	None	Short	3'-0"	2.2	(1)	2.5	(1)	3.0	(1)	5.2	(5)	5.8	(5)	6.3	(5)	6.8	(5)	7.4	(5)	7.9	(5)
		Long	4'-6"	2.4	(2)	2.6	(2)	3.2	(2)	3.7	(2)	4.3	(2)	6.3	(5)	6.8	(5)	7.4	(5)	7.9	(5)
	Travers	Short	No Slot	2.2	(1)	2.5	(1)	3.0	(1)	5.8	(4)	6.3	(4)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
			Under Slot	2.8	(3)	3.0	(3)	3.6	(3)	5.8	(4)	6.3	(4)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
		Long		2.4	(2)	2.6	(2)	3.2	(2)	3.7	(2)	4.3	(2)	6.9	(4)	7.4	(4)	8.0	(4)	8.5	(4)
	Non-Trav 12" Std.	Short	No Slot	2.2	(1)	2.5	(1)	3.0	(1)	6.2	(4)	6.8	(4)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
			Under Slot	3.2	(3)	3.5	(3)	4.0	(3)	6.2	(4)	6.8	(4)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)
		Long		2.4	(2)	2.6	(2)	3.2	(2)	3.7	(2)	4.3	(2)	7.3	(4)	7.8	(4)	8.4	(4)	8.9	(4)

Notes: 1. The number in parentheses ( ) refers to one of the structure pipe combinations shown in Figure 4-4.

2. *** **CAUTION** *** Where multiple pipes enter a structure, needing a J-bottom because of one pipe could dictate greater distances than shown above for other pipes entering the structure.

3. The values shown for Type B, C, D, & E inlets are based on Alt. B Bottoms. Alternate A Bottoms have thicker slabs, so add 2 inches for up through 6' diameter bottoms. Add 4 inches for 8' diameter bottoms.

4. The distances are based on precast structures and standard precast openings for concrete pipes.

5. The designer should check that the minimum cover requirements of Drainage Manual Appendix E are met.

TABLE 4-4

INLET TYPE	SLOT TYPE	PIPE LOCATION		RECOMMENDED MIN. DISTANCE (Ft.) FROM GRATE (INLET) ELEVATION TO PIPE FLOW LINE															
		Wall	Wall Dim.	15" Pipe		18" Pipe		24" Pipe		30" Pipe		36" Pipe		42" Pipe		48" Pipe		54" Pipe		60" Pipe	
Type F	n/a	Short	2'-6"	2.2	(1)	2.5	(1)	4.8	(5)	5.3	(5)	5.8	(5)	6.4	(5)	6.9	(5)	7.5	(5)	8.0	(5)
		Long	4'-0"	2.4	(2)	2.7	(2)	3.3	(2)	3.8	(2)	4.3	(2)	6.4	(5)	6.9	(5)	7.5	(5)	8.0	(5)
Type H	None	Short	3'-0"	2.2	(1)	2.5	(1)	3.0	(1)	n/a		n/a		n/a		n/a		n/a		n/a	
		Long	6'-7"	2.4	(2)	2.6	(2)	3.2	(2)	3.7	(2)	4.3	(2)	4.8	(2)	5.3	(2)	5.9	(2)	6.4	(2)
	Non-Trav 12" std.	Short	3'-0"	3.2	(3)	3.5	(3)	4.0	(3)	n/a		n/a		n/a		n/a		n/a		n/a	
		Long	6'-7"	2.4	(2)	2.6	(2)	3.2	(2)	3.7	(2)	4.3	(2)	4.8	(2)	5.3	(2)	5.9	(2)	6.4	(2)
Type J	n/a	Short	3'-3"	2.6	(2)	2.9	(2)	3.4	(2)	5.5	(5)	6.0	(5)	6.5	(5)	7.1	(5)	7.6	(5)	8.2	(5)
		Long	3'-10"	2.4	(2)	2.7	(2)	3.3	(2)	3.8	(2)	6.0	(5)	6.5	(5)	7.1	(5)	7.6	(5)	8.2	(5)
Type S	n/a	Short	3'-3"	2.6	(2)	2.9	(2)	3.5	(2)	5.5	(5)	6.0	(5)	6.6	(5)	7.1	(5)	7.7	(5)	8.2	(5)
		Long	3'-10"	2.3	(2)	2.5	(2)	3.1	(2)	3.6	(2)	6.0	(5)	6.6	(5)	7.1	(5)	7.7	(5)	8.2	(5)
Type V	n/a	Short	3'-3"	2.6	(2)	2.9	(2)	3.4	(2)	5.5	(5)	6.0	(5)	6.5	(5)	7.1	(5)	7.6	(5)	8.2	(5)
		Long	3'-10"	2.4	(2)	2.7	(2)	3.3	(2)	3.8	(2)	6.0	(5)	6.5	(5)	7.1	(5)	7.6	(5)	8.2	(5)
Manhole Type 8	n/a	n/a		RECOMMENDED MIN. DISTANCE (Ft.) FROM TOP ELEVATION TO PIPE FLOW LINE															
				3.7	(10)	4.0	(10)	4.5	(10)	5.0	(10)	6.3	(11)	6.8	(11)	7.3	(11)	7.9	(11)	8.4	(11)
Barr-Wall 218	n/a			RECOMMENDED MIN. DISTANCE (Ft.) FROM LOW POINT OF GRATE TO PIPE FLOW LINE															
		Short	3'-3"	4.2	(8)	4.5	(8)	5.0	(8)	6.2	(9)	6.8	(9)	7.3	(9)	7.8	(9)	8.4	(9)	8.9	(9)
		Long	3'-8"	4.2	(8)	4.5	(8)	5.0	(8)	5.5	(8)	6.8	(9)	7.3	(9)	7.8	(9)	8.4	(9)	8.9	(9)
Curb 1-9	n/a	n/a		RECOMMENDED MIN. DISTANCE (Ft.) FROM EDGE OF PAVEMENT TO PIPE FLOW LINE															
				3.9	(6)	4.2	(6)	4.7	(6)	5.3	(6)	6.5	(7)	7.0	(7)	7.5	(7)	8.1	(7)	8.6	(7)

Notes: 1. The number in parentheses ( ) refers to one of the structure pipe combinations shown in Figure 4-4 and 4-5.

2. ***** CAUTION ***** Where multiple pipes enter a structure, needing a J-bottom because of one pipe could dictate greater distances than shown above for other pipes entering the structure.

3. ***** CAUTION ***** For curb inlets and manholes, where 30" pipes with similar inverts enter a structure at 90 degrees, a J-bottom is required, thus the minimum distance may be greater than shown above. This may apply to other inlets also.

4. The distances are based on precast structures and standard precast openings for concrete pipes.

5. The designer should check that the minimum cover requirements of Drainage Manual Appendix E are met.

TABLE 4-5

basin and can be calculated using two methods: (1) Composite Curve Number (CN) Method or (2) Soil Storage Method. The Composite CN Method includes calculating a weighted Curve Number based on published CN values for defined soil types. This method is documented in the National Resources Conservation Service (NRCS) Technical Release (TR) 55. The Soil Storage Method uses a soil storage determination based on a surface-to-groundwater depth relationship. This method is documented in the *SFWMD Environmental Resources Permit (ERP) Applicant's Handbook Volume II (SFWMD Volume II).* The CN is computed from the soil storage by using **Equation 2.3.1-1**. Streamline Technologies, Inc. also includes an alternate method of calculating the CN. This alternate method is calculated using **Equation 2.3.1-2**. FDOT District 6 prefers the use of the Soil Storage Method to be consistent with the *SFWMD Volume II.*

- Preferred CN Method (Soil Storage Method):

  $CN = 1000 / (S+10)$ **Equation 2.3.2-1**

  where CN = Curve Number
  S = Soil storage (inches)

As outlined in the SFWMD Volume II, the soil storage is correlated to the available depth of unsaturated soil above the seasonal high ground water elevation. *SFWMD Volume II* provides a table, **Table 2.3.1-1**, of available soil storage relative to the groundwater elevation along with the storage with a 25% reduction to account for compaction during construction.

Depth to Groundwater (feet)	Available Soil Storage (inches)	Available Compacted Soil Storage (inches)
1	0.6	0.45
2	2.5	1.88
3	6.6	4.95
4 or greater	10.9	8.18

Table 2.3.1-1 : Soil Storage (S) Relative to Depth to Groundwater from *SFWMD Volume II*

Soil storage is impractical below 4 feet except in high sandy coastal ridge areas per the SFWMD Volume II. However, FDOT Disctict 6 has set the maximum allowable soil storage (S) to 8.18 inches for developed or compacted soils, which correlates to a minimum CN value of 55 for pervious areas. For impervious areas, the maximum CN that should be used is 98.

The depth to groundwater for each basin is determined by the difference between the average basin elevation and the DHW as defined in **Section 2.3.1**

		Storm Event Rainfall Depth (inches)		
		1-hr	8-hr	24-hr
Return Frequency	3-year	2.83	4.64	6.00
	5-year	3.10	5.20	6.72
	10-year	3.48	5.96	7.92
	50-year	4.40	7.76	10.56
	100-year	4.82	8.96	12.24

Table 2.3.3-8 : FDOT Zone 9 Rainfall Depths for the 3-, 5-, 10-, 50- and 100-year Design Storm Event Frequencies with 1-, 8-, and 24-Hour Durations

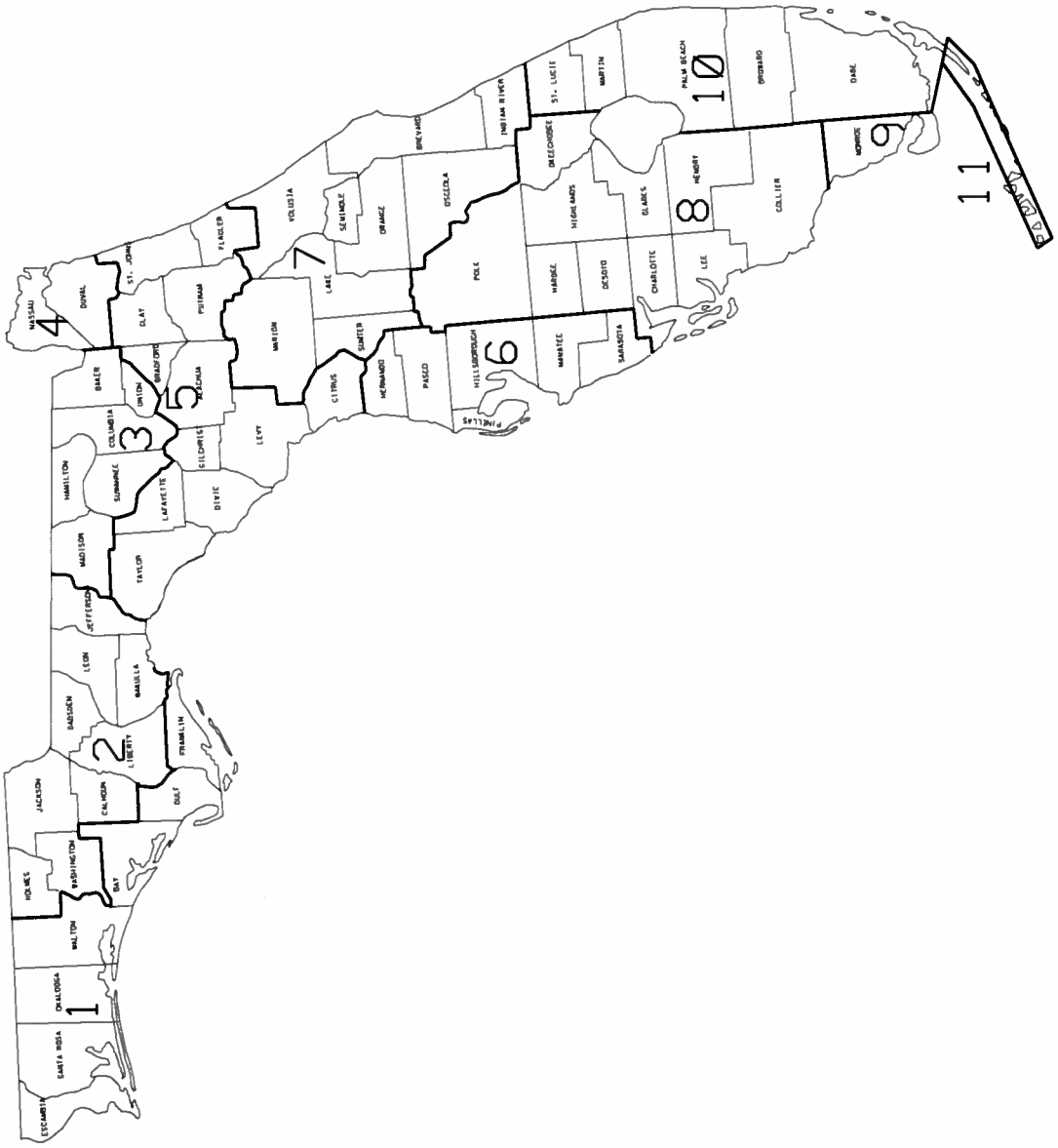
		Storm Event Rainfall Depth (inches)		
		1-hr	8-hr	24-hr
Return Frequency	3-year	2.90	4.96	6.48
	5-year	3.30	5.60	7.44
	10-year	3.55	6.80	8.88
	50-year	4.60	8.80	12.00
	100-year	5.10	9.60	13.44

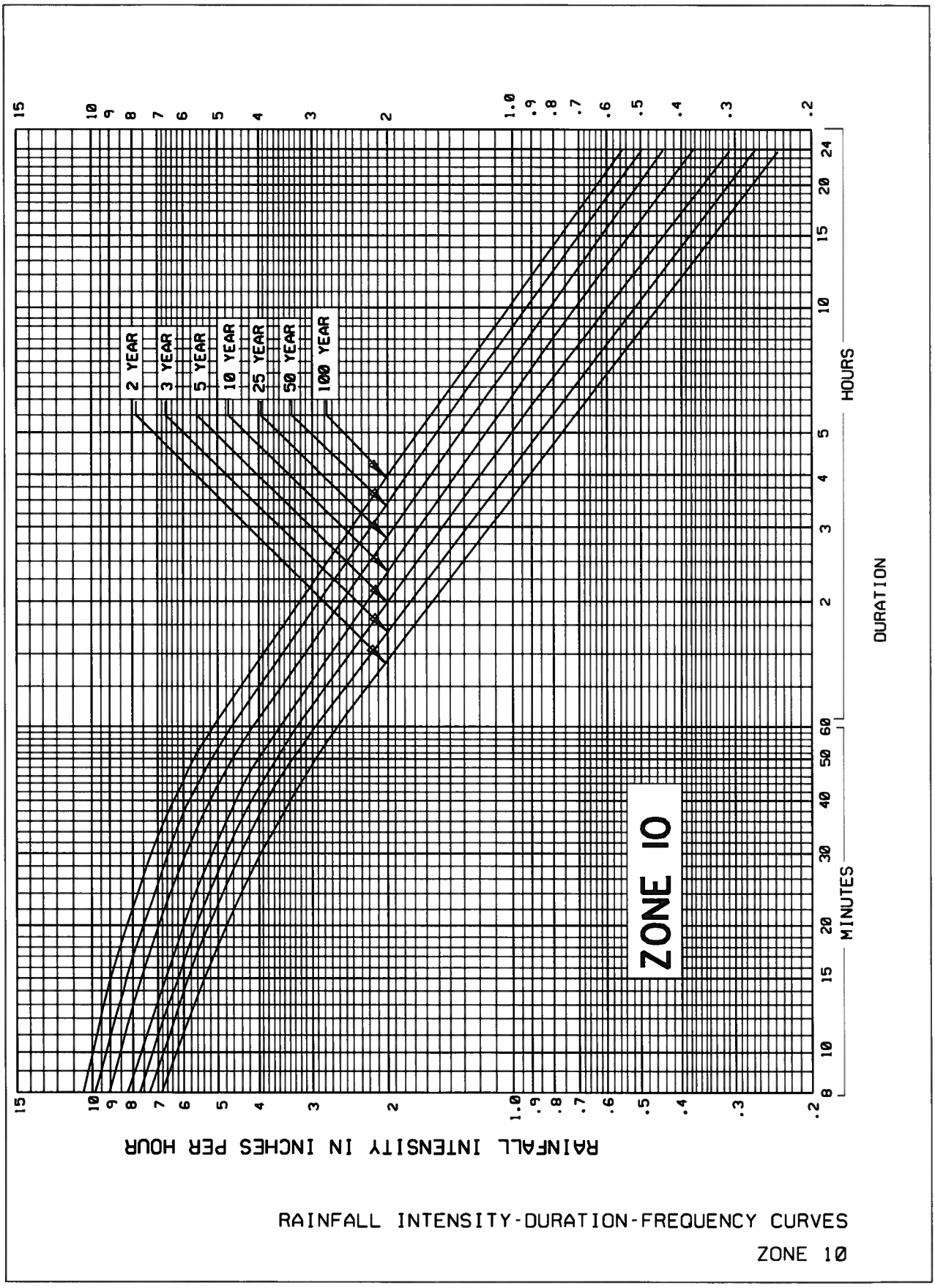
Table 2.3.3-9 : FDOT Zone 10 Rainfall Depths for the 3-, 5-, 10-, 50- and 100-year Design Storm Event Frequencies with 1-, 8-, and 24-Hour Durations

		Storm Event Rainfall Depth (inches)		
		1-hr	8-hr	24-hr
Return Frequency	3-year	2.55	4.32	5.76
	5-year	2.85	5.20	7.08
	10-year	3.10	6.00	8.40
	50-year	3.90	7.68	11.04
	100-year	4.50	8.96	12.96

Table 2.3.3-10 : FDOT Zone 11 Rainfall Depths for the 3-, 5-, 10-, 50- and 100-year Design Storm Event Frequencies with 1-, 8-, and 24-Hour Durations

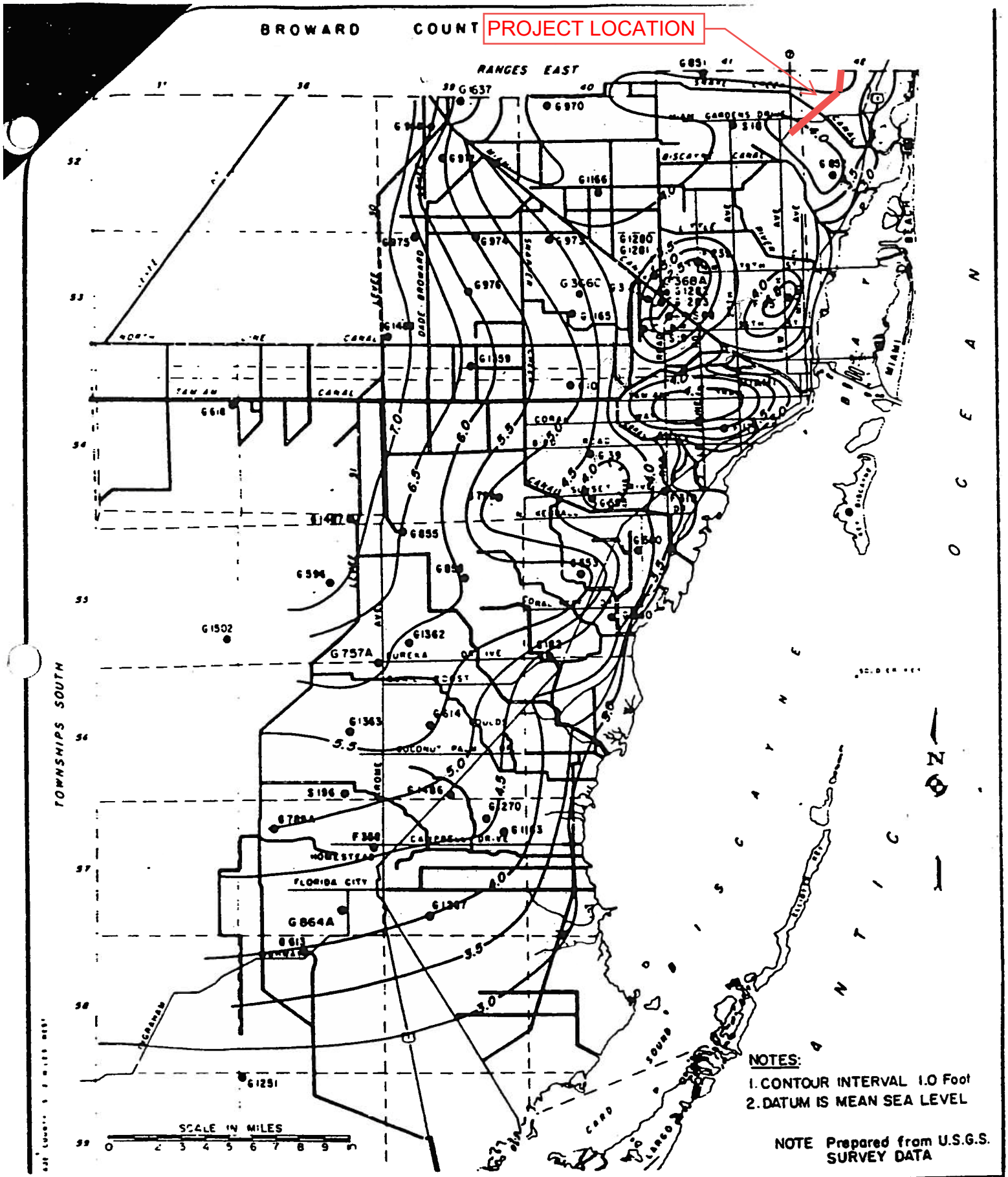
ZONES FOR PRECIPITATION IDF CURVES DEVELOPED BY THE DEPARTMENT



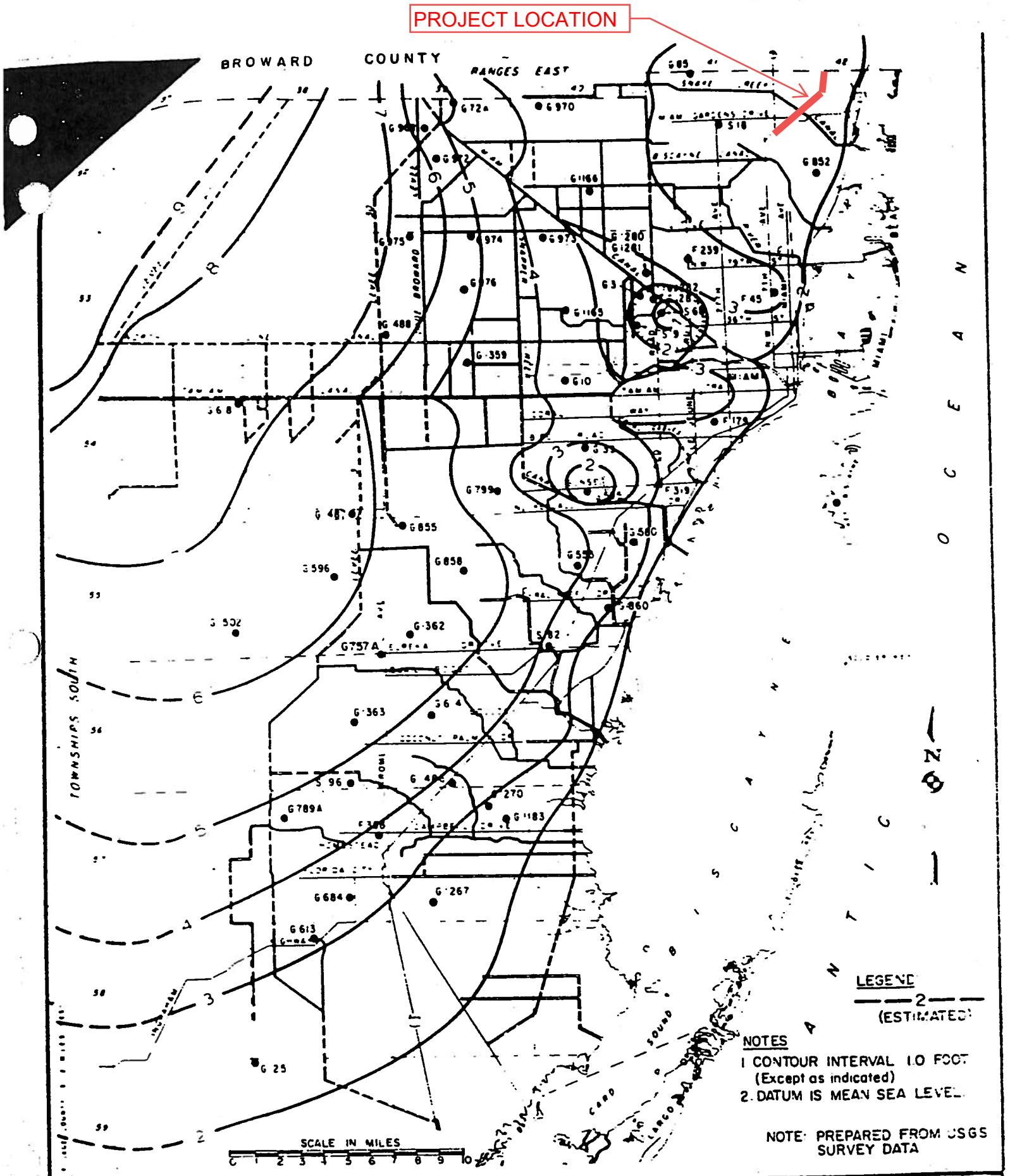


RAINFALL INTENSITY-DURATION-FREQUENCY CURVES

ZONE 10



METROPOLITAN DADE COUNTY PUBLIC WORKS DEPARTMENT	APPROVED 4/5/72	REVISED 2/19/75 4/14/77 2/7/83	DESIGN STANDARDS AVERAGE YEARLY HIGHEST GROUND WATER LEVEL 1965 - 78	W.C. 2.1 SHEET 1 OF 1



METROPOLITAN DADE COUNTY PUBLIC WORKS DEPARTMENT	APPROVED 4/5/72	REVISED 2/3/77 4/14/77	DESIGN STANDARDS AVERAGE OCTOBER GROUND WATER LEVEL 1960–75	W.C. 2.2 SHEET 1 OF 1

APPENDIX I

FEMA FIRM Maps

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Florida State Plane east zone (FIPSZONE 0901). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

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

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

Base map information shown on this FIRM was provided in digital format by the Miami-Dade County Information Technology Department. These data were compiled at a scale of 1:3,600 from digital orthophotography dated 2001. Additional base map information was provided by the Cities of Aventura, Coral Gables, and Homestead, the Town of Cutler Bay, and Miami-Dade County.

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

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

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

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

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



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

- A — A — Cross section Line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 3976000mN — 1000-meter Universal Transverse Mercator grid values, zone 17
- 600000 FT — 5000-foot grid ticks: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ●M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
January 20, 1993

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 2, 1994 - May 16, 1994 - July 17, 1995 - for description of revision, see Notice to Users page in the Flood Insurance Study report
September 11, 2009 - to reflect revised shoreline, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, to add and change Base Flood Elevations, to update corporate limits, to change zone designations, to add roads and road names, and to add and change Special Flood Hazard Areas

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0137L

FIRM

FLOOD INSURANCE RATE MAP

MIAMI-DADE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 137 OF 1031

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS

COMMUNITY	NUMBER	PANEL	SUFFIX
MIAMI - DADE COUNTY	120635	0137	L
MIAMI GARDENS, CITY OF	120345	0137	L
NORTH MIAMI BEACH, CITY OF	120656	0137	L
NORTH MIAMI, CITY OF	120655	0137	L

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
12086C0137L

MAP REVISED
SEPTEMBER 11, 2009

Federal Emergency Management Agency

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0° National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Florida State Plane east zone (FIPSZONE 0901). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

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

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

Base map information shown on this FIRM was provided in digital format by the Miami-Dade County Information Technology Department. These data were compiled at a scale of 1:3,600 from digital orthophotography dated 2001. Additional base map information was provided by the Cities of Aventura, Coral Gables, and Homestead, the Town of Cutler Bay, and Miami-Dade County.

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

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

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

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

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


915000 FT
JOINS PANEL 0127
920000 FT
80°13'07.5"
25°58'07.5"
80°11'15"
595000 FT
590000 FT
585000 FT
City of Miami Gardens 120345
Miami - Dade County Unincorporated Areas 120635
City of North Miami Beach 120656
ZONE AE (EL 6)
ZONE X
Andover Lake
Lake Andover
North Dade Golf Course
East Andover Canal
West Andover Canal
Rock Pit Lake
North Star Lake
South Star Lake
Snake Creek Canal Number C-9
NW 207TH ST
NE 207TH ST
NW 206TH TE
NE 206TH TE
NW 205TH TE
NW 204TH TE
NW 204TH ST
NW 203RD TE
NE 203RD ST
NW 202ND TE
NW 202ND ST
NW 201ST ST
NW 200TH TE
NW 200TH ST
NW 199TH ST
NE 199TH ST
NW 198TH ST
NW 197TH ST
NW 196TH ST
NE 196TH ST
NW 195TH TE
NE 195TH ST
NW 194TH TE
NW 194TH ST
NW 193RD TE
NW 193RD ST
NE 193RD ST
NW 192ND ST
NW 191ST ST
NW 190TH ST
NW 189TH TE
NW 189TH ST
NW 188TH ST
NW 187TH ST
NW 186TH ST
NW 185TH TE
NW 185TH ST
NW 184TH TE
NW 183RD TE
NW 183RD ST
NW 182ND TE
NW 181ST TE
NW 179TH TE
NW 179TH ST
NW 178TH TE
NE 207TH CRTE
SAN SIMEON WAY
NE 4TH PL
NE 5TH PL
206TH TE
207TH CT
NE 4TH CT
205TH TE
NE 199TH ST
NE 201ST CT
199TH TE
NE 2ND CT
200TH TE
201ST TE
198TH LA
NE 197TH ST
NE 196TH ST
NE 195TH ST
NE 194TH ST
NE 193RD ST
NE 192ND ST
NE 191ST ST
NE 190TH ST
NE 189TH ST
NE 188TH ST
NE 187TH ST
NE 186TH TE
NE 185TH TE
NE 184TH TE
NE 183RD ST
NE 182ND TE
NE 181ST ST
NE 179TH ST
NE 178TH ST
NW 1ST AV
NW 2ND AV
NW 3RD AV
NW 4TH AV
NW 5TH AV
NW 6TH AV
NW 7TH AV
NW 8TH AV
NW 9TH AV
NW 10TH AV
NW 1ST CT
NW 2ND CT
NW 3RD CT
NW 4TH CT
NW 5TH CT
NW 6TH CT
NW 7TH CT
NW 8TH CT
NW 9TH CT
NW 10TH CT
NE 1ST AV
NE 2ND AV
NE 3RD AV
NE 1ST CT
NE 2ND CT
NE 3RD CT
NE 1ST PL
NE 2ND PL
NE 3RD PL
NW 1ST PL
NW 2ND PL
NW 3RD PL
NW 4TH PL
NW 5TH PL
NW 6TH PL
NW 7TH PL
NW 8TH PL
NW 9TH PL
NW 10TH PL
NW 10TH RD
NW 8TH RD
NW 165TH DR
NW 166TH DR
NW 167TH DR
NW NORTH DR
NW 168TH DR
NW 169TH DR
NW 170TH DR
NW 171ST CT
NW 172ND CT
NW 173RD CT
NW 174TH CT
NW 175TH CT
NW 176TH CT
NW 177TH CT
NW 178TH CT
NE MIAMI CT
NE MIAMI PL
NE 1ST CT
NE 1ST PL
NE 3RD AV
NE 4TH CT
NE 4TH AV
NE 5TH AV
NE 6TH AV
NE 6TH CT
NE 6TH PL
NE 7TH CT
NE 7TH PL
NE 8TH CT
NE 8TH PL
NE 9TH CT
NE 9TH PL
NE 10TH CT
NE 10TH PL
NE 11TH CT
NE 11TH PL
NE 12TH CT
NE 12TH PL
NE 13TH CT
NE 13TH PL
NE 14TH CT
NE 14TH PL
NE 15TH CT
NE 15TH PL
NE 16TH CT
NE 16TH PL
NE 17TH CT
NE 17TH PL
NE 18TH CT
NE 18TH PL
NE 19TH CT
NE 19TH PL
NE 20TH CT
NE 20TH PL
NE 21ST CT
NE 21ST PL
NE 22ND CT
NE 22ND PL
NE 23RD CT
NE 23RD PL
NE 24TH CT
NE 24TH PL
NE 25TH CT
NE 25TH PL
NE 26TH CT
NE 26TH PL
NE 27TH CT
NE 27TH PL
NE 28TH CT
NE 28TH PL
NE 29TH CT
NE 29TH PL
NE 30TH CT
NE 30TH PL
NE 31ST CT
NE 31ST PL
NE 32ND CT
NE 32ND PL
NE 33RD CT
NE 33RD PL
NE 34TH CT
NE 34TH PL
NE 35TH CT
NE 35TH PL
NE 36TH CT
NE 36TH PL
NE 37TH CT
NE 37TH PL
NE 38TH CT
NE 38TH PL
NE 39TH CT
NE 39TH PL
NE 40TH CT
NE 40TH PL
NE 41ST CT
NE 41ST PL
NE 42ND CT
NE 42ND PL
NE 43RD CT
NE 43RD PL
NE 44TH CT
NE 44TH PL
NE 45TH CT
NE 45TH PL
NE 46TH CT
NE 46TH PL
NE 47TH CT
NE 47TH PL
NE 48TH CT
NE 48TH PL
NE 49TH CT
NE 49TH PL
NE 50TH CT
NE 50TH PL
NE 51ST CT
NE 51ST PL
NE 52ND CT
NE 52ND PL
NE 53RD CT
NE 53RD PL
NE 54TH CT
NE 54TH PL
NE 55TH CT
NE 55TH PL
NE 56TH CT
NE 56TH PL
NE 57TH CT
NE 57TH PL
NE 58TH CT
NE 58TH PL
NE 59TH CT
NE 59TH PL
NE 60TH CT
NE 60TH PL
NE 61ST CT
NE 61ST PL
NE 62ND CT
NE 62ND PL
NE 63RD CT
NE 63RD PL
NE 64TH CT
NE 64TH PL
NE 65TH CT
NE 65TH PL
NE 66TH CT
NE 66TH PL
NE 67TH CT
NE 67TH PL
NE 68TH CT
NE 68TH PL
NE 69TH CT
NE 69TH PL
NE 70TH CT
NE 70TH PL
NE 71ST CT
NE 71ST PL
NE 72ND CT
NE 72ND PL
NE 73RD CT
NE 73RD PL
NE 74TH CT
NE 74TH PL
NE 75TH CT
NE 75TH PL
NE 76TH CT
NE 76TH PL
NE 77TH CT
NE 77TH PL
NE 78TH CT
NE 78TH PL
NE 79TH CT
NE 79TH PL
NE 80TH CT
NE 80TH PL
NE 81ST CT
NE 81ST PL
NE 82ND CT
NE 82ND PL
NE 83RD CT
NE 83RD PL
NE 84TH CT
NE 84TH PL
NE 85TH CT
NE 85TH PL
NE 86TH CT
NE 86TH PL
NE 87TH CT
NE 87TH PL
NE 88TH CT
NE 88TH PL
NE 89TH CT
NE 89TH PL
NE 90TH CT
NE 90TH PL
NE 91ST CT
NE 91ST PL
NE 92ND CT
NE 92ND PL
NE 93RD CT
NE 93RD PL
NE 94TH CT
NE 94TH PL
NE 95TH CT
NE 95TH PL
NE 96TH CT
NE 96TH PL
NE 97TH CT
NE 97TH PL
NE 98TH CT
NE 98TH PL
NE 99TH CT
NE 99TH PL
NE 100TH CT
NE 100TH PL
NE 101ST CT
NE 101ST PL
NE 102ND CT
NE 102ND PL
NE 103RD CT
NE 103RD PL
NE 104TH CT
NE 104TH PL
NE 105TH CT
NE 105TH PL
NE 106TH CT
NE 106TH PL
NE 107TH CT
NE 107TH PL
NE 108TH CT
NE 108TH PL
NE 109TH CT
NE 109TH PL
NE 110TH CT
NE 110TH PL
NE 111TH CT
NE 111TH PL
NE 112TH CT
NE 112TH PL
NE 113TH CT
NE 113TH PL
NE 114TH CT
NE 114TH PL
NE 115TH CT
NE 115TH PL
NE 116TH CT
NE 116TH PL
NE 117TH CT
NE 117TH PL
NE 118TH CT
NE 118TH PL
NE 119TH CT
NE 119TH PL
NE 120TH CT
NE 120TH PL
NE 121ST CT
NE 121ST PL
NE 122ND CT
NE 122ND PL
NE 123RD CT
NE 123RD PL
NE 124TH CT
NE 124TH PL
NE 125TH CT
NE 125TH PL
NE 126TH CT
NE 126TH PL
NE 127TH CT
NE 127TH PL
NE 128TH CT
NE 128TH PL
NE 129TH CT
NE 129TH PL
NE 130TH CT
NE 130TH PL
NE 131ST CT
NE 131ST PL
NE 132ND CT
NE 132ND PL
NE 133RD CT
NE 133RD PL
NE 134TH CT
NE 134TH PL
NE 135TH CT
NE 135TH PL
NE 136TH CT
NE 136TH PL
NE 137TH CT
NE 137TH PL
NE 138TH CT
NE 138TH PL
NE 139TH CT
NE 139TH PL
NE 140TH CT
NE 140TH PL
NE 141ST CT
NE 141ST PL
NE 142ND CT
NE 142ND PL
NE 143RD CT
NE 143RD PL
NE 144TH CT
NE 144TH PL
NE 145TH CT
NE 145TH PL
NE 146TH CT
NE 146TH PL
NE 147TH CT
NE 147TH PL
NE 148TH CT
NE 148TH PL
NE 149TH CT
NE 149TH PL
NE 150TH CT
NE 150TH PL
NE 151ST CT
NE 151ST PL
NE 152ND CT
NE 152ND PL
NE 153RD CT
NE 153RD PL
NE 154TH CT
NE 154TH PL
NE 155TH CT
NE 155TH PL
NE 156TH CT
NE 156TH PL
NE 157TH CT
NE 157TH PL
NE 158TH CT
NE 158TH PL
NE 159TH CT
NE 159TH PL
NE 160TH CT
NE 160TH PL
NE 161ST CT
NE 161ST PL
NE 162ND CT
NE 162ND PL
NE 163RD CT
NE 163RD PL
NE 164TH CT
NE 164TH PL
NE 165TH CT
NE 165TH PL
NE 166TH CT
NE 166TH PL
NE 167TH CT
NE 167TH PL
NE 168TH CT
NE 168TH PL
NE 169TH CT
NE 169TH PL
NE 170TH CT
NE 170TH PL
NE 171ST CT
NE 171ST PL
NE 172ND CT
NE 172ND PL
NE 173RD CT
NE 173RD PL
NE 174TH CT
NE 174TH PL
NE 175TH CT
NE 175TH PL
NE 176TH CT
NE 176TH PL
NE 177TH CT
NE 177TH PL
NE 178TH CT
NE 178TH PL
NE 179TH CT
NE 179TH PL
NE 180TH CT
NE 180TH PL
NE 181ST CT
NE 181ST PL
NE 182ND CT
NE 182ND PL
NE 183RD CT
NE 183RD PL
NE 184TH CT
NE 184TH PL
NE 185TH CT
NE 185TH PL
NE 186TH CT
NE 186TH PL
NE 187TH CT
NE 187TH PL
NE 188TH CT
NE 188TH PL
NE 189TH CT
NE 189TH PL
NE 190TH CT
NE 190TH PL
NE 191ST CT
NE 191ST PL
NE 192ND CT
NE 192ND PL
NE 193RD CT
NE 193RD PL
NE 194TH CT
NE 194TH PL
NE 195TH CT
NE 195TH PL
NE 196TH CT
NE 196TH PL
NE 197TH CT
NE 197TH PL
NE 198TH CT
NE 198TH PL
NE 199TH CT
NE 199TH PL
NE 200TH CT
NE 200TH PL
NE 201ST CT
NE 201ST PL
NE 202ND CT
NE 202ND PL
NE 203RD CT
NE 203RD PL
NE 204TH CT
NE 204TH PL
NE 205TH CT
NE 205TH PL
NE 206TH CT
NE 206TH PL
NE 207TH CT
NE 207TH PL
NE 208TH CT
NE 208TH PL
NE 209TH CT
NE 209TH PL
NE 210TH CT
NE 210TH PL
NE 211TH CT
NE 211TH PL
NE 212TH CT
NE 212TH PL
NE 213TH CT
NE 213TH PL
NE 214TH CT
NE 214TH PL
NE 215TH CT
NE 215TH PL
NE 216TH CT
NE 216TH PL
NE 217TH CT
NE 217TH PL
NE 218TH CT
NE 218TH PL
NE 219TH CT
NE 219TH PL
NE 220TH CT
NE 220TH PL
NE 221ST CT
NE 221ST PL
NE 222ND CT
NE 222ND PL
NE 223RD CT
NE 223RD PL
NE 224TH CT
NE 224TH PL
NE 225TH CT
NE 225TH PL
NE 226TH CT
NE 226TH PL
NE 227TH CT
NE 227TH PL
NE 228TH CT
NE 228TH PL
NE 229TH CT
NE 229TH PL
NE 230TH CT
NE 230TH PL
NE 231ST CT
NE 231ST PL
NE 232ND CT
NE 232ND PL
NE 233RD CT
NE 233RD PL
NE 234TH CT
NE 234TH PL
NE 235TH CT
NE 235TH PL
NE 236TH CT
NE 236TH PL
NE 237TH CT
NE 237TH PL
NE 238TH CT
NE 238TH PL
NE 239TH CT
NE 239TH PL
NE 240TH CT
NE 240TH PL
NE 241ST CT
NE 241ST PL
NE 242ND CT
NE 242ND PL
NE 243RD CT
NE 243RD PL
NE 244TH CT
NE 244TH PL
NE 245TH CT
NE 245TH PL
NE 246TH CT
NE 246TH PL
NE 247TH CT
NE 247TH PL
NE 248TH CT
NE 248TH PL
NE 249TH CT
NE 249TH PL
NE 250TH CT
NE 250TH PL
NE 251ST CT
NE 251ST PL
NE 252ND CT
NE 252ND PL
NE 253RD CT
NE 253RD PL
NE 254TH CT
NE 254TH PL
NE 255TH CT
NE 255TH PL
NE 256TH CT
NE 256TH PL
NE 257TH CT
NE 257TH PL
NE 258TH CT
NE 258TH PL
NE 259TH CT
NE 259TH PL
NE 260TH CT
NE 260TH PL
NE 261ST CT
NE 261ST PL
NE 262ND CT
NE 262ND PL
NE 263RD CT
NE 263RD PL
NE 264TH CT
NE 264TH PL
NE 265TH CT
NE 265TH PL
NE 266TH CT
NE 266TH PL
NE 267TH CT
NE 267TH PL
NE 268TH CT
NE 268TH PL
NE 269TH CT
NE 269TH PL
NE 270TH CT
NE 270TH PL
NE 271ST CT
NE 271ST PL
NE 272ND CT
NE 272ND PL
NE 273RD CT
NE 273RD PL
NE 274TH CT
NE 274TH PL
NE 275TH CT
NE 275TH PL
NE 276TH CT
NE 276TH PL
NE 277TH CT
NE 277TH PL
NE 278TH CT
NE 278TH PL
NE 279TH CT
NE 279TH PL
NE 280TH CT
NE 280TH PL
NE 281ST CT
NE 281ST PL
NE 282ND CT
NE 282ND PL
NE 283RD CT
NE 283RD PL
NE 284TH CT
NE 284TH PL
NE 285TH CT
NE 285TH PL
NE 286TH CT
NE 286TH PL
NE 287TH CT
NE 287TH PL
NE 288TH CT
NE 288TH PL
NE 289TH CT
NE 289TH PL
NE 290TH CT
NE 290TH PL
NE 291ST CT
NE 291ST PL
NE 292ND CT
NE 292ND PL
NE 293RD CT
NE 293RD PL
NE 294TH CT
NE 294TH PL
NE 295TH CT
NE 295TH PL
NE 296TH CT
NE 296TH PL
NE 297TH CT
NE 297TH PL
NE 298TH CT
NE 298TH PL
NE 299TH CT
NE 299TH PL
NE 300TH CT
NE 300TH PL
NE 301ST CT
NE 301ST PL
NE 302ND CT
NE 302ND PL
NE 303RD CT
NE 303RD PL
NE 304TH CT
NE 304TH PL
NE 305TH CT
NE 305TH PL
NE 306TH CT
NE 306TH PL
NE 307TH CT
NE 307TH PL
NE 308TH CT
NE 308TH PL
NE 309TH CT
NE 309TH PL
NE 310TH CT
NE 310TH PL
NE 311TH CT
NE 311TH PL
NE 312TH CT
NE 312TH PL
NE 313TH CT
NE 313TH PL
NE 314TH CT
NE 314TH PL
NE 315TH CT
NE 315TH PL
NE 316TH CT
NE 316TH PL
NE 317TH CT
NE 317TH PL
NE 318TH CT
NE 318TH PL
NE 319TH CT
NE 319TH PL
NE 320TH CT
NE 320TH PL
NE 321ST CT
NE 321ST PL
NE 322ND CT
NE 322ND PL
NE 323RD CT
NE 323RD PL
NE 324TH CT
NE 324TH PL
NE 325TH CT
NE 325TH PL
NE 326TH CT
NE 326TH PL
NE 327TH CT
NE 327TH PL
NE 328TH CT
NE 328TH PL
NE 329TH CT
NE 329TH PL
NE 330TH CT
NE 330TH PL
NE 331ST CT
NE 331ST PL
NE 332ND CT
NE 332ND PL
NE 333RD CT
NE 333RD PL
NE 334TH CT
NE 334TH PL
NE 335TH CT
NE 335TH PL
NE 336TH CT
NE 336TH PL
NE 337TH CT
NE 337TH PL
NE 338TH CT
NE 338TH PL
NE 339TH CT
NE 339TH PL
NE 340TH CT
NE 340TH PL
NE 341ST CT
NE 341ST PL
NE 342ND CT
NE 342ND PL
NE 343RD CT
NE 343RD PL
NE 344TH CT
NE 344TH PL
NE 345TH CT
NE 345TH PL
NE 346TH CT
NE 346TH PL
NE 347TH CT
NE 347TH PL
NE 348TH CT
NE 348TH PL
NE 349TH CT
NE 349TH PL
NE 350TH CT
NE 350TH PL
NE 351ST CT
NE 351ST PL
NE 352ND CT
NE 352ND PL
NE 353RD CT
NE 353RD PL
NE 354TH CT
NE 354TH PL
NE 355TH CT
NE 355TH PL
NE 356TH CT
NE 356TH PL
NE 357TH CT
NE 357TH PL
NE 358TH CT
NE 358TH PL
NE 359TH CT
NE 359TH PL
NE 360TH CT
NE 360TH PL
NE 361ST CT
NE 361ST PL
NE 362ND CT
NE 362ND PL
NE 363RD CT
NE 363RD PL
NE 364TH CT
NE 364TH PL
NE 365TH CT
NE 365TH PL
NE 366TH CT
NE 366TH PL
NE 367TH CT
NE 367TH PL
NE 368TH CT
NE 368TH PL
NE 369TH CT
NE 369TH PL
NE 370TH CT
NE 370TH PL
NE 371ST CT
NE 371ST PL
NE 372ND CT
NE 372ND PL
NE 373RD CT
NE 373RD PL
NE 374TH CT
NE 374TH PL
NE 375TH CT
NE 375TH PL
NE 376TH CT
NE 376TH PL
NE 377TH CT
NE 377TH PL
NE 378TH CT
NE 378TH PL
NE 379TH CT
NE 379TH PL
NE 380TH CT
NE 380TH PL
NE 381ST CT
NE 381ST PL
NE 382ND CT
NE 382ND PL
NE 383RD CT
NE 383RD PL
NE 384TH CT
NE 384TH PL
NE 385TH CT
NE 385TH PL
NE 386TH CT
NE 386TH PL
NE 387TH CT
NE 387TH PL
NE 388TH CT
NE 388TH PL
NE 389TH CT
NE 389TH PL
NE 390TH CT
NE 390TH PL
NE 391ST CT
NE 391ST PL
NE 392ND CT
NE 392ND PL
NE 393RD CT
NE 393RD PL
NE 394TH CT
NE 394TH PL
NE 395TH CT
NE 395TH PL
NE 396TH CT
NE 396TH PL
NE 397TH CT
NE 397TH PL
NE 398TH CT
NE 398TH PL
NE 399TH CT
NE 399TH PL
NE 400TH CT
NE 400TH PL
NE 401ST CT
NE 401ST PL
NE 402ND CT
NE 402ND PL
NE 403RD CT
NE 403RD PL
NE 404TH CT
NE 404TH PL
NE 405TH CT
NE 405TH PL
NE 406TH CT
NE 406TH PL
NE 407TH CT
NE 407TH PL
NE 408TH CT
NE 408TH PL
NE 409TH CT
NE 409TH PL
NE 410TH CT
NE 410TH PL
NE 411TH CT
NE 411TH PL
NE 412TH CT
NE 412TH PL
NE 413TH CT
NE 413TH PL
NE 414TH CT
NE 414TH PL
NE 415TH CT
NE 415TH PL
NE 416TH CT
NE 416TH PL
NE 417TH CT
NE 417TH PL
NE 418TH CT
NE 418TH PL
NE 419TH CT
NE 419TH PL
NE 420TH CT
NE 420TH PL
NE 421ST CT
NE 421ST PL
NE 422ND CT
NE 422ND PL
NE 423RD CT
NE 423RD PL
NE 424TH CT
NE 424TH PL
NE 425TH CT
NE 425TH PL
NE 426TH CT
NE 426TH PL
NE 427TH CT
NE 427TH PL
NE 428TH CT
NE 428TH PL
NE 429TH CT
NE 429TH PL
NE 430TH CT
NE 430TH PL
NE 431ST CT
NE 431ST PL
NE 432ND CT
NE 432ND PL
NE 433RD CT
NE 433RD PL
NE 434TH CT
NE 434TH PL
NE 435TH CT
NE 435TH PL
NE 436TH CT
NE 436TH PL
NE 437TH CT
NE 437TH PL
NE 438TH CT
NE 438TH PL
NE 439TH CT
NE 439TH PL
NE 440TH CT
NE 440TH PL
NE 441ST CT
NE 441ST PL
NE 442ND CT
NE 442ND PL
NE 443RD CT
NE 443RD PL
NE 444TH CT
NE 444TH PL
NE 445TH CT
NE 445TH PL
NE 446TH CT
NE 446TH PL
NE 447TH CT
NE 447TH PL
NE 448TH CT
NE 448TH PL
NE 449TH CT
NE 449TH PL
NE 450TH CT
NE 450TH PL
NE 451ST CT
NE 451ST PL
NE 452ND CT
NE 452ND PL
NE 453RD CT
NE 453RD PL
NE 454TH CT
NE 454TH PL
NE 455TH CT
NE 455TH PL
NE 456TH CT
NE 456TH PL
NE 457TH CT
NE 457TH PL
NE 458TH CT
NE 458TH PL
NE 459TH CT
NE 459TH PL
NE 460TH CT
NE 460TH PL
NE 461ST CT
NE 461ST PL
NE 462ND CT
NE 462ND PL
NE 463RD CT
NE 463RD PL
NE 464TH CT
NE 464TH PL
NE 465TH CT
NE 465TH PL
NE 466TH CT
NE 466TH PL
NE 467TH CT
NE 467TH PL
NE 468TH CT
NE 468TH PL
NE 469TH CT
NE 469TH PL
NE 470TH CT
NE 470TH PL
NE 471ST CT
NE 471ST PL
NE 472ND CT
NE 472ND PL
NE 473RD CT
NE 473RD PL
NE 474TH CT
NE 474TH PL
NE 475TH CT
NE 475TH PL
NE 476TH CT
NE 476TH PL
NE 477TH CT
NE 477TH PL
NE 478TH CT
NE 478TH PL
NE 479TH CT
NE 479TH PL
NE 480TH CT
NE 480TH PL
NE 481ST CT
NE 481ST PL
NE 482ND CT
NE 482ND PL
NE 483RD CT
NE 483RD PL
NE 484TH CT
NE 484TH PL
NE 485TH CT
NE 485TH PL
NE 486TH CT
NE 486TH PL
NE 487TH CT
NE 487TH PL
NE 488TH CT
NE 488TH PL
NE 489TH CT
NE 489TH PL
NE 490TH CT
NE 490TH PL
NE 491ST CT
NE 491ST PL
NE 492ND CT
NE 492ND PL
NE 493RD CT
NE 493RD PL
NE 494TH CT
NE 494TH PL
NE 495TH CT
NE 495TH PL
NE 496TH CT
NE 496TH PL
NE 497TH CT
NE 497TH PL
NE 498TH CT
NE 498TH PL
NE 499TH CT
NE 499TH PL
NE 500TH CT
NE 500TH PL
NE 501ST CT
NE 501ST PL
NE 502ND CT
NE 502ND PL
NE 503RD CT
NE 503RD PL
NE 504TH CT
NE 504TH PL
NE 505TH CT
NE 505TH PL
NE 506TH CT
NE 506TH PL
NE 507TH CT
NE 507TH PL
NE 508TH CT
NE 508TH PL
NE 509TH CT
NE 509TH PL
NE 510TH CT
NE 510TH PL
NE 511TH CT
NE 511TH PL
NE 512TH CT
NE 512TH PL
NE 513TH CT
NE 513TH PL
NE 514TH CT
NE 514TH PL
NE 515TH CT
NE 515TH PL
NE 516TH CT
NE 516TH PL
NE 517TH CT
NE 517TH PL
NE 518TH CT
NE 518TH PL
NE 519TH CT
NE 519TH PL
NE 520TH CT
NE 520TH PL
NE 521ST CT
NE 521ST PL
NE 522ND CT
NE 522ND PL
NE 523RD CT
NE 523RD PL
NE 524TH CT
NE 524TH PL
NE 525TH CT
NE 525TH PL
NE 526TH CT
NE 526TH PL
NE 527TH CT
NE 527TH PL
NE 528TH CT
NE 528TH PL
NE 529TH CT
NE 529TH PL
NE 530TH CT
NE 530TH PL
NE 531ST CT
NE 531ST PL
NE 532ND CT
NE 532ND PL
NE 533RD CT
NE 533RD PL
NE 534TH CT
NE 534TH PL
NE 535TH CT
NE 535TH PL
NE 536TH CT
NE 536TH PL
NE 537TH CT
NE 537TH PL
NE 538TH CT
NE 538TH PL
NE 539TH CT
NE 539TH PL
NE 540TH CT
NE 540TH PL
NE 541ST CT
NE 541ST PL
NE 542ND CT
NE 542ND PL
NE 543RD CT
NE 543RD PL
NE 544TH CT
NE 544TH PL
NE 545TH CT
NE 545TH PL
NE 546TH CT
NE 546TH PL
NE 547TH CT
NE 547TH PL
NE 548TH CT
NE 548TH PL
NE 549TH CT
NE 549TH PL
NE 550TH CT
NE 550TH PL
NE 551ST CT
NE 551ST PL
NE 552ND CT
NE 552ND PL
NE 553RD CT
NE 553RD PL
NE 554TH CT
NE 554TH PL
NE 555TH CT
NE 555TH PL
NE 556TH CT
NE 556TH PL
NE 557TH CT
NE 557TH PL
NE 558TH CT
NE 558TH PL
NE 559TH CT
NE 559TH PL
NE 560TH CT
NE 560TH PL
NE 561ST CT
NE 561ST PL
NE 562ND CT
NE 562ND PL
NE 563RD CT
NE 563RD PL
NE 564TH CT
NE 564TH PL
NE 565TH CT
NE 565TH PL
NE 566TH CT
NE 566TH PL
NE 567TH CT
NE 567TH PL
NE 568TH CT
NE 568TH PL
NE 569TH CT
NE 569TH PL
NE 570TH CT
NE 570TH PL
NE 571ST CT
NE 571ST PL
NE 572ND CT
NE 572ND PL
NE 573RD CT
NE 573RD PL
NE 574TH CT
NE 574TH PL
NE 575TH CT
NE 575TH PL
NE 576TH CT
NE 576TH PL
NE 577TH CT
NE 577TH PL
NE 578TH CT
NE 578TH PL
NE 579TH CT
NE 579TH PL
NE 580TH CT
NE 580TH PL
NE 581ST CT
NE 581ST PL
NE 582ND CT
NE 582ND PL
NE 583RD CT
NE 583RD PL
NE 584TH CT
NE 584TH PL
NE 585TH CT
NE 585TH PL
NE 586TH CT
NE 586TH PL
NE 587TH CT
NE 587TH PL
NE 588TH CT
NE 588TH PL
NE 589TH CT
NE 589TH PL
NE 590TH CT
NE 590TH PL
NE 591ST CT
NE 591ST PL
NE 592ND CT
NE 592ND PL
NE 593RD CT
NE 593RD PL
NE 594TH CT
NE 594TH PL
NE 595TH CT
NE 595TH PL
NE 596TH CT
NE 596TH PL
NE 597TH CT
NE 597TH PL
NE 598TH CT
NE 598TH PL
NE 599TH CT
NE 599TH PL
NE 600TH CT
NE 600TH PL
NE 601ST CT
NE 601ST PL
NE 602ND CT
NE 602ND PL
NE 603RD CT
NE 603RD PL
NE 604TH CT
NE 604TH PL
NE 605TH CT
NE 605TH PL
NE 606TH CT
NE 606TH PL
NE 607TH CT
NE 607TH PL
NE 608TH CT
NE 608TH PL
NE 609TH CT
NE 609TH PL
NE 610TH CT
NE 610TH PL
NE 611TH CT
NE 611TH PL
NE 612TH CT
NE 612TH PL
NE 613TH CT
NE 613TH PL
NE 614TH CT
NE 614TH PL
NE 615TH CT
NE 615TH PL
NE 616TH CT
NE 616TH PL
NE 617TH CT
NE 617TH PL
NE 618TH CT
NE 618TH PL
NE 619TH CT
NE 619TH PL
NE 620TH CT
NE 620TH PL
NE 621ST CT
NE 621ST PL
NE 622ND CT
NE 622ND PL
NE 623RD CT
NE 623RD PL
NE 624TH CT
NE 624TH PL
NE 625TH CT
NE 625TH PL
NE 626TH CT
NE 626TH PL
NE 627TH CT
NE 627TH PL
NE 628TH CT
NE 628TH PL
NE 629TH CT
NE 629TH PL
NE 630TH CT
NE 630TH PL
NE 631ST CT
NE 631ST PL
NE 632ND CT
NE 632ND PL
NE 633RD CT
NE 633RD PL
NE 634TH CT
NE 634TH PL
NE 635TH CT
NE 635TH PL
NE 636TH CT
NE 636TH PL
NE 637TH CT
NE 637TH PL
NE 638TH CT
NE 638TH PL
NE 639TH CT
NE 639TH PL
NE 640TH CT
NE 640TH PL
NE 641ST CT
NE 641ST PL
NE 642ND CT
NE 642ND PL
NE 643RD CT
NE 643RD PL
NE 644TH CT
NE 644TH PL
NE 645TH CT
NE 645TH PL
NE 646TH CT
NE 646TH PL
NE 647TH CT
NE 647TH PL
NE 648TH CT
NE 648TH PL
NE 649TH CT
NE 649TH PL
NE 650TH CT
NE 650TH PL
NE 651ST CT
NE 651ST PL
NE 652ND CT
NE 652ND PL
NE 653RD CT
NE 653RD PL
NE 654TH CT
NE 654TH PL
NE 655TH CT
NE 655TH PL
NE 656TH CT
NE 656TH PL
NE 657TH CT
NE 657TH PL
NE 658TH CT
NE 658TH PL
NE 659TH CT
NE 659TH PL
NE 660TH CT
NE 660TH PL
NE 661ST CT
NE 661ST PL
NE 662ND CT
NE 662ND PL
NE 663RD CT
NE 663RD PL
NE 664TH CT
NE 664TH PL
NE 665TH CT
NE 665TH PL
NE 666TH CT
NE 666TH PL
NE 667TH CT
NE 667TH PL
NE 668TH CT
NE 668TH PL
NE 669TH CT
NE 669TH PL
NE 670TH CT
NE 670TH PL
NE 671ST CT
NE 671ST PL
NE 672ND CT
NE 672ND PL
NE 673RD CT
NE 673RD PL
NE 674TH CT
NE 674TH PL
NE 675TH CT
NE 675TH PL
NE 676TH CT
NE 676TH PL
NE 677TH CT
NE 677TH PL
NE 678TH CT
NE 678TH PL
NE 679TH CT
NE 679TH PL
NE 680TH CT
NE 680TH PL
NE 681ST CT
NE 681ST PL
NE 682ND CT
NE 682ND PL
NE 683RD CT
NE 683RD PL
NE 684TH CT
NE 684TH PL
NE 685TH CT
NE 685TH PL
NE 686TH CT
NE 686TH PL
NE 687TH CT
NE 687TH PL
NE 688TH CT
NE 688TH PL
NE 689TH CT
NE 689TH PL
NE 690TH CT
NE 690TH PL
NE 691ST CT
NE 691ST PL
NE 692ND CT
NE 692ND PL
NE 693RD CT
NE 693RD PL
NE 694TH CT
NE 694TH PL
NE 695TH CT
NE 695TH PL
NE 696TH CT
NE 696TH PL
NE 697TH CT
NE 697TH PL
NE 698TH CT
NE 698TH PL
NE 699TH CT
NE 699TH PL
NE 700TH CT
NE 700TH PL
NE 701ST CT
NE 701ST PL
NE 702ND CT
NE 702ND PL
NE 703RD CT
NE 703RD PL
NE 704TH CT
NE 704TH PL
NE 705TH CT
NE 705TH PL
NE 706TH CT
NE 706T

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0° National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Florida State Plane east zone (FIPSZONE 0901). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

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

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

Base map information shown on this FIRM was provided in digital format by the Miami-Dade County Information Technology Department. These data were compiled at a scale of 1:3,600 from digital orthophotography dated 2001. Additional base map information was provided by the Cities of Aventura, Coral Gables, and Homestead, the Town of Cutler Bay, and Miami-Dade County.

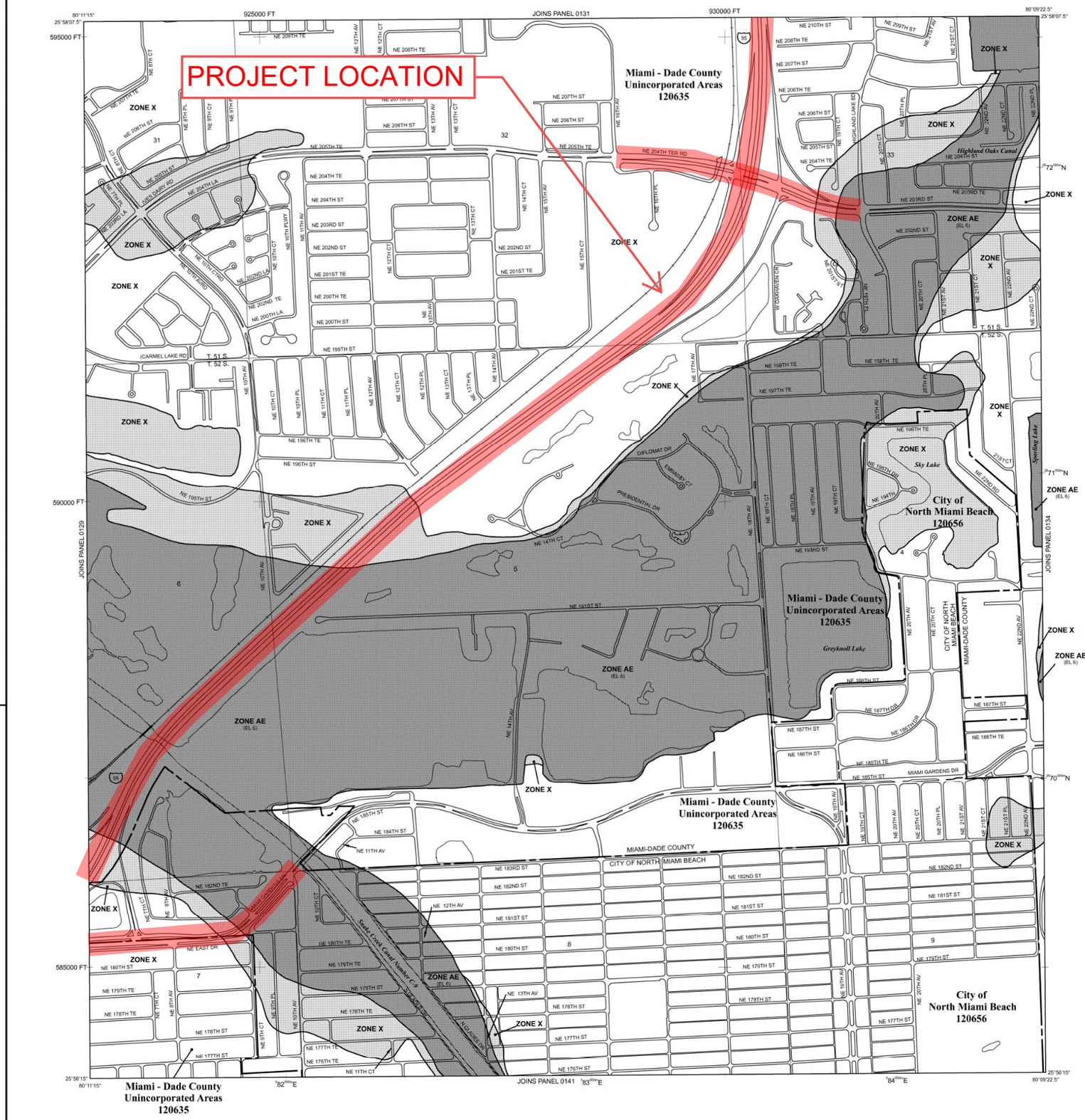
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result,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

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

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

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

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



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

- Floodplain boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
- 513 — Base Flood Elevation line and value; elevation in feet*
- (EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

- A — A — Cross section Line
- 23 — 23 — Transect line
- 87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
- 2976000mN — 1000-meter Universal Transverse Mercator grid values, zone 17
- 600000 FT — 5000-foot grid ticks: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
- DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)
- ●M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
January 20, 1993

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 2, 1994 - May 16, 1994 - July 17, 1995 - for description of revision, see Notice to Users page in the Flood Insurance Study report.
September 11, 2009 - to reflect revised shoreline, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, to add and change Base Flood Elevations, to update corporate limits, to change zone designations, to add roads and road names, and to add and change Special Flood Hazard Areas

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0133L

FIRM

FLOOD INSURANCE RATE MAP

MIAMI-DADE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 133 OF 1031

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MIAMI - DADE COUNTY	120635	0133	L
NORTH MIAMI BEACH, CITY OF	120656	0133	L

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
12086C0133L

MAP REVISED
SEPTEMBER 11, 2009

Federal Emergency Management Agency

NOTES TO USERS

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

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

Coastal Base Flood Elevations shown on this map apply only landward of 0.0° National Geodetic Vertical Datum of 1929 (NGVD 29). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

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

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

The **projection** used in the preparation of this map was Florida State Plane east zone (FIPSZONE 0901). The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

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

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

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

Base map information shown on this FIRM was provided in digital format by the Miami-Dade County Information Technology Department. These data were compiled at a scale of 1:3,600 from digital orthophotography dated 2001. Additional base map information was provided by the Cities of Aventura, Coral Gables, and Homestead, the Town of Cutler Bay, and Miami-Dade County.

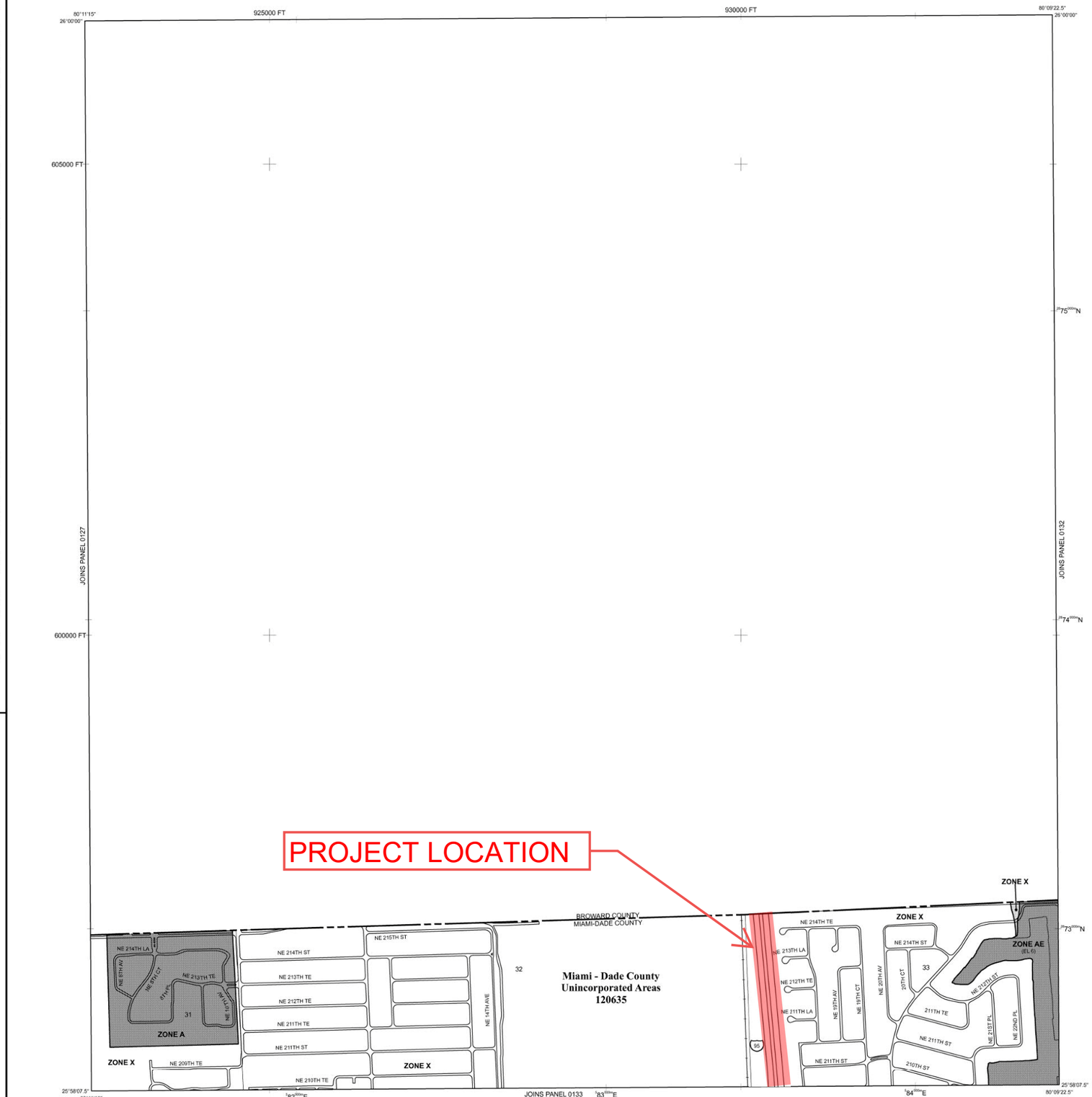
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to confirm to these new stream channel configurations. As a result,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

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

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

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

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



LEGEND

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

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

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

FLOODWAY AREAS IN ZONE AE

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

OTHER FLOOD AREAS

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

OTHER AREAS

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

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

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

	Floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the National Geodetic Vertical Datum of 1929

A — A	Cross section Line
23 — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3976000mN	1000-meter Universal Transverse Mercator grid values, zone 17
600000 FT	5000-foot grid ticks: Florida State Plane coordinate system, East zone (FIPSZONE 0901), Transverse Mercator projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
●M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE
FLOOD INSURANCE RATE MAP
January 20, 1993

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
March 2, 1994 - May 16, 1994 - July 17, 1995 - for description of revision, see Notice to Users page in the Flood Insurance Study report.
September 11, 2009 - to reflect revised shoreline, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, to add and change Base Flood Elevations, to update corporate limits, to change zone designations, to add roads and road names, and to add and change Special Flood Hazard Areas

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

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

MAP SCALE 1" = 500'

250 0 500 1000 FEET
150 0 150 300 METERS

NFIP
NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0131L

FIRM

FLOOD INSURANCE RATE MAP

MIAMI-DADE COUNTY, FLORIDA
AND INCORPORATED AREAS

PANEL 131 OF 1031

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MIAMI - DADE COUNTY	120635	0131	L

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
12086C0131L

MAP REVISED
SEPTEMBER 11, 2009

Federal Emergency Management Agency

APPENDIX J

Floodplain Compensation Calculations

BUILD ALTERNATIVE #1
VOLUME AVAILABLE FOR FLOODPLAIN COMPENSATION

POND	AREA AT POND BOTTOM (= ELEV. 1.92 NAVD) (ACRES)	*AREA AT ELEV. 4.42 NAVD (ACRES)	STORAGE VOLUME (AC.-FT.)
2 (PARTIAL)	0.161	0.279	0.550
5	0.111	0.563	0.843
6	0.046	0.238	0.355
7 (PARTIAL)	0.304	1.527	2.289
8	0.068	0.347	0.519
9 (PARTIAL)	0.092	0.465	0.696

*Assume 1:4 Side Slopes

TOTAL: 5.251

From Approximately Station 582+30.00 to Approximately Station 622+00.00, the project is location within Zone AE with a Base Flood Elevation of 6.00 NGVD (= 4.42 NAVD)

BUILD ALTERNATIVE #2
VOLUME AVAILABLE FOR FLOODPLAIN COMPENSATION

POND	AREA AT POND BOTTOM (= ELEV. 1.92 NAVD) (ACRES)	*AREA AT ELEV. 4.42 NAVD (ACRES)	STORAGE VOLUME (AC.-FT.)
5 (PARTIAL)	0.071	0.150	0.276
6 (PARTIAL)	0.304	1.528	2.290

*Assume 1:4 Side Slopes

TOTAL: 2.566

From Approximately Station 582+30.00 to Approximately Station 622+00.00, the project is location within Zone AE with a Base Flood Elevation of 6.00 NGVD (= 4.42 NAVD)

BUILD ALTERNATIVE #3
VOLUME AVAILABLE FOR FLOODPLAIN COMPENSATION

POND	AREA AT POND BOTTOM (= ELEV. 1.92 NAVD) (ACRES)	*AREA AT ELEV. 4.42 NAVD (ACRES)	STORAGE VOLUME (AC.-FT.)
7 (PARTIAL)	0.093	0.210	0.379
8 (PARTIAL)	0.300	1.505	2.256

*Assume 1:4 Side Slopes

TOTAL: 2.635

From Approximately Station 582+30.00 to Approximately Station 622+00.00, the project is location within Zone AE with a Base Flood Elevation of 6.00 NGVD (= 4.42 NAVD)

APPENDIX K

Nutrient Loading Analysis

NUTRIENT LOADING SUMMARY

DESIGN ALTERNATIVE	BASIN	PRE-DEVELOPMENT NITROGEN LOADING (kg/yr)	POST-DEVELOPMENT NITROGEN LOADING (kg/yr)	NET REDUCTION (kg/yr)	PRE-DEVELOPMENT PHOSPHORUS LOADING (kg/yr)	POST-DEVELOPMENT PHOSPHORUS LOADING (kg/yr)	NET REDUCTION (kg/yr)	POST-DEVELOPMENT PRE-TREATMENT NITROGEN LOADING (kg/yr)	POST-DEVELOPMENT POST-TREATMENT NITROGEN LOADING (kg/yr)	PERCENT REDUCTION (%)	ADDITIONAL TREATMENT NEEDED FOR 55% REDUCTION (kg/yr)	POST-DEVELOPMENT PRE-TREATMENT PHOSPHORUS LOADING (kg/yr)	POST-DEVELOPMENT POST-TREATMENT PHOSPHORUS LOADING (kg/yr)	PERCENT REDUCTION (%)	ADDITIONAL TREATMENT NEEDED FOR 80% REDUCTION (kg/yr)	TOTAL ADDITIONAL TREATMENT REQUIRED (NITROGEN) (kg/yr)	TOTAL ADDITIONAL TREATMENT REQUIRED (PHOSPHORUS) (kg/yr)
NO-BUILD	SYSTEM 2	29.77	29.77	0.00	4.03	4.03	0.00	29.77	29.77	0.00	16.37	4.03	4.03	0.00	3.22	16.37	3.22
NO-BUILD	SYSTEM 3	12.92	12.92	0.00	0.95	0.95	0.00	61.66	12.92	79.05	0.00	7.88	0.95	87.94	0.00	0.00	0.00
NO-BUILD	SYSTEM 4	32.92	32.92	0.00	4.18	4.18	0.00	154.42	32.92	78.68	0.00	19.62	4.18	78.70	0.26	0.00	0.26
NO-BUILD	SYSTEM 5	42.66	42.66	0.00	5.54	5.54	0.00	121.83	42.66	64.98	0.00	15.82	5.54	64.98	2.38	0.00	2.38
BUILD ALT. #1	SYSTEM 2	29.77	16.08	13.69	4.03	2.21	1.82	37.66	16.08	57.30	0.00	5.19	2.21	57.42	1.17	0.00	1.17
BUILD ALT. #1	SYSTEM 3	12.92	6.00	6.92	0.95	0.80	0.15	73.29	6.00	91.81	0.00	9.83	0.80	91.86	0.00	0.00	0.00
BUILD ALT. #1	SYSTEM 4	32.92	46.43	-13.51	4.18	6.16	-1.98	230.68	46.43	79.87	0.00	30.62	6.16	79.88	0.04	13.51	1.98
BUILD ALT. #1	SYSTEM 5	42.66	42.04	0.62	5.54	5.55	-0.01	148.34	42.04	71.66	0.00	19.57	5.55	71.64	1.64	0.00	1.64
BUILD ALT. #2	SYSTEM 2	29.77	15.30	14.47	4.03	2.11	1.92	37.43	15.30	59.12	0.00	5.15	2.11	59.03	1.08	0.00	1.08
BUILD ALT. #2	SYSTEM 3	12.92	27.97	-15.05	0.95	3.77	-2.82	127.02	27.97	77.98	0.00	17.13	3.77	77.99	0.34	15.05	2.82
BUILD ALT. #2	SYSTEM 4	32.92	180.61	-147.69	4.18	24.48	-20.30	279.42	180.61	35.36	54.87	37.87	24.48	35.36	16.91	147.69	20.30
BUILD ALT. #2	SYSTEM 5	42.66	73.46	-30.80	5.54	9.85	-4.31	169.31	73.46	56.61	0.00	22.71	9.85	56.63	5.31	30.80	5.31
BUILD ALT. #3	SYSTEM 2	29.77	16.82	12.95	4.03	2.32	1.71	39.66	16.82	57.59	0.00	5.46	2.32	57.51	1.23	0.00	1.23
BUILD ALT. #3	SYSTEM 3	12.92	32.62	-19.70	0.95	4.40	-3.45	138.89	32.62	76.51	0.00	18.73	4.40	76.51	0.65	19.70	3.45
BUILD ALT. #3	SYSTEM 4	32.92	94.34	-61.42	4.18	12.80	-8.62	313.66	94.34	69.92	0.00	42.54	12.80	69.91	4.29	61.42	8.62
BUILD ALT. #3	SYSTEM 5	42.66	86.93	-44.27	5.54	11.66	-6.12	170.21	86.93	48.93	10.34	22.83	11.66	48.93	7.09	44.27	7.09

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

Date: 01/3/2023

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	SYSTEM 2	SYSTEM 3	SYSTEM 4	SYSTEM 5
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	58.5	58.5	58.5	58.5
Post-Condition Landuse Information				
Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	10.490	26.824	91.622	61.136
Rational Coefficient (0-1)	0.478	0.365	0.337	0.325
Non DCIA Curve Number	95.59	92.39	91.47	91.07
DCIA Percent (0-100)	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.249	1.245	1.243	1.243
Phosphorus EMC (mg/l)	0.172	0.167	0.165	0.164
Runoff Volume (ac-ft/yr)	24.456	47.740	150.512	96.792
Nitrogen Loading (kg/yr)	37.663	73.286	230.678	148.345
Phosphorus Loading (kg/yr)	5.187	9.830	30.621	19.572

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

INPUT

SYSTEM 2

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
9.940	96	0.501	0.475
0.560	61	0.060	0.003
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.478
DCIA Percent 0.0
Composite CN 95.58

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
9.940	1.250	96	0.501	0.475
0.560	1.150	61	0.060	0.003
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.478
DCIA Percent 0.0
Composite EMC 1.249

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
9.940	0.173	96	0.501	0.475
0.560	0.055	61	0.060	0.003
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.478
DCIA Percent 0.0
Composite EMC 0.172

SYSTEM 3

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
18.550	96	0.501	0.347
8.280	61	0.060	0.019
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.365
DCIA Percent 0.0
Composite CN 92.39

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
18.550	1.250	96	0.501	0.347
8.280	1.150	61	0.060	0.019
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.365
DCIA Percent 0.0
Composite EMC 1.245

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
18.550	0.173	96	0.501	0.347
8.280	0.055	61	0.060	0.019
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.365
DCIA Percent 0.0
Composite EMC 0.167

SYSTEM 4

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
57.480	96	0.501	0.315
34.140	61	0.060	0.022
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.337
DCIA Percent 0.0
Composite CN 91.47

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
57.480	1.250	96	0.501	0.315
34.140	1.150	61	0.060	0.022
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.337
DCIA Percent 0.0
Composite EMC 1.243

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
57.480	0.173	96	0.501	0.315
34.140	0.055	61	0.060	0.022
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.337
DCIA Percent 0.0
Composite EMC 0.165

SYSTEM 5

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
36.650	96	0.501	0.301
24.480	61	0.060	0.024
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.325
DCIA Percent 0.0
Composite CN 91.07

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
36.650	1.250	96	0.501	0.301
24.480	1.150	61	0.060	0.024
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.325
DCIA Percent 0.0
Composite EMC 1.243

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
36.650	0.173	96	0.501	0.301
24.480	0.055	61	0.060	0.024
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.325
DCIA Percent 0.0
Composite EMC 0.164

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

CATCHMENT: SYSTEM 2

Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	792.0
Trench Width (ft)	5.0
Trench Depth (ft)	15.0
Trench Length (ft)	792.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	0.75
Retention Depth (in over CA)	0.853

Watershed Characteristics

Catchment Area (acres)	10.49
Contributing Area (acres)	10.490
Non-DCIA Curve Number	95.59
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	57
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	57

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

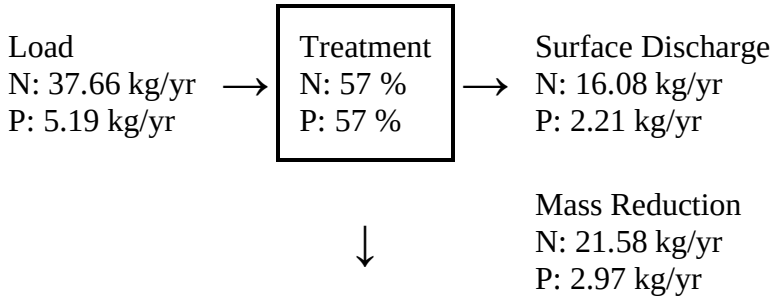
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	21.584
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	2.972

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

TP Concentration (mg/L) 0.000

Load Diagram for Exfiltration Trench (stand-alone)



Project: I-95 PD&E (BUILD ALTERNATIVE #1)

CATCHMENT: SYSTEM 3

Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Retention Design

Retention Depth (in)	3.300
Retention Volume (ac-ft)	7.376

Watershed Characteristics

Catchment Area (acres)	26.82
Contributing Area (acres)	26.820
Non-DCIA Curve Number	92.39
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	91
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	91

Media Mix Information

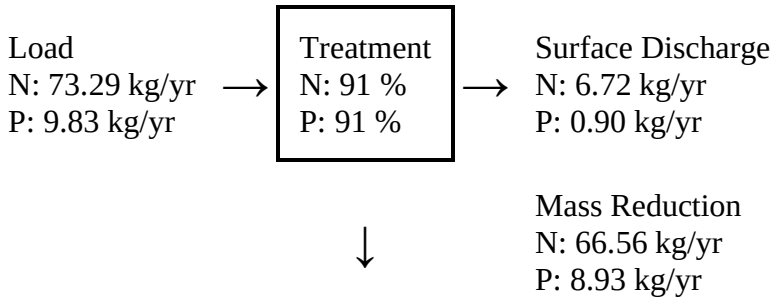
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	66.562
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	8.928
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #1)



Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	515.0
Trench Width (ft)	5.0
Trench Depth (ft)	15.0
Trench Length (ft)	515.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	0.49
Retention Depth (in over CA)	0.217

Watershed Characteristics

Catchment Area (acres)	26.82
Contributing Area (acres)	26.820
Non-DCIA Curve Number	92.39
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	24
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	24

Media Mix Information

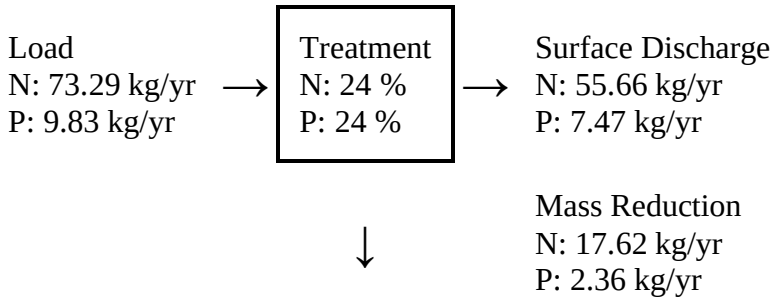
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	17.623
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	2.364
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



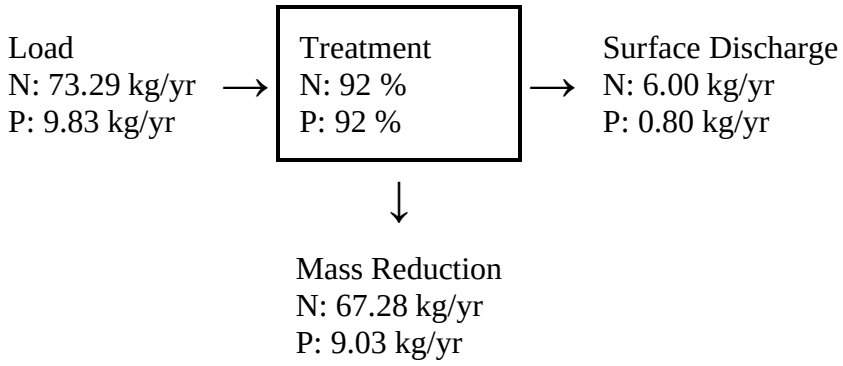
Combined Report of all BMP's

Catchment Area (acres)	26.82
Watershed Non-DCIA Curve Number	92.39
Watershed DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Calculated Annual Coefficient (0-1)	0.37
Total (accumulated) Retention Depth (in over watershed)	3.517
Overall Provided Nitrogen Treatment Efficiency (%)	92
Overall Provided Phosphorus Treatment Efficiency (%)	92
Overall Nitrogen Load (kg/yr)	6.001
Overall Phosphorus Load (kg/yr)	0.805

Equivalent Retention

Load for Multiple BMP in Series

Project: I-95 PD&E (BUILD ALTERNATIVE #1)



Project: I-95 PD&E (BUILD ALTERNATIVE #1)

CATCHMENT: SYSTEM 4

Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Retention Design

Retention Depth (in)	1.680
Retention Volume (ac-ft)	12.827

Watershed Characteristics

Catchment Area (acres)	91.62
Contributing Area (acres)	91.620
Non-DCIA Curve Number	91.47
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	77
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	77

Media Mix Information

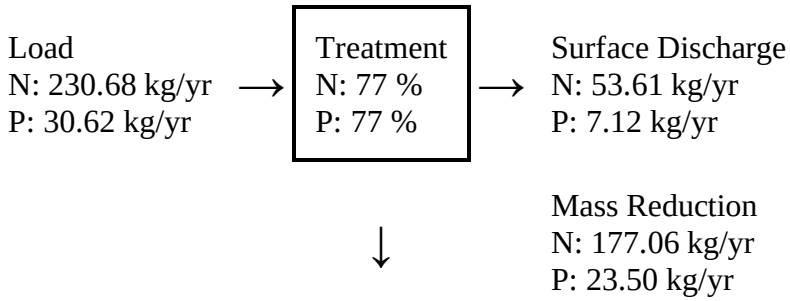
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	177.065
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	23.504
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #1)



Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	1,858.0
Trench Width (ft)	5.0
Trench Depth (ft)	15.0
Trench Length (ft)	1,858.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	1.75
Retention Depth (in over CA)	0.229

Watershed Characteristics

Catchment Area (acres)	91.62
Contributing Area (acres)	91.620
Non-DCIA Curve Number	91.47
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	26
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	26

Media Mix Information

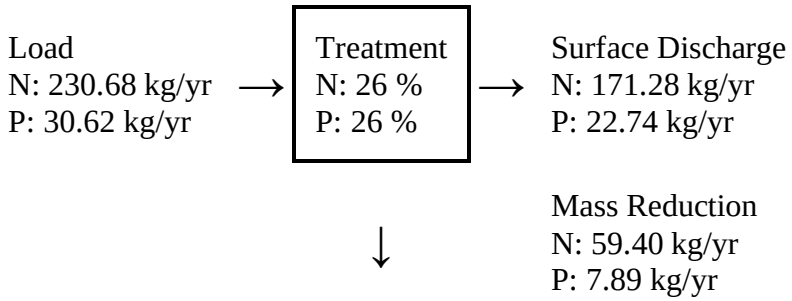
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	59.402
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	7.885
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



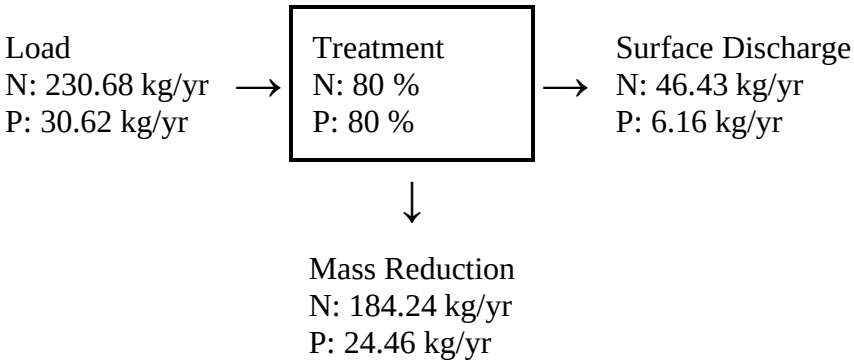
Combined Report of all BMP's

Catchment Area (acres)	91.62
Watershed Non-DCIA Curve Number	91.47
Watershed DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Calculated Annual Coefficient (0-1)	0.34
Total (accumulated) Retention Depth (in over watershed)	1.909
Overall Provided Nitrogen Treatment Efficiency (%)	80
Overall Provided Phosphorus Treatment Efficiency (%)	80
Overall Nitrogen Load (kg/yr)	46.433
Overall Phosphorus Load (kg/yr)	6.164

Equivalent Retention

Load for Multiple BMP in Series

Project: I-95 PD&E (BUILD ALTERNATIVE #1)



Project: I-95 PD&E (BUILD ALTERNATIVE #1)

CATCHMENT: SYSTEM 5

Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Retention Design

Retention Depth (in)	1.280
Retention Volume (ac-ft)	6.522

Watershed Characteristics

Catchment Area (acres)	61.14
Contributing Area (acres)	61.140
Non-DCIA Curve Number	91.07
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	70
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	70

Media Mix Information

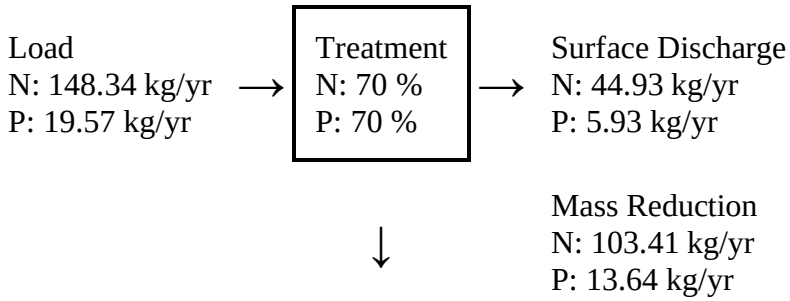
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	103.411
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	13.644
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #1)



Project: I-95 PD_E (BUILD ALT.1)
Date: 8/23/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	551.0
Trench Width (ft)	5.0
Trench Depth (ft)	15.0
Trench Length (ft)	551.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	0.52
Retention Depth (in over CA)	0.102

Watershed Characteristics

Catchment Area (acres)	61.14
Contributing Area (acres)	61.140
Non-DCIA Curve Number	91.07
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	12
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	12

Media Mix Information

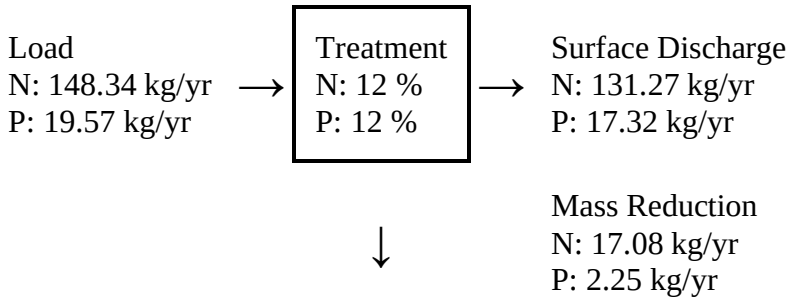
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #1)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	17.078
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	2.253
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



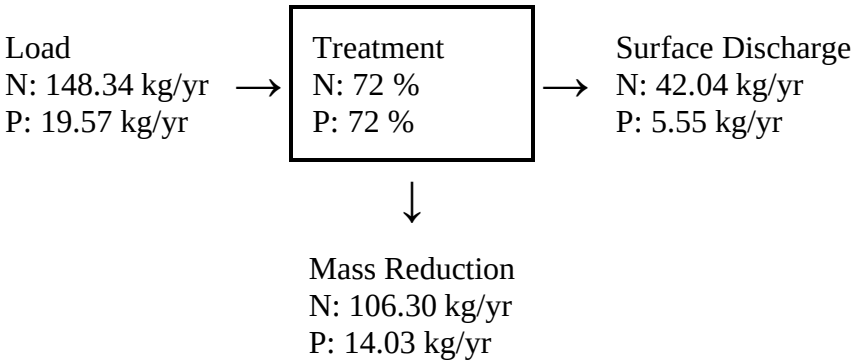
Combined Report of all BMP's

Catchment Area (acres)	61.14
Watershed Non-DCIA Curve Number	91.07
Watershed DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Calculated Annual Coefficient (0-1)	0.32
Total (accumulated) Retention Depth (in over watershed)	1.382
Overall Provided Nitrogen Treatment Efficiency (%)	72
Overall Provided Phosphorus Treatment Efficiency (%)	72
Overall Nitrogen Load (kg/yr)	42.041
Overall Phosphorus Load (kg/yr)	5.547

Equivalent Retention

Load for Multiple BMP in Series

Project: I-95 PD&E (BUILD ALTERNATIVE #1)



Project: I-95 PD&E (BUILD ALTERNATIVE #2)

Date: 01/3/2023

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	SYSTEM 2	SYSTEM 3	SYSTEM 4	SYSTEM 5
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	58.5	58.5	58.5	58.5
Post-Condition Landuse Information				
Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	10.858	44.327	93.121	60.636
Rational Coefficient (0-1)	0.459	0.383	0.400	0.373
Non DCIA Curve Number	95.25	92.96	93.54	92.65
DCIA Percent (0-100)	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.249	1.246	1.247	1.245
Phosphorus EMC (mg/l)	0.172	0.168	0.169	0.167
Runoff Volume (ac-ft/yr)	24.305	82.678	181.731	110.293
Nitrogen Loading (kg/yr)	37.430	127.020	279.421	169.309
Phosphorus Loading (kg/yr)	5.155	17.126	37.869	22.711

Project: I-95 PD&E (BUILD ALTERNATIVE #2)

INPUT

SYSTEM 2

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
9.820	96	0.501	0.453
1.040	61	0.060	0.006
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.459
DCIA Percent 0.0
Composite CN 95.25

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
9.820	1.250	96	0.501	0.453
1.040	1.150	61	0.060	0.006
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.459
DCIA Percent 0.0
Composite EMC 1.249

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
9.820	0.173	96	0.501	0.453
1.040	0.055	61	0.060	0.006
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.459
DCIA Percent 0.0
Composite EMC 0.172

SYSTEM 3

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
32.400	96	0.501	0.366
11.930	61	0.060	0.016
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.383
DCIA Percent 0.0
Composite CN 92.96

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
32.400	1.250	96	0.501	0.366
11.930	1.150	61	0.060	0.016
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.383
DCIA Percent 0.0
Composite EMC 1.246

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
32.400	0.173	96	0.501	0.366
11.930	0.055	61	0.060	0.016
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.383
DCIA Percent 0.0
Composite EMC 0.168

SYSTEM 4

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
71.800	96	0.501	0.387
21.320	61	0.060	0.014
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.400
DCIA Percent 0.0
Composite CN 93.54

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
71.800	1.250	96	0.501	0.387
21.320	1.150	61	0.060	0.014
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.400
DCIA Percent 0.0
Composite EMC 1.247

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
71.800	0.173	96	0.501	0.387
21.320	0.055	61	0.060	0.014
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.400
DCIA Percent 0.0
Composite EMC 0.169

SYSTEM 5

Non DCIA Curve Number - Input

Area (ac)	CN	C	Weighted C
43.020	96	0.501	0.356
17.610	61	0.060	0.017
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.373
DCIA Percent 0.0
Composite CN 92.65

EMC (N) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
43.020	1.250	96	0.501	0.356
17.610	1.150	61	0.060	0.017
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.373
DCIA Percent 0.0
Composite EMC 1.245

EMC (P) mg/l - Input

Area (ac)	EMC	CN	C	Weighted C
43.020	0.173	96	0.501	0.356
17.610	0.055	61	0.060	0.017
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.373
DCIA Percent 0.0
Composite EMC 0.167

Project: I-95 PD&E (BUILD ALTERNATIVE #2)

CATCHMENT: SYSTEM 2

Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	899.0
Trench Width (ft)	5.0
Trench Depth (ft)	14.5
Trench Length (ft)	899.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	0.82
Retention Depth (in over CA)	0.907

Watershed Characteristics

Catchment Area (acres)	10.86
Contributing Area (acres)	10.860
Non-DCIA Curve Number	95.25
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	59
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	59

Media Mix Information

Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

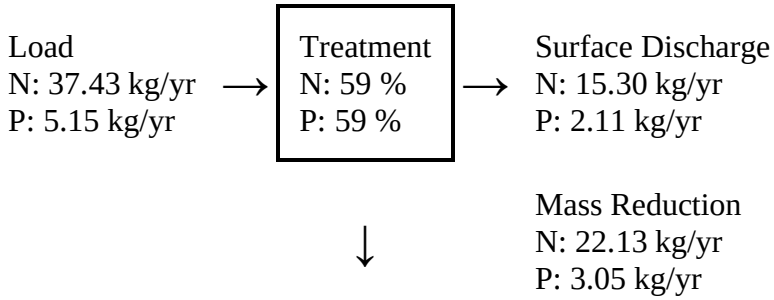
Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	22.133
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	3.048

Project: I-95 PD&E (BUILD ALTERNATIVE #2)

TP Concentration (mg/L) 0.000

Load Diagram for Exfiltration Trench (stand-alone)



Project: I-95 PD&E (BUILD ALTERNATIVE #2)

CATCHMENT: SYSTEM 3

Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Retention Design

Retention Depth (in)	1.560
Retention Volume (ac-ft)	5.763

Watershed Characteristics

Catchment Area (acres)	44.33
Contributing Area (acres)	44.330
Non-DCIA Curve Number	92.96
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	75
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	75

Media Mix Information

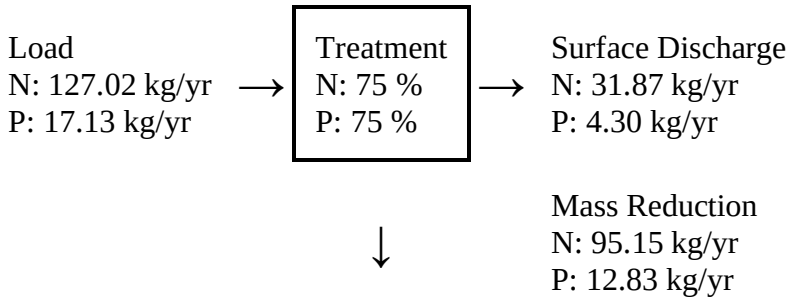
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	95.150
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	12.829
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #2)



Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	788.0
Trench Width (ft)	5.0
Trench Depth (ft)	14.5
Trench Length (ft)	788.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	0.72
Retention Depth (in over CA)	0.195

Watershed Characteristics

Catchment Area (acres)	44.33
Contributing Area (acres)	44.330
Non-DCIA Curve Number	92.96
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	21
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	21

Media Mix Information

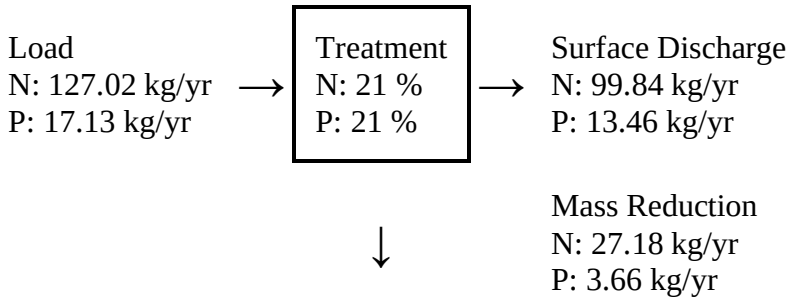
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #2)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	27.178
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	3.664
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



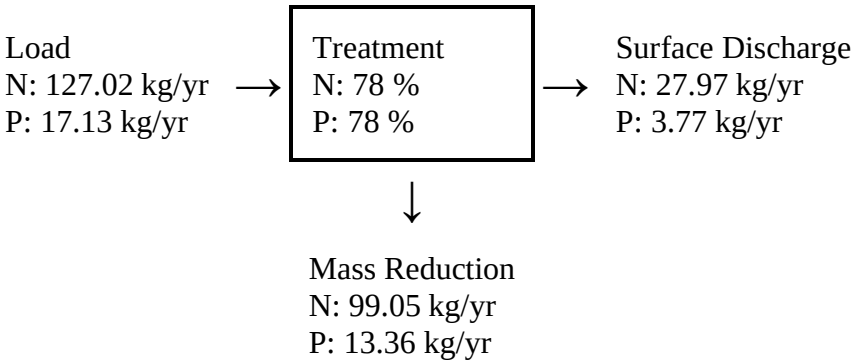
Combined Report of all BMP's

Catchment Area (acres)	44.33
Watershed Non-DCIA Curve Number	92.96
Watershed DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Calculated Annual Coefficient (0-1)	0.38
Total (accumulated) Retention Depth (in over watershed)	1.755
Overall Provided Nitrogen Treatment Efficiency (%)	78
Overall Provided Phosphorus Treatment Efficiency (%)	78
Overall Nitrogen Load (kg/yr)	27.969
Overall Phosphorus Load (kg/yr)	3.771

Equivalent Retention

Load for Multiple BMP in Series

Project: I-95 PD&E (BUILD ALTERNATIVE #2)



Project: I-95 PD&E (BUILD ALTERNATIVE #2)

CATCHMENT: SYSTEM 4

_Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Retention Design

Retention Depth (in)	0.250
Retention Volume (ac-ft)	1.940

Watershed Characteristics

Catchment Area (acres)	93.12
Contributing Area (acres)	93.120
Non-DCIA Curve Number	93.54
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	27
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	27

Media Mix Information

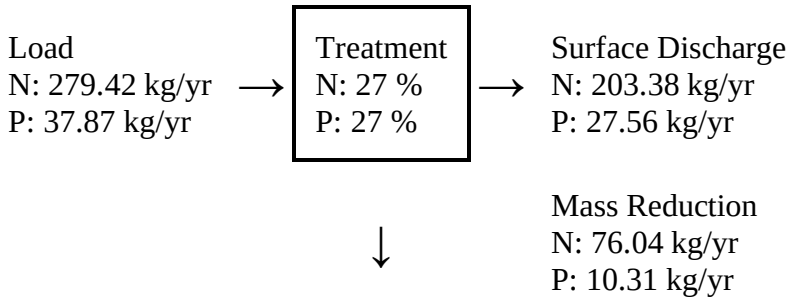
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	76.039
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	10.305
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #2)



Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	1,097.0
Trench Width (ft)	5.0
Trench Depth (ft)	14.5
Trench Length (ft)	1,097.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	1.00
Retention Depth (in over CA)	0.129

Watershed Characteristics

Catchment Area (acres)	93.12
Contributing Area (acres)	93.120
Non-DCIA Curve Number	93.54
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	14
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	14

Media Mix Information

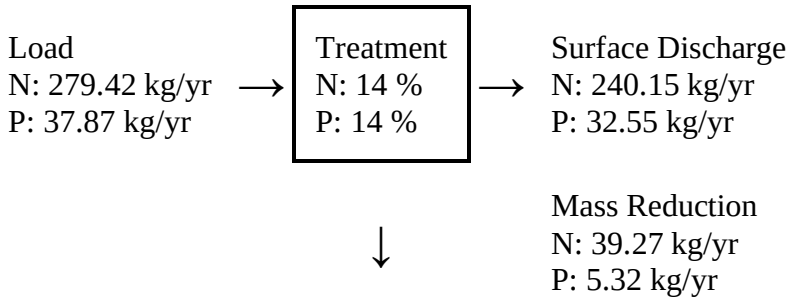
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #2)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	39.271
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	5.322
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



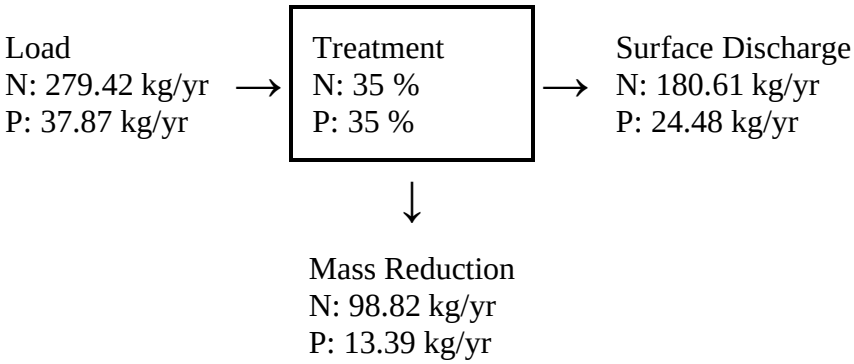
Combined Report of all BMP's

Catchment Area (acres)	93.12
Watershed Non-DCIA Curve Number	93.54
Watershed DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Calculated Annual Coefficient (0-1)	0.40
Total (accumulated) Retention Depth (in over watershed)	0.379
Overall Provided Nitrogen Treatment Efficiency (%)	35
Overall Provided Phosphorus Treatment Efficiency (%)	35
Overall Nitrogen Load (kg/yr)	180.605
Overall Phosphorus Load (kg/yr)	24.477

Equivalent Retention

Load for Multiple BMP in Series

Project: I-95 PD&E (BUILD ALTERNATIVE #2)



Project: I-95 PD&E (BUILD ALTERNATIVE #2)

CATCHMENT: SYSTEM 5

Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Retention Design

Retention Depth (in)	0.620
Retention Volume (ac-ft)	3.133

Watershed Characteristics

Catchment Area (acres)	60.64
Contributing Area (acres)	60.640
Non-DCIA Curve Number	92.65
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	49
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	49

Media Mix Information

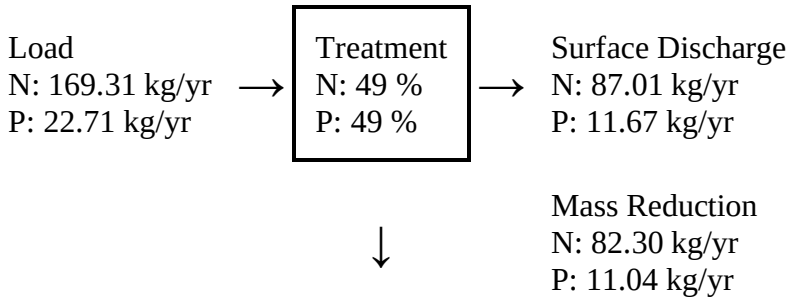
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	82.297
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	11.039
TP Concentration (mg/L)	0.000

Load Diagram for Retention (stand-alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #2)



Project: I-95 PD_E (BUILD ALT.2)
Date: 8/28/2023

Exfiltration Trench Design

Pipe Span (in)	36.0
Pipe Rise (in)	36.0
Pipe Length (ft)	1,096.0
Trench Width (ft)	5.0
Trench Depth (ft)	14.5
Trench Length (ft)	1,096.0
Aggregate Void %	0.50
Storage Volume (Ac-ft)	1.00
Retention Depth (in over CA)	0.198

Watershed Characteristics

Catchment Area (acres)	60.64
Contributing Area (acres)	60.640
Non-DCIA Curve Number	92.65
DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Rainfall (in)	58.50

Surface Water Discharge

Required TN Treatment Efficiency (%)	100
Provided TN Treatment Efficiency (%)	22
Required TP Treatment Efficiency (%)	100
Provided TP Treatment Efficiency (%)	22

Media Mix Information

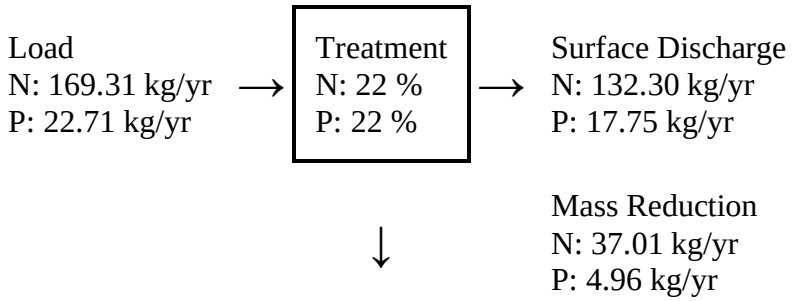
Type of Media Mix	Not Specified
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #2)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	37.008
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	4.964
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



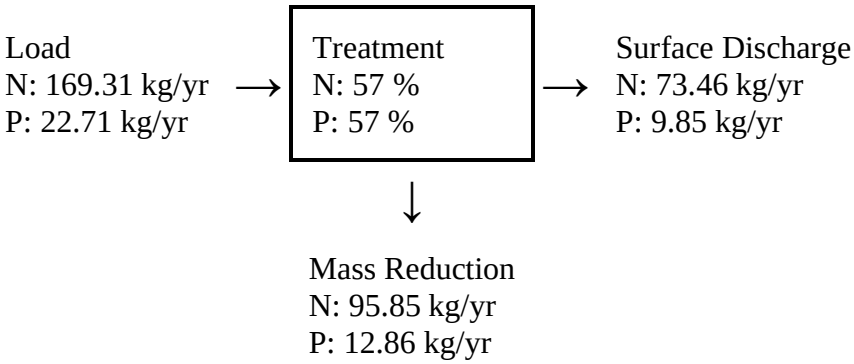
Combined Report of all BMP's

Catchment Area (acres)	60.64
Watershed Non-DCIA Curve Number	92.65
Watershed DCIA Percent	0.00
Rainfall Zone	Florida Zone 5
Calculated Annual Coefficient (0-1)	0.37
Total (accumulated) Retention Depth (in over watershed)	0.818
Overall Provided Nitrogen Treatment Efficiency (%)	57
Overall Provided Phosphorus Treatment Efficiency (%)	57
Overall Nitrogen Load (kg/yr)	73.462
Overall Phosphorus Load (kg/yr)	9.854

Equivalent Retention

Load for Multiple BMP in Series

Project: I-95 PD&E (BUILD ALTERNATIVE #2)



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Date: 01/6/2025

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	SYSTEM 2	SYSTEM 3	SYSTEM 4	SYSTEM 5
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	58.5	58.5	58.5	58.5
Post-Condition Landuse Information				
Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	11.403	48.545	106.243	61.669
Rational Coefficient (0-1)	0.463	0.382	0.394	0.369
Non DCIA Curve Number	95.33	92.94	93.34	92.51
DCIA Percent (0-100)	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.249	1.246	1.246	1.245
Phosphorus EMC (mg/l)	0.172	0.168	0.169	0.167
Runoff Volume (ac-ft/yr)	25.764	90.404	204.166	110.878
Nitrogen Loading (kg/yr)	39.677	138.889	313.664	170.208
Phosphorus Loading (kg/yr)	5.464	18.727	42.544	22.831

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

INPUT

SYSTEM 2

Area (ac)	CN	C	Weighted C
10.420	96	0.501	0.458
0.980	61	0.060	0.005
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.463
DCIA Percent 0.0
Composite CN 95.33

Area (ac)	EMC	CN	C	Weighted C
10.420	1.250	96	0.501	0.458
0.980	1.150	61	0.060	0.005
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.463
DCIA Percent 0.0
Composite EMC 1.249

Area (ac)	EMC	CN	C	Weighted C
10.420	0.173	96	0.501	0.458
0.980	0.055	61	0.060	0.005
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.463
DCIA Percent 0.0
Composite EMC 0.172

SYSTEM 3

Area (ac)	CN	C	Weighted C
35.420	96	0.501	0.366
13.130	61	0.060	0.016
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.382
DCIA Percent 0.0
Composite CN 92.94

Area (ac)	EMC	CN	C	Weighted C
35.420	1.250	96	0.501	0.366
13.130	1.150	61	0.060	0.016
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.382
DCIA Percent 0.0
Composite EMC 1.246

Area (ac)	EMC	CN	C	Weighted C
35.420	0.173	96	0.501	0.366
13.130	0.055	61	0.060	0.016
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.382
DCIA Percent 0.0
Composite EMC 0.168

SYSTEM 4

Area (ac)	CN	C	Weighted C
80.440	96	0.501	0.380
25.800	61	0.060	0.015
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.394
DCIA Percent 0.0
Composite CN 93.34

Area (ac)	EMC	CN	C	Weighted C
80.440	1.250	96	0.501	0.380
25.800	1.150	61	0.060	0.015
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.394
DCIA Percent 0.0
Composite EMC 1.246

Area (ac)	EMC	CN	C	Weighted C
80.440	0.173	96	0.501	0.380
25.800	0.055	61	0.060	0.015
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.394
DCIA Percent 0.0
Composite EMC 0.169

SYSTEM 5

Area (ac)	CN	C	Weighted C
43.130	96	0.501	0.351
18.540	61	0.060	0.018
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000
0.000	0	0.000	0.000

Avg Weighted C 0.369
DCIA Percent 0.0
Composite CN 92.51

Area (ac)	EMC	CN	C	Weighted C
43.130	1.250	96	0.501	0.351
18.540	1.150	61	0.060	0.018
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.369
DCIA Percent 0.0
Composite EMC 1.245

Area (ac)	EMC	CN	C	Weighted C
43.130	0.173	96	0.501	0.351
18.540	0.055	61	0.060	0.018
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000
0.000	0.000	0	0.000	0.000

Avg Weighted C 0.369
DCIA Percent 0.0
Composite EMC 0.167

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

CATCHMENT: SYSTEM 2

Project: ALT3
Date: 1/6/2025

Exfiltration Trench Design

Pipe Span (in)	**24.0**
Pipe Rise (in)	**24.0**
Pipe Length (ft)	**1,130.0**
Trench Width (ft)	**4.0**
Trench Depth (ft)	**15.0**
Trench Length (ft)	**1,130.0**
Aggregate Void %	**0.50**
Storage Volume (Ac-ft)	**0.82**
Retention Depth (in over CA)	**0.862**

Watershed Characteristics

Catchment Area (acres)	**11.40**
Contributing Area (acres)	**11.400**
Non-DCIA Curve Number	**95.33**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**58**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**58**

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

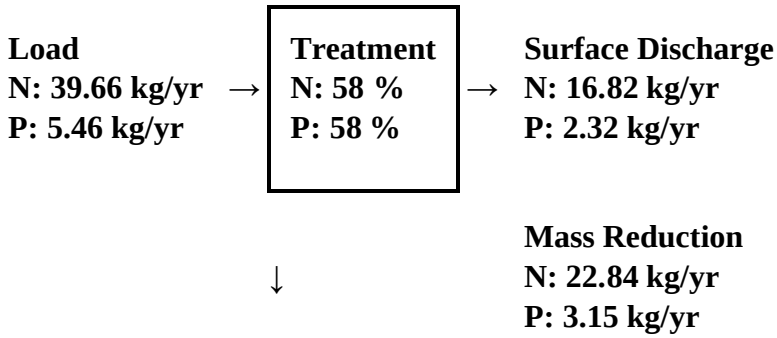
Media Mix Information

Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	**0.000**
TN Mass Load (kg/yr)	**22.838**
TN Concentration (mg/L)	**0.000**
TP Mass Load (kg/yr)	**3.145**
TP Concentration (mg/L)	**0.000**

Load Diagram for Exfiltration Trench (stand-alone)



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

CATCHMENT: SYSTEM 3

Project: ALT3
Date: 1/6/2025

Retention Design

Retention Depth (in)	**1.520**
Retention Volume (ac-ft)	**6.150**

Watershed Characteristics

Catchment Area (acres)	**48.55**
Contributing Area (acres)	**48.550**
Non-DCIA Curve Number	**92.94**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**74**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**74**

Media Mix Information

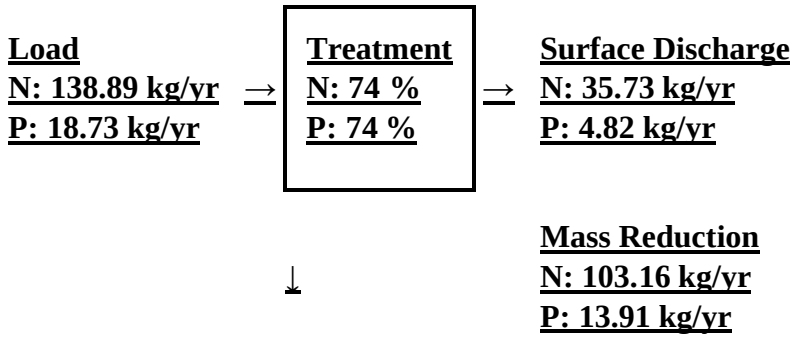
Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Treatment Rate (MG/yr)	**0.000**
TN Mass Load (kg/yr)	**103.160**
TN Concentration (mg/L)	**0.000**
TP Mass Load (kg/yr)	**13.909**
TP Concentration (mg/L)	**0.000**

Load Diagram for Retention (stand-alone)



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Project: ALT3
Date: 1/6/2025

Exfiltration Trench Design

Pipe Span (in)	**24.0**
Pipe Rise (in)	**24.0**
Pipe Length (ft)	**788.0**
Trench Width (ft)	**4.0**
Trench Depth (ft)	**15.0**
Trench Length (ft)	**788.0**
Aggregate Void %	**0.50**
Storage Volume (Ac-ft)	**0.57**
Retention Depth (in over CA)	**0.141**

Watershed Characteristics

Catchment Area (acres)	**48.55**
Contributing Area (acres)	**48.550**
Non-DCIA Curve Number	**92.94**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**16**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**16**

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

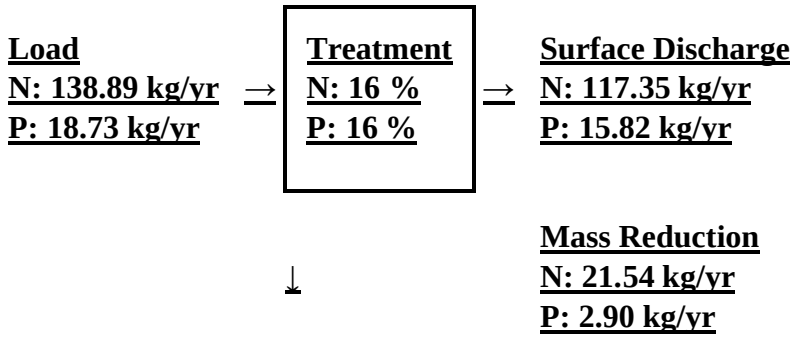
Media Mix Information

Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	**0.000**
TN Mass Load (kg/yr)	**21.539**
TN Concentration (mg/L)	**0.000**
TP Mass Load (kg/yr)	**2.904**
TP Concentration (mg/L)	**0.000**

Load Diagram for Exfiltration Trench (stand-alone)



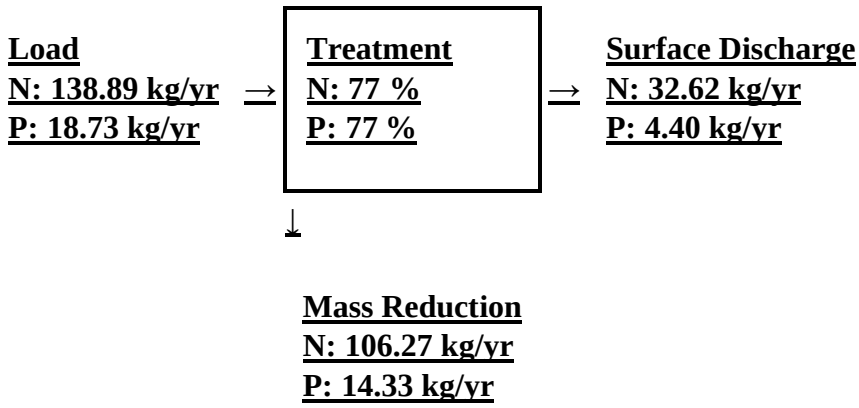
Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Combined Report of all BMP's

Catchment Area (acres)	**48.55**
Watershed Non-DCIA Curve Number	**92.94**
Watershed DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Calculated Annual Coefficient (0-1)	**0.38**
Total (accumulated) Retention Depth (in over watershed)	**1.661**
Overall Provided Nitrogen Treatment Efficiency (%)	**77**
Overall Provided Phosphorus Treatment Efficiency (%)	**77**
Overall Nitrogen Load (kg/yr)	**32.624**
Overall Phosphorus Load (kg/yr)	**4.399**

Equivalent Retention

Load for Multiple BMP in Series



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

CATCHMENT: SYSTEM 4

Project: ALT3
Date: 1/6/2025

Retention Design

Retention Depth (in)	**1.160**
Retention Volume (ac-ft)	**10.270**

Watershed Characteristics

Catchment Area (acres)	**106.24**
Contributing Area (acres)	**106.240**
Non-DCIA Curve Number	**93.34**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**67**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**67**

Media Mix Information

Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Treatment Rate (MG/yr) **0.000**

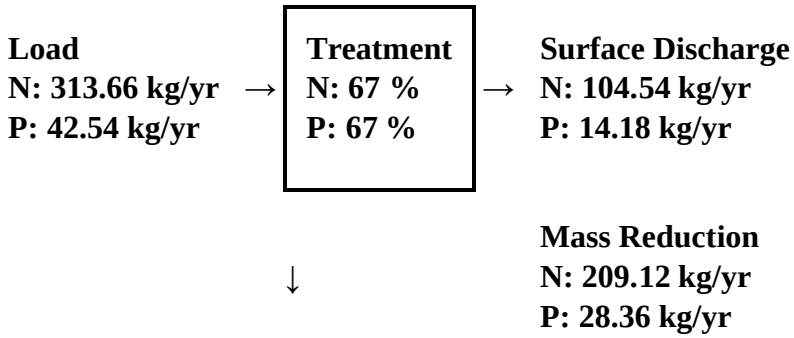
TN Mass Load (kg/yr) **209.124**

TN Concentration (mg/L) **0.000**

TP Mass Load (kg/yr) **28.364**

TP Concentration (mg/L) **0.000**

Load Diagram for Retention (stand-alone)



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Project: ALT3
Date: 1/6/2025

Exfiltration Trench Design

Pipe Span (in)	**24.0**
Pipe Rise (in)	**24.0**
Pipe Length (ft)	**1,667.0**
Trench Width (ft)	**4.0**
Trench Depth (ft)	**15.0**
Trench Length (ft)	**1,667.0**
Aggregate Void %	**0.50**
Storage Volume (Ac-ft)	**1.21**
Retention Depth (in over CA)	**0.136**

Watershed Characteristics

Catchment Area (acres)	**106.24**
Contributing Area (acres)	**106.240**
Non-DCIA Curve Number	**93.34**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**15**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**15**

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

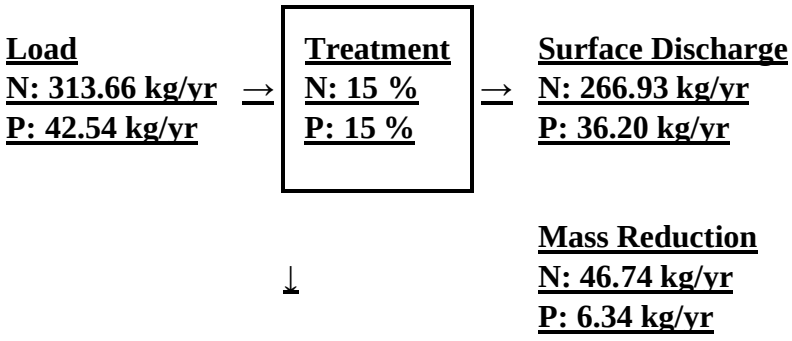
Media Mix Information

Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	**0.000**
TN Mass Load (kg/yr)	**46.738**
TN Concentration (mg/L)	**0.000**
TP Mass Load (kg/yr)	**6.339**
TP Concentration (mg/L)	**0.000**

Load Diagram for Exfiltration Trench (stand-alone)



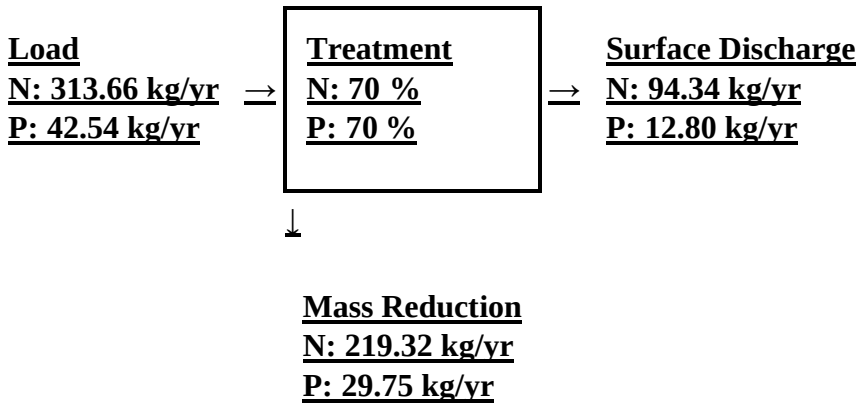
Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Combined Report of all BMP's

Catchment Area (acres)	**106.24**
Watershed Non-DCIA Curve Number	**93.34**
Watershed DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Calculated Annual Coefficient (0-1)	**0.39**
Total (accumulated) Retention Depth (in over watershed)	**1.296**
Overall Provided Nitrogen Treatment Efficiency (%)	**70**
Overall Provided Phosphorus Treatment Efficiency (%)	**70**
Overall Nitrogen Load (kg/yr)	**94.341**
Overall Phosphorus Load (kg/yr)	**12.796**

Equivalent Retention

Load for Multiple BMP in Series



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

CATCHMENT: SYSTEM 5

Project: ALT3
Date: 1/6/2025

Retention Design

Retention Depth (in)	**0.190**
Retention Volume (ac-ft)	**0.976**

Watershed Characteristics

Catchment Area (acres)	**61.67**
Contributing Area (acres)	**61.670**
Non-DCIA Curve Number	**92.51**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**21**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**21**

Media Mix Information

Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Treatment Rate (MG/yr) **0.000**

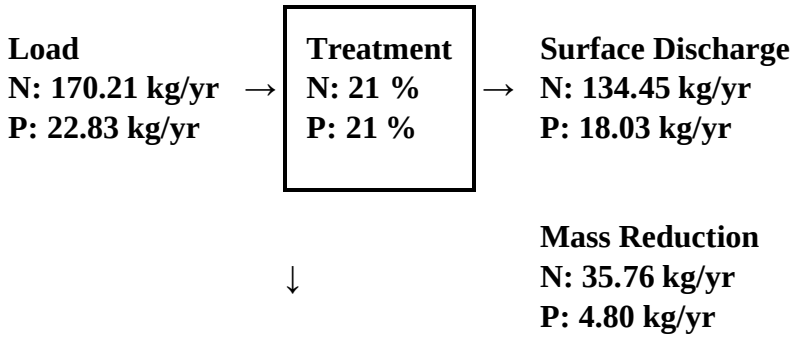
TN Mass Load (kg/yr) **35.762**

TN Concentration (mg/L) **0.000**

TP Mass Load (kg/yr) **4.797**

TP Concentration (mg/L) **0.000**

Load Diagram for Retention (stand-alone)



Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Project: ALT3
Date: 1/6/2025

Exfiltration Trench Design

Pipe Span (in)	**24.0**
Pipe Rise (in)	**24.0**
Pipe Length (ft)	**3,093.0**
Trench Width (ft)	**4.0**
Trench Depth (ft)	**15.0**
Trench Length (ft)	**3,093.0**
Aggregate Void %	**0.50**
Storage Volume (Ac-ft)	**2.24**
Retention Depth (in over CA)	**0.436**

Watershed Characteristics

Catchment Area (acres)	**61.67**
Contributing Area (acres)	**61.670**
Non-DCIA Curve Number	**92.51**
DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Rainfall (in)	**58.50**

Surface Water Discharge

Required TN Treatment Efficiency (%)	**100**
Provided TN Treatment Efficiency (%)	**39**
Required TP Treatment Efficiency (%)	**100**
Provided TP Treatment Efficiency (%)	**39**

Project: I-95 PD&E (BUILD ALTERNATIVE #3)

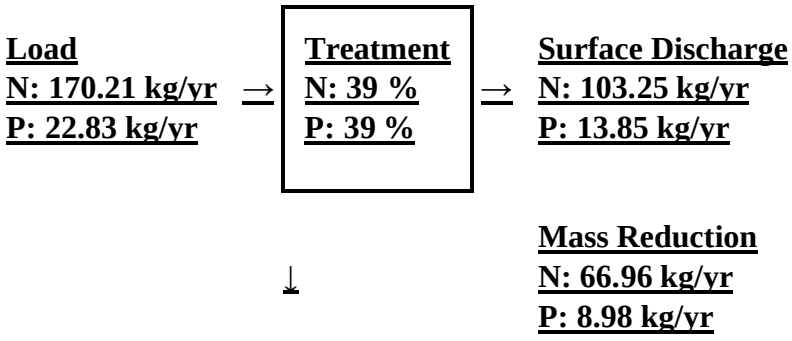
Media Mix Information

Type of Media Mix	**Not Specified**
Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	**0.000**
TN Mass Load (kg/yr)	**66.959**
TN Concentration (mg/L)	**0.000**
TP Mass Load (kg/yr)	**8.982**
TP Concentration (mg/L)	**0.000**

Load Diagram for Exfiltration Trench (stand-alone)



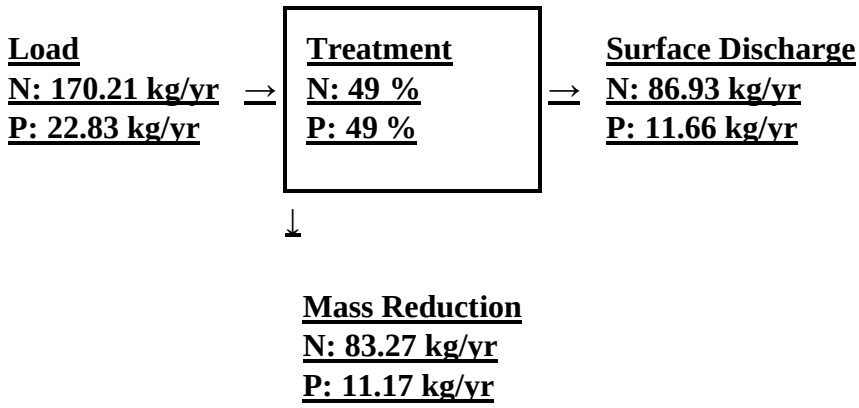
Project: I-95 PD&E (BUILD ALTERNATIVE #3)

Combined Report of all BMP's

Catchment Area (acres)	**61.67**
Watershed Non-DCIA Curve Number	**92.51**
Watershed DCIA Percent	**0.00**
Rainfall Zone	**Florida Zone 5**
Calculated Annual Coefficient (0-1)	**0.37**
Total (accumulated) Retention Depth (in over watershed)	**0.626**
Overall Provided Nitrogen Treatment Efficiency (%)	**49**
Overall Provided Phosphorus Treatment Efficiency (%)	**49**
Overall Nitrogen Load (kg/yr)	**86.934**
Overall Phosphorus Load (kg/yr)	**11.661**

Equivalent Retention

Load for Multiple BMP in Series



APPENDIX L

Existing ERP Permit From SFWMD

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
STANDARD GENERAL PERMIT NO. 85-00070-S
DATE ISSUED:May 2, 2012

Form #0941
08/95

PERMITTEE: FLORIDA DEPARTMENT OF TRANSPORTATION
DISTRICT 4
3400 WEST COMMERCIAL BLVD.
FORT LAUDERDALE, FL 33309

PROJECT DESCRIPTION: Modification of a surface water management system to serve 10.62 acres of additional impervious area for a project known as SR-9/I-95 Express Lanes.

PROJECT LOCATION: MIAMI-DADE COUNTY, SEC 5, 6, 7 TWP 52S RGE 42E
SEC 32, 33 TWP 51S RGE 42E
SEC 12 TWP 52S RGE 41E

PERMIT DURATION: See Special Condition No:1. Pursuant to Rule 40E-4.321, Florida Administrative Code.

This is to notify you of the District's agency action concerning Notice of Intent for Permit Application No. 120327-2, dated March 27, 2012. This action is taken pursuant to Rule 40E-1.603 and Chapter 40E-40 , Florida Administrative Code (F.A.C.).

Based on the information provided, District rules have been adhered to and an Environmental Resource General Permit is in effect for this project subject to:

1. Not receiving a filed request for a Chapter 120, Florida Statutes, administrative hearing.
2. the attached 19 General Conditions (See Pages : 2 - 4 of 7) and
3. the attached 15 Special Conditions (See Pages : 5 - 7 of 7)

Should you object to these conditions, please refer to the attached "Notice of Rights" which addresses the procedures to be followed if you desire a public hearing or other review of the proposed agency action. Please contact this office if you have any questions concerning this matter. If we do not hear from you in accordance with the "Notice of Rights," we will assume that you concur with the District's action.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a "Notice of Rights" has been mailed to the Permittee (and the persons listed in the attached distribution list) no later than 5:00 p.m. on this 2nd day of May, 2012, in accordance with Section 120.60(3), Florida Statutes.

BY: Anita R. Bain

Anita R. Bain
Bureau Chief - Environmental Resource Permitting
Regulation Division

Scanned 05/02/2012 11:42 DROO

GENERAL CONDITIONS

1. All activities authorized by this permit shall be implemented as set forth in the plans, specifications and performance criteria as approved by this permit. Any deviation from the permitted activity and the conditions for undertaking that activity shall constitute a violation of this permit and Part IV, Chapter 373. F.S.

2. This permit or a copy thereof, complete with all conditions, attachments, exhibits, and modifications shall be kept at the work site of the permitted activity. The complete permit shall be available for review at the work site upon request by District staff. The permittee shall require the contractor to review the complete permit prior to commencement of the activity authorized by this permit.

3. Activities approved by this permit shall be conducted in a manner which does not cause violations of State water quality standards. The permittee shall implement best management practices for erosion and pollution control to prevent violation of State water quality standards. Temporary erosion control shall be implemented prior to and during construction, and permanent control measures shall be completed within 7 days of any construction activity. Turbidity barriers shall be installed and maintained at all locations where the possibility of transferring suspended solids into the receiving waterbody exists due to the permitted work. Turbidity barriers shall remain in place at all locations until construction is completed and soils are stabilized and vegetation has been established. All practices shall be in accordance with the guidelines and specifications described in Chapter 6 of the Florida Land Development Manual; A Guide to Sound Land and Water Management (Department of Environmental Regulation, 1988), incorporated by reference in Rule 40E-4.091, F.A.C. unless a project-specific erosion and sediment control plan is approved as part of the permit. Thereafter the permittee shall be responsible for the removal of the barriers. The permittee shall correct any erosion or shoaling that causes adverse impacts to the water resources.

4. The permittee shall notify the District of the anticipated construction start date within 30 days of the date that this permit is issued. At least 48 hours prior to commencement of activity authorized by this permit, the permittee shall submit to the District an Environmental Resource Permit Construction Commencement Notice Form Number 0960 indicating the actual start date and the expected construction completion date.

5. When the duration of construction will exceed one year, the permittee shall submit construction status reports to the District on an annual basis utilizing an annual status report form. Status report forms shall be submitted the following June of each year.

6. Within 30 days after completion of construction of the permitted activity, the permitee shall submit a written statement of completion and certification by a professional engineer or other individual authorized by law, utilizing the supplied Environmental Resource/Surface Water Management Permit Construction Completion/Certification Form Number 0881A, or Environmental Resource/Surface Water Management Permit Construction Completion Certification - For Projects Permitted prior to October 3, 1995 Form No. 0881B, incorporated by reference in Rule 40E-1.659, F.A.C. The statement of completion and certification shall be based on onsite observation of construction or review of as-built drawings for the purpose of determining if the work was completed in compliance with permitted plans and specifications. This submittal shall serve to notify the District that the system is ready for inspection. Additionally, if deviation from the approved drawings are discovered during the certification process, the certification must be accompanied by a copy of the approved permit drawings with deviations noted. Both the original and revised specifications must be clearly shown. The plans must be clearly labeled as "as-built" or "record" drawings. All surveyed dimensions and elevations shall be certified by a registered surveyor.

7. The operation phase of this permit shall not become effective: until the permittee has complied with the requirements of condition (6) above, and submitted a request for conversion of Environmental Resource Permit from Construction Phase to Operation Phase, Form No. 0920; the District determines the system to

DRDD
05/02/2012 11:42
Scanned

GENERAL CONDITIONS

be in compliance with the permitted plans and specifications; and the entity approved by the District in accordance with Sections 9.0 and 10.0 of the Basis of Review for Environmental Resource Permit Applications within the South Florida Water Management District, accepts responsibility for operation and maintenance of the system. The permit shall not be transferred to such approved operation and maintenance entity until the operation phase of the permit becomes effective. Following inspection and approval of the permitted system by the District, the permittee shall initiate transfer of the permit to the approved responsible operating entity if different from the permittee. Until the permit is transferred pursuant to Section 40E-1.6107, F.A.C., the permittee shall be liable for compliance with the terms of the permit.

8. Each phase or independent portion of the permitted system must be completed in accordance with the permitted plans and permit conditions prior to the initiation of the permitted use of site infrastructure located within the area served by that portion or phase of the system. Each phase or independent portion of the system must be completed in accordance with the permitted plans and permit conditions prior to transfer of responsibility for operation and maintenance of the phase or portion of the system to a local government or other responsible entity.

9. For those systems that will be operated or maintained by an entity that will require an easement or deed restriction in order to enable that entity to operate or maintain the system in conformance with this permit, such easement or deed restriction must be recorded in the public records and submitted to the District along with any other final operation and maintenance documents required by Sections 9.0 and 10.0 of the Basis of Review for Environmental Resource Permit applications within the South Florida Water Management District, prior to lot or units sales or prior to the completion of the system, whichever comes first. Other documents concerning the establishment and authority of the operating entity must be filed with the Secretary of State, county or municipal entities. Final operation and maintenance documents must be received by the District when maintenance and operation of the system is accepted by the local government entity. Failure to submit the appropriate final documents will result in the permittee remaining liable for carrying out maintenance and operation of the permitted system and any other permit conditions.

10. Should any other regulatory agency require changes to the permitted system, the permittee shall notify the District in writing of the changes prior to implementation so that a determination can be made whether a permit modification is required.

11. This permit does not eliminate the necessity to obtain any required federal, state, local and special district authorizations prior to the start of any activity approved by this permit. This permit does not convey to the permittee or create in the permittee any property right, or any interest in real property, nor does it authorize any entrance upon or activities on property which is not owned or controlled by the permittee, or convey any rights or privileges other than those specified in the permit and Chapter 40E-4 or Chapter 40E-40, F.A.C..

12. The permittee is hereby advised that Section 253.77, F.S. states that a person may not commence any excavation, construction, or other activity involving the use of sovereign or other lands of the State, the title to which is vested in the Board of Trustees of the Internal Improvement Trust Fund without obtaining the required lease, license, easement, or other form of consent authorizing the proposed use. Therefore, the permittee is responsible for obtaining any necessary authorizations from the Board of Trustees prior to commencing activity on sovereignty lands or other state-owned lands.

13. The permittee must obtain a Water Use permit prior to construction dewatering, unless the work qualifies for a general permit pursuant to Subsection 40E-20.302(3), F.A.C., also known as the "No Notice" Rule.

14. The permittee shall hold and save the District harmless from any and all damages, claims, or liabilities

Scanned 05/02/2012 11:42 DROD

GENERAL CONDITIONS

which may arise by reason of the construction, alteration, operation, maintenance, removal, abandonment or use of any system authorized by the permit.

15. Any delineation of the extent of a wetland or other surface water submitted as part of the permit application, including plans or other supporting documentation, shall not be considered binding, unless a specific condition of this permit or a formal determination under Section 373.421(2), F.S., provides otherwise.

16. The permittee shall notify the District in writing within 30 days of any sale, conveyance, or other transfer of ownership or control of a permitted system or the real property on which the permitted system is located. All transfers of ownership or transfers of a permit are subject to the requirements of Rules 40E-1.6105 and 40E-1.6107, F.A.C.. The permittee transferring the permit shall remain liable for corrective actions that may be required as a result of any violations prior to the sale, conveyance or other transfer of the system.

17. Upon reasonable notice to the permittee, District authorized staff with proper identification shall have permission to enter, inspect, sample and test the system to insure conformity with the plans and specifications approved by the permit.

18. If historical or archaeological artifacts are discovered at any time on the project site, the permittee shall immediately notify the appropriate District service center.

19. The permittee shall immediately notify the District in writing of any previously submitted information that is later discovered to be inaccurate.

Scanned 05/02/2012 11:42 DROD

SPECIAL CONDITIONS

1. The construction phase of this permit shall expire on May 2, 2017.

2. Operation of the surface water management system shall be the responsibility of the permittee.

3. The permittee shall be responsible for the correction of any erosion, shoaling or water quality problems that result from the construction or operation of the surface water management system.

4. Measures shall be taken during construction to insure that sedimentation and/or turbidity violations do not occur in the receiving water.

5. The District reserves the right to require that additional water quality treatment methods be incorporated into the drainage system if such measures are shown to be necessary.

6. Facilities other than those stated herein shall not be constructed without an approved modification of this permit.

7. A stable, permanent and accessible elevation reference shall be established on or within one hundred (100) feet of all permitted discharge structures no later than the submission of the certification report. The location of the elevation reference must be noted on or with the certification report.

8. The permittee shall provide routine maintenance of all of the components of the surface water management system in order to remove all trapped sediments/debris. All materials shall be properly disposed of as required by law. Failure to properly maintain the system may result in adverse flooding conditions.

9. If prehistoric or historic artifacts, such as pottery or ceramics, stone tools or metal implements, dugout canoes, or any other physical remains that could be associated with Native American cultures, or early colonial or American settlement are encountered at any time within the project site area, the permitted project should cease all activities involving subsurface disturbance in the immediate vicinity of such discoveries. The permittee, or other designee, should contact the Florida Department of State, Division of Historical Resources, Review and Compliance Section at (850) 245-6333 or (800) 847-7278, as well as the appropriate permitting agency office. Project activities should not resume without verbal and/or written authorization from the Division of Historical Resources. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and the proper authorities notified in accordance with Section 872.05, Florida Statutes.

10. The permittee acknowledges that, pursuant to Rule 40E-4.101(2), F.A.C., a notice of Environmental Resource or Surface Water Management Permit may be recorded in the county public records. Pursuant to the specific language of the rule, this notice shall not be considered an encumbrance upon the property.

11. Endangered species, threatened species and/or species of special concern have been observed onsite and/or the project contains suitable habitat for these species. It shall be the permittee's responsibility to coordinate with the Florida Fish and Wildlife Conservation Commission and/or the U.S. Fish and Wildlife Service for appropriate guidance, recommendations and/or necessary permits to avoid impacts to listed species.

12. Reference is made to Exhibit No. 2 by the Florida Department of Transportation, Project ID 422796-2-52-01 & 422796-1-52-01, State Road No. 9 / I-95. The plan set consisting of drainage plans and detail sheets. The drawings have been signed and sealed by Charles B. Fuller P.E., of Metric Engineering, Inc. on 3-26-12 and have been included in this permit by reference (please see permit file).

13. The permittee shall comply with the following conditions intended to protect manatees and marine turtles from direct project effects:

Scanned 05/02/2012 11:42 DROD

SPECIAL CONDITIONS

a. All personnel associated with the project shall be instructed about the presence of marine turtles, manatees and manatee speed zones, and the need to avoid collisions with and injuries to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees and marine turtles cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee and marine turtle entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of marine turtles and manatee(s). All in-water operations, including vessels, must be shutdown if a marine turtle or manatee(s) comes within 50 feet of the operation. Activities will not resume until the animal(s) have moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the animal(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a marine turtle or manatee shall be reported immediately to the FWC Hotline at 1-888-404-FWCC. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-232-2580) for north Florida or Vero Beach (1-772-562-3909) for south Florida.

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Awareness signs that have already been approved for this use by the Florida Fish and Wildlife Conservation Commission (FWC) must be used. One sign measuring at least 3 ft. by 4 ft. which reads Caution: Manatee Area must be posted. A second sign measuring at least 81/2" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities.

14. A turbidity control plan shall be implemented in accordance with Exhibit No. 3. Prior to the commencement of construction in the Snake Creek Canal, floating turbidity curtains with weighted skirts that extend to the bottom of the water body shall be properly installed to isolate adjacent waters from the work area. The floating turbidity curtains shall be maintained and shall remain in place until all construction is complete and turbidity levels in the project area are within 29 NTUs of background levels. The permittee shall be responsible for ensuring that turbidity control devices are inspected daily and maintained in good working order so that there are no violations of state water quality standards outside of the turbidity screens.

15. A water quality monitoring program shall be implemented as outlined below:

Turbidity expressed in nephelometric turbidity units (ntu). Background samples shall be taken 200 feet upstream of any construction activity within adjacent surface waters. Compliance samples shall be taken 200 feet downstream. Samples shall be taken twice daily, with at least a four-hour interval, during all work authorized by this permit.

DRDD
11-42
05/02/2012
Scanned

SPECIAL CONDITIONS

Monitoring shall begin on the first day of construction for all activities within or adjacent to surface waters. The monitoring data must demonstrate that turbidity 200 feet downstream of all proposed activities is less than or equal to 29 NTU's above natural background turbidity (or meets OFW standards) and 200 feet upstream of each proposed activity for a period of 7 consecutive days after completion of construction. If monitoring shows such levels to be exceeded, construction shall cease and District compliance staff shall be notified immediately. Work shall not resume until District staff is satisfied that adequate corrective measures have been taken and turbidity has returned to acceptable levels.

All monitoring data shall be maintained on site and be available to District staff during regular business hours. The content of the data shall include:

1) permit and application number; (2) dates of sampling and analysis; (3) statement describing the methods used in collection, handling, storage and analysis of the samples; (4) a map indicating the sampling locations and (5) a statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection and accuracy of the data.

Monitoring reports shall also include the following information for each sample that is taken:
(a) time of day samples taken;
(b) depth of water body;
(c) depth of samples;
(d) antecedent weather conditions;
(e) wind direction and velocity;
(f) direction of tide.

Scanned 05/02/2012 11:42 DRDD

NOTICE OF RIGHTS

As required by Sections 120.569(1), and 120.60(3), Fla. Stat., following is notice of the opportunities which may be available for administrative hearing or judicial review when the substantial interests of a party are determined by an agency. Please note that this Notice of Rights is not intended to provide legal advice. Not all the legal proceedings detailed below may be an applicable or appropriate remedy. You may wish to consult an attorney regarding your legal rights.

RIGHT TO REQUEST ADMINISTRATIVE HEARING

A person whose substantial interests are or may be affected by the South Florida Water Management District's (SFWMD or District) action has the right to request an administrative hearing on that action pursuant to Sections 120.569 and 120.57, Fla. Stat. Persons seeking a hearing on a District decision which does or may determine their substantial interests shall file a petition for hearing with the District Clerk within 21 days of receipt of written notice of the decision, unless one of the following shorter time periods apply: 1) within 14 days of the notice of consolidated intent to grant or deny concurrently reviewed applications for environmental resource permits and use of sovereign submerged lands pursuant to Section 373.427, Fla. Stat.; or 2) within 14 days of service of an Administrative Order pursuant to Subsection 373.119(1), Fla. Stat. "Receipt of written notice of agency decision" means receipt of either written notice through mail, or electronic mail, or posting that the District has or intends to take final agency action, or publication of notice that the District has or intends to take final agency action. Any person who receives written notice of a SFWMD decision and fails to file a written request for hearing within the timeframe described above waives the right to request a hearing on that decision.

Filing Instructions

The Petition must be filed with the Office of the District Clerk of the SFWMD. Filings with the District Clerk may be made by mail, hand-delivery or facsimile. **Filings by e-mail will not be accepted.** Any person wishing to receive a clerked copy with the date and time stamped must provide an additional copy. A petition for administrative hearing is deemed filed upon receipt during normal business hours by the District Clerk at SFWMD headquarters in West Palm Beach, Florida. Any document received by the office of the SFWMD Clerk after 5:00 p.m. shall be filed as of 8:00 a.m. on the next regular business day. Additional filing instructions are as follows:

- Filings by mail must be addressed to the Office of the SFWMD Clerk, P.O. Box 24680, West Palm Beach, Florida 33416.
- Filings by hand-delivery must be delivered to the Office of the SFWMD Clerk. **Delivery of a petition to the SFWMD's security desk does not constitute filing. To ensure proper filing, it will be necessary to request the SFWMD's security officer to contact the Clerk's office.** An employee of the SFWMD's Clerk's office will receive and file the petition.
- Filings by facsimile must be transmitted to the SFWMD Clerk's Office at (561) 682-6010. Pursuant to Subsections 28-106.104(7), (8) and (9), Fla. Admin. Code, a party who files a document by facsimile represents that the original physically signed document will be retained by that party for the duration of that proceeding and of any subsequent appeal or subsequent proceeding in that cause. Any party who elects to file any document by facsimile shall be responsible for any delay, disruption, or interruption of the electronic signals and accepts the full risk that the document may not be properly filed with the clerk as a result. The filing date for a document filed by facsimile shall be the date the SFWMD Clerk receives the complete document.

Scanned 05/02/2012 11:42 DROD

Initiation of an Administrative Hearing
Pursuant to Rules 28-106.201 and 28-106.301, Fla. Admin. Code, initiation of an administrative hearing shall be made by written petition to the SFWMD in legible form and on 8 and 1/2 by 11 inch white paper. All petitions shall contain:

1. Identification of the action being contested, including the permit number, application number, District file number or any other SFWMD identification number, if known.
2. The name, address and telephone number of the petitioner and petitioner's representative, if any.
3. An explanation of how the petitioner's substantial interests will be affected by the agency determination.
4. A statement of when and how the petitioner received notice of the SFWMD's decision.
5. A statement of all disputed issues of material fact. If there are none, the petition must so indicate.
6. A concise statement of the ultimate facts alleged, including the specific facts the petitioner contends warrant reversal or modification of the SFWMD's proposed action.
7. A statement of the specific rules or statutes the petitioner contends require reversal or modification of the SFWMD's proposed action.
8. If disputed issues of material fact exist, the statement must also include an explanation of how the alleged facts relate to the specific rules or statutes.
9. A statement of the relief sought by the petitioner, stating precisely the action the petitioner wishes the SFWMD to take with respect to the SFWMD's proposed action.

A person may file a request for an extension of time for filing a petition. The SFWMD may, for good cause, grant the request. Requests for extension of time must be filed with the SFWMD prior to the deadline for filing a petition for hearing. Such requests for extension shall contain a certificate that the moving party has consulted with all other parties concerning the extension and that the SFWMD and any other parties agree to or oppose the extension. A timely request for extension of time shall toll the running of the time period for filing a petition until the request is acted upon.

If the District takes action with substantially different impacts on water resources from the notice of intended agency decision, the persons who may be substantially affected shall have an additional point of entry pursuant to Rule 28-106.111, Fla. Admin. Code, unless otherwise provided by law.

Mediation
The procedures for pursuing mediation are set forth in Section 120.573, Fla. Stat., and Rules 28-106.111 and 28-106.401-.405, Fla. Admin. Code. The SFWMD is not proposing mediation for this agency action under Section 120.573, Fla. Stat., at this time.

RIGHT TO SEEK JUDICIAL REVIEW
Pursuant to Sections 120.60(3) and 120.68, Fla. Stat., a party who is adversely affected by final SFWMD action may seek judicial review of the SFWMD's final decision by filing a notice of appeal pursuant to Florida Rule of Appellate Procedure 9.110 in the Fourth District Court of Appeal or in the appellate district where a party resides and filing a second copy of the notice with the SFWMD Clerk within 30 days of rendering of the final SFWMD action.

Scanned 05/02/2012 11:42 DROD

Last Date For Agency Action: May 26, 2012

GENERAL ENVIRONMENTAL RESOURCE PERMIT STAFF REPORT

Project Name: Sr-9/I-95 Express Lanes

Permit No.: 85-00070-S

Application No.: 120327-2 **Associated File:** 120330-2 WU Concurrent

Application Type: Environmental Resource (General Permit Modification)

Location: Miami-Dade County, S5, 6, 7/T52S/R42E
S12/T52S/R41E
S32, 33/T51S/R42E

Permittee : Florida Department Of Transportation District 4

Operating Entity : Permittee

Project Area: 10.62 acres

Project Land Use: Highway

Drainage Basin: C-9 EAST

Receiving Body: SFWMD C-9 Canal (Snake Creek Canal) & Golden Glades Interchange SWMS

Special Drainage District: NA

Conservation Easement To District : No

Sovereign Submerged Lands: No

PROJECT PURPOSE:

This application is a request for modification of a surface water management system to serve 10.62 acres of additional impervious area for a project known as SR-9/I-95 Express Lanes.

Scanned 05/02/2012 11:42 DROD

PROJECT EVALUATION:

PROJECT SITE DESCRIPTION:

The project site is a section of I-95 from north of the Golden Glades Interchange to the Miami-Dade/Broward County boundary line. In addition the project includes improvements to the Ives Dairy Road Interchange from NE 16th Avenue to east of Highland Lakes Boulevard. The site is currently a multilane divided Interstate highway with an existing surface water management system (SWMS) consisting of inlets, culverts and roadside detention swales directing runoff to the Golden Glades Interchange surface water management system (SWMS) and the SFWMD C-9 Canal (Snake Creek Canal). The site was originally issued Permit No. 85-00070-S in 1985, and was most recently modified in 2009 under Application No. 090225-2 for a project then known as I-95 Managed Lanes. This application is a request to modify the previously permitted design for what is now referred to as the I-95 Express Lanes project.

PROJECT BACKGROUND:

The FDOT is proposing to convert the existing I-95 HOV lane to two express lanes from the Golden Glades Interchange to the Broward Boulevard Park and Ride. Improvements to I-95 in this area have been previously authorized under three Surface Water Management permits (85-00070-S, 88-00053-S and 88-00050-S). Three applications have been submitted to modify each respective permit (120327-2, 120327-4 and 120327-6). This application is for the modification of Permit No. 85-00070-S which covers the stretch of I-95 from the Golden Glades Interchange to the Miami-Dade/Broward County line.

PROPOSED PROJECT:

Proposed is the modification of Permit No. 85-00070-S for the construction and operation of a surface water management system to serve 10.62 acres of additional impervious area for a highway development project known as SR-9/I-95 Express Lanes. The proposed surface water management system will consist of inlets, culverts and roadside detention swales which will provide water quality treatment prior to overflow into the Golden Glades Interchange surface water management system and the SFWMD C-9 Canal (Snake Creek Canal).

The project scope includes roadway widening, milling and resurfacing, shoulder reconstruction, drainage collection and conveyance, swale regrading and expansion, tolling infrastructure and bridge widening. The intention is to widen this section of I-95 in order to facilitate toll lanes where currently High Occupancy Vehicle (HOV) lanes exist.

WATER QUANTITY :

Discharge Rate :

The engineer-of-record has submitted an analysis which demonstrates that the post-development peak discharge rate for the 25-year 3-day design storm event will not exceed the existing condition.

Control Elevation :

Basin	Area (Acres)	Ctrl Elev (ft, NAVD 88)	WSWT Ctrl Elev (ft, NAVD 88)	Method Of Determination
site	10.62	.42	.42	Previously Permitted

WATER QUALITY :

Water quality treatment of 2.5" times the new impervious area will be provided in roadside detention

DRDD 11:42 05/02/2012 Scanned

swales. During construction of the bridge expansion over the Snake Creek Canal, the applicant proposes to utilize floating turbidity barriers and implement a turbidity monitoring plan to ensure state water quality standards are maintained (Exhibit 3).

The authorization for construction of the surface water management system is issued pursuant to the water quality net improvement provisions referenced in Rule Section 40E-4.303(1), Florida Administrative Code; therefore, the state water quality certification is waived.

Basin	Treatment Method		Vol Req.d (ac-ft)	Vol Prov'd
site	Treatment	Dry Detention	1.66	1.66

WETLANDS:

There are no mangrove or other wetland resources associated with the portion of the Snake Creek Canal affected by the project. Ten pilings are proposed to be installed to accomodate twenty-two feet of bridge widening over the Snake Creek Canal. However, the total filling in other surface waters associated with this construction will be less than 0.01 acre.

Wildlife Issues:

The project site does contain preferred habitat for wetland-dependent endangered or threatened wildlife species or species of special concern. Specifically, manatees are known to utilize the Snake Creek Canal. Per Exhibit 3, the applicant proposes to implement standard manatee conditions for in water work during the installation of ten pilings associated with expansion of the bridge over Snake Creek Canal. This permit does not relieve the applicant from complying with all applicable rules and any other agencies' requirements if, in the future, endangered/threatened species or species of special concern are discovered on the site.

CERTIFICATION AND MAINTENANCE OF THE WATER MANAGEMENT SYSTEM:

It is suggested that the permittee retain the services of a Professional Engineer registered in the State of Florida for periodic observation of construction of the surface water management (SWM) system. This will facilitate the completion of construction completion certification Form #0881 which is required pursuant to Section 10 of the Basis of Review for Environmental Resource Permit Applications within the South Florida Water Management District, and Rule 40E-4.361(2), Florida Administrative Code (F.A.C.).

Pursuant to Chapter 40E-4 F.A.C., this permit may not be converted from the construction phase to the operation phase until certification of the SWM system is submitted to and accepted by this District. Rule 40E-4.321(7) F.A.C. states that failure to complete construction of the SWM system and obtain operation phase approval from the District within the permit duration shall require a new permit authorization unless a permit extension is granted.

For SWM systems permitted with an operating entity who is different from the permittee, it should be noted that until the permit is transferred to the operating entity pursuant to Rule 40E-1.6107, F.A.C., the permittee is liable for compliance with the terms of this permit.

The permittee is advised that the efficiency of a SWM system will normally decrease over time unless the system is periodically maintained. A significant reduction in flow capacity can usually be attributed to

Scanned 05/02/2012 11:42 DROD

partial blockages of the conveyance system. Once flow capacity is compromised, flooding of the project may result. Maintenance of the SWM system is required to protect the public health, safety and the natural resources of the state. Therefore, the permittee must have periodic inspections of the SWM system performed to ensure performance for flood protection and water quality purposes. If deficiencies are found, it is the responsibility of the permittee to correct these deficiencies in a timely manner.

Scanned 05/02/2012 11:42 DRDD

RELATED CONCERNS:

Water Use Permit Status:

Water Use application number 120330-2 has been submitted and is being processed concurrently for this project.

This permit does not release the permittee from obtaining all necessary Water Use authorization(s) prior to the commencement of activities which will require such authorization, including construction dewatering and irrigation.

CERP:

The proposed project is not located within or adjacent to a Comprehensive Everglades Restoration Project component.

Potable Water Supplier:

Not Applicable

Waste Water System/Supplier:

Not Applicable

Right-Of-Way Permit Status:

District Right-of-Way Application No. 3758M has been submitted for this project. The application is a modification to Right-of-Way Permit No. 12-0206-1M.

DRI Status:

This project is not a DRI.

Historical/Archeological Resources:

The District has received correspondence from the Florida Department of State, Division of Historical Resources indicating that no significant archaeological or historical resources are recorded in the project area and therefore is unlikely to have an effect upon any such properties.

DEO/CZM Consistency Review:

The issuance of this permit constitutes a finding of consistency with the Florida Coastal Management Program.

Third Party Interest:

No third party has contacted the District with concerns about this application.

Enforcement:

There has been no enforcement activity associated with this application.

STAFF REVIEW:

Scanned 05/02/2012 11:42 DRDD

DIVISION APPROVAL:

NATURAL RESOURCE MANAGEMENT:

Barbara J. Conmy

DATE: 5/1/12

SURFACE WATER MANAGEMENT:

Carlos A. de Rojas, P.E.

DATE: 4/30/12

Scanned 05/02/2012 11:42 DRDD

SR-9/I-95 Express Lanes

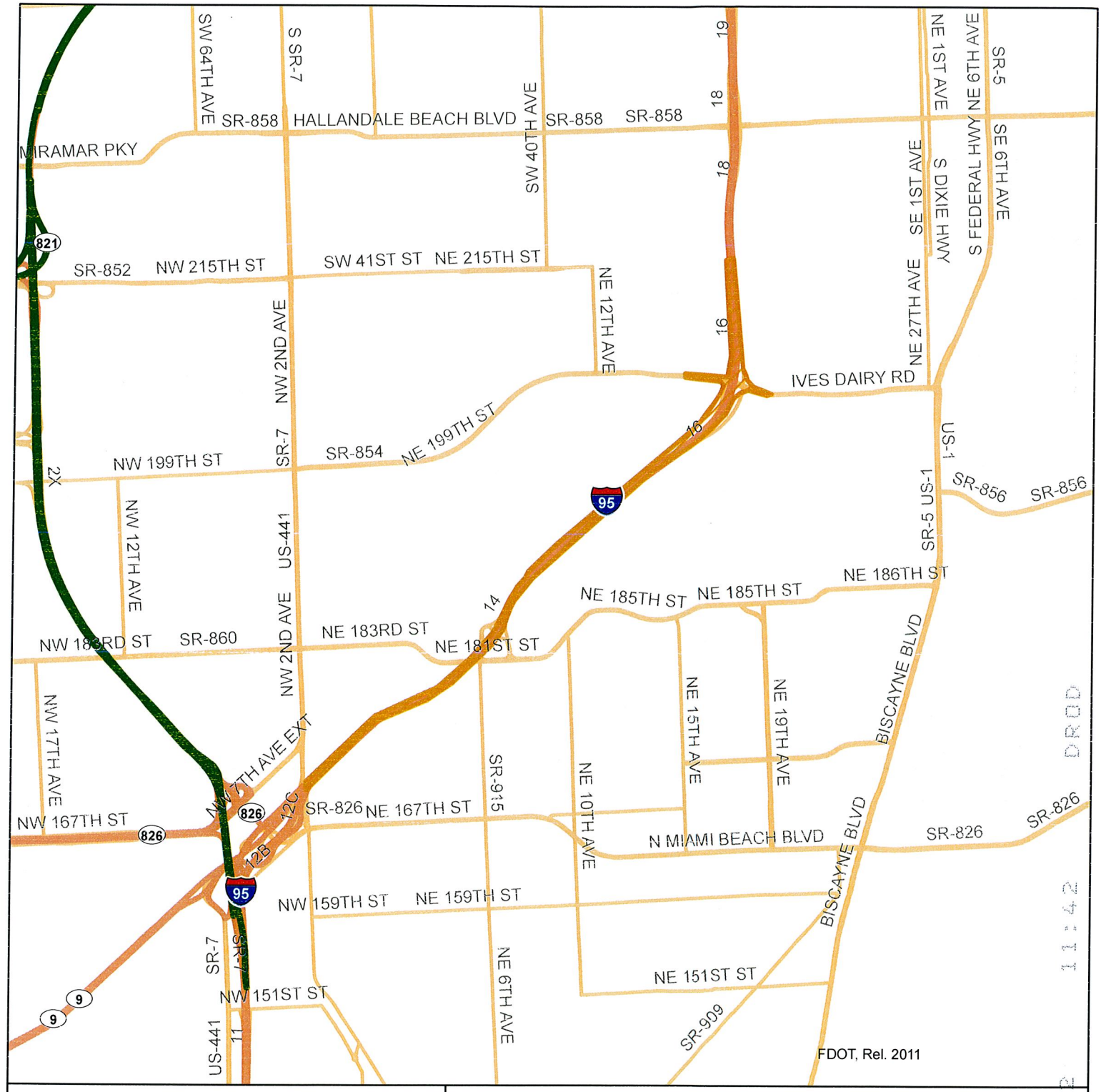
Application No. 120327-2

1.0 Location Map

2.0 Construction Plans

3.0 Environmental Plans

Scanned 05/02/2012 11:42 DROD





MIAMI-DADE COUNTY, FLORIDA

Legend

Application

Application Number: 120327-2

Sec 5, 6, 7 / Twp 52 / Rge 42

Project Name: SR-9/I-95 EXPRESS LANES

N

Map Date: 2012-04-16

Permit Number: 85-00070-S

0 0.5 1

Miles

Exhibit 1

Scanned 09/27/2012 11:42 DROD

APPLICATION No. 120327-2
PERMIT No. 85-00070-S
SR-9/I-95 Express Lanes

EXHIBIT NUMBER 2

PLAN SET TITLED:
State Road No. 9 / I-95
Project ID. 422796-2-52-01 &
422796-1-52-01

INCORPORATED BY REFERENCE

Scanned 05/02/2012 11:42 DROD

METRIC ENGINEERING

Summary Assessment Report
Ecological Assessment of the I-95 Managed Lanes Project Corridor

This summary assessment report was prepared to support permit modification applications for improvements in Miami-Dade and Broward Counties associated with the Florida Department of Transportation (FDOT) I-95 Express Lanes project from the Golden Glades interchange in Miami-Dade County to south of the Broward Boulevard Park & Ride in Broward County (FPID Nos. 422796-1 and 422796-2). The following information covers the entire corridor, which includes the sections of the project that fall under existing Standard General Permits 88-00050-S, 88-00053-S and 85-00070-S.

Metric Engineering, Inc. (MEI) scientists reviewed existing project documentation and GIS data and aerial photographs to identify the presence of ecological resources in the vicinity of the I-95 project corridor that have the potential to be impacted by the proposed project. In addition, MEI conducted field observations of the corridor on January 12, 2011 and January 19, 2011. Findings from these investigations are included below.

Wetlands, Other Surface Waters and Water Quality

There are five waterway crossings associated with the project corridor, which include, from the south, the C-9 Canal (Snake Creek) in Miami-Dade County and the C-10 Spur, C-10 Canal, Dania Cutoff Canal and the South Fork of the New River in Broward County.

Minimal filling within other surface waters will occur at the Snake Creek crossing due to 22 feet of total widening and installation of 10 pilings within the canal (on the south side). The total filling of surface waters associated with such pile installation will be less than 0.01 acres. This work will occur within the limits of the existing permit 85-00070-S. Mitigation for these minimal impacts to other surface waters are not proposed.

Mangroves exist along canal banks adjacent to the bridges over the C-10 Canal and C-10 Spur canal in Broward County, within the limits identified under existing permit 88-00053-S. Due to the scope of the work and limits of construction depicted in the project plans, impacts to these mangroves are not anticipated. No work is proposed for these existing bridges over these canals.

Due to the nature of the rest of the proposed work (i.e. no widening or in-water work), impacts to wetlands and/or other surface waters are not anticipated for the remainder of the waterway crossings. In addition, staff has reviewed staging and stockpiling locations with the FDOT District Construction Environmental Coordinator (Fernando Ascanio) to ensure that impacts to protected natural resources do not occur during construction. Water quality impacts will be avoided through standard best management practices during construction as depicted in the Erosion Control Plans.

Wildlife

Each of the canal crossings is accessible to manatees, however, none of the sites is designated an Important Manatee Area or a Warm Water Aggregation Area according to 2008 US Army Corps of Engineers maps of important manatee areas for northern Miami-Dade and Broward Counties (**Attachment 1**). When performing in-water work, such as at the bridges over the

METRIC PLAZA - CORPORATE HEADQUARTERS
13940 S.W. 136 Street, Miami, FL 33186
Design: Suite 200 - CEI: Suite 107
Phone: (305) 235-5098 - Fax: (305) 251-5894
Acct. & Personnel Fax: (305) 235-5271
www.metriceng.com

Scanned 05/02/2012 11:42 DROD

Snake Creek Canal, the contractor will adhere to Standard Manatee Conditions (**Attachment 2**).

The corridor is highly urbanized. MEI reviewed GIS layers for Critical Habitat and species observations from the Florida Fish and Wildlife Conservation Commission (FWC) GIS data layer for the corridor. No Critical Habitat is identified within the project corridor. Shorebirds such as least tern (*Sternula antillarum*) and migratory birds, such as warblers and thrushes, have been seen within the urban settings surrounding the roadway. No other state or federally-listed species occurrences have been recorded in the FWC observation databases. During field reviews on January 12 and 19, 2011, minimal wildlife usage was observed along the corridor. On January 19, 2011, a little blue heron (*Egretta caerulea*) was observed foraging adjacent to the I-95 bridge over the C-10 Canal. The work proposed under these permit modifications will not impact habitat for wildlife species; accordingly, impacts to wildlife species including listed species are not anticipated. The project is overlapped by two areas of wood stork (*Mycteria americana*) core foraging area (CFA). Because there will be no loss of wetland habitat, impacts to wood storks and wood stork CFA are not anticipated.

FDOT previously determined that this project is not likely to adversely affect federally-listed species; the US Fish and Wildlife Service concurred with this finding on May 21, 2007. On May 16, 2007, the National Marine Fisheries Service concurred with the FDOT finding that this project will not adversely affect Essential Fish Habitat.

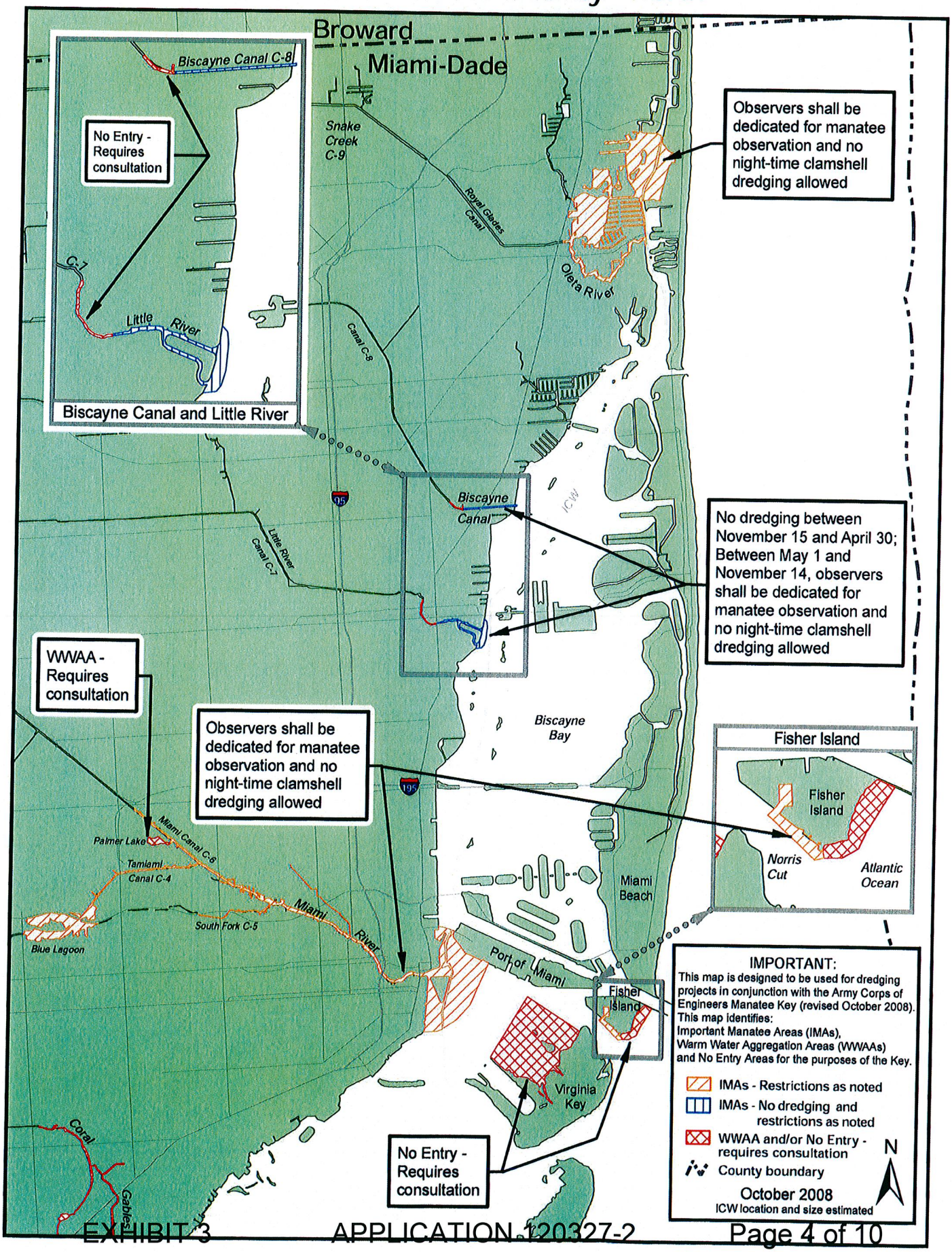
Summary
Based on the analysis of existing project documentation, field observations and GIS data, MEI does not anticipate impacts to wetlands, other surface waters, water quality or wildlife as a result of this project.

Attachments:

Attachment 1: Maps of Important Manatee Areas
Attachment 2: Standard Manatee Conditions for In-Water Work

DRDD
11:42
05/02/2012
Scanned

Miami-Dade County - North

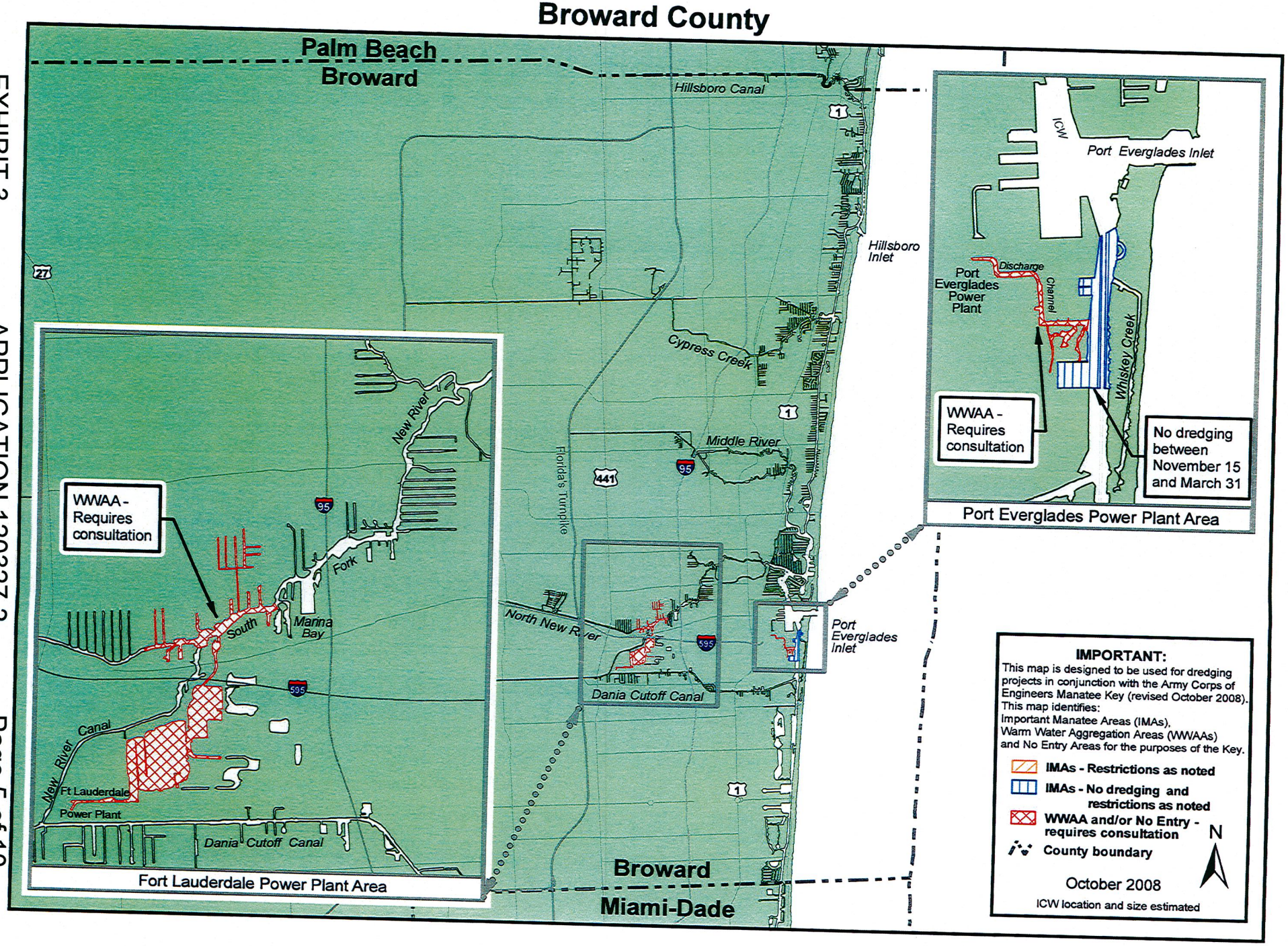


Scanned 05/02/2012 11:42 DROD

EXHIBIT 3

APPLICATION 120327-2

Page 5 of 10



Scanned 05/02/2012 11:42 DROD

Attachment 1:

Maps of Important Manatee Areas

Scanned 05/02/2012 11:42 DROD

Attachment 2:

Standard Manatee Conditions for In-Water Work

Scanned 05/02/2012 11:42 DROD

STANDARD MANATEE CONDITIONS FOR IN-WATER WORK
2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.

b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.

c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.

d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.

e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or Vero Beach (1-772-562-3909) for south Florida, and to FWC at ImperiledSpecies@myFWC.com

f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at MyFWC.com/manatee. Questions concerning these signs can be sent to the email address listed above.

Scanned 05/02/2012 11:42 DROD

CAUTION: MANATEE HABITAT

All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:



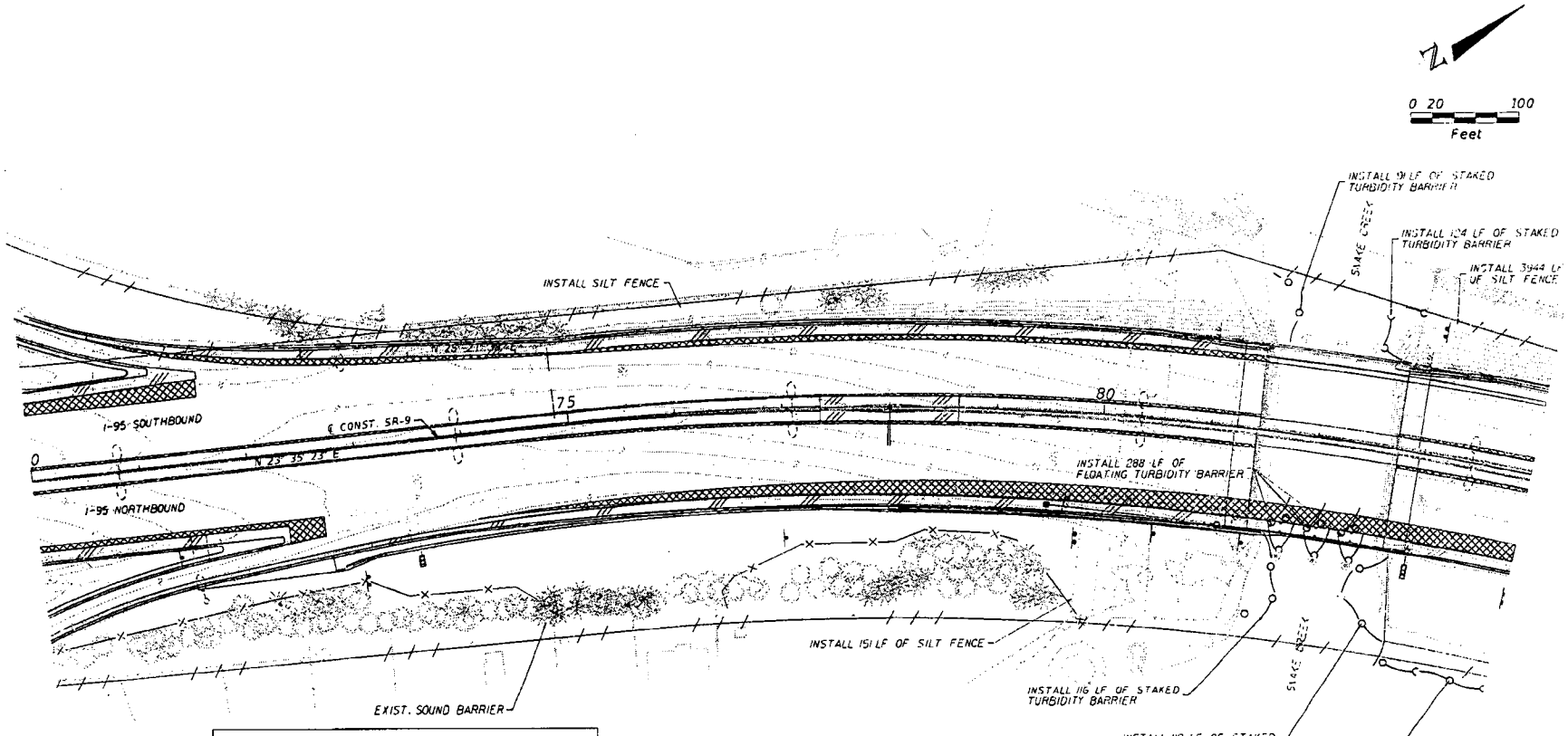
Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

Scanned 05/02/2012 11:42 DROD

EXHIBIT 3 APPLICATION 120327-2 Page 9 of 10



LEGEND

- SILT FENCE (TYPE III)
- STAKED/FLOATING TURBIDITY BARRIER
- TREE PROTECTION BARRICADE
- COMPLIANCE MONITORING STATION
- BACKGROUND MONITORING STATION
- CLEARING AND GRUBBING LIMITS

NOTES:

1. PRACTICES TO MAINTAIN EROSION AND SEDIMENT CONTROL AROUND ALL EXISTING INLETS SHALL BE IN ACCORDANCE WITH FDOT DESIGN STANDARD INDEX NO. 102.
2. COMPLIANCE MONITORING STATIONS WILL BE ESTABLISHED AT THE IMMEDIATE DOWNSTREAM POINT OF EACH PILE. SAMPLING WILL OCCUR IMMEDIATELY DOWNSTREAM (IN THE DIRECTION OF PREVAILING FLOW) OF THE DISCHARGE POINT AS DETERMINED BY TIDAL EFFECTS.
3. BACKGROUND MONITORING STATIONS WILL BE ESTABLISHED 200 FEET UPSTREAM (OPPOSITE DIRECTION OF PREVAILING FLOW) AT EACH DISCHARGE LOCATION. BACKGROUND MONITORING STATIONS WILL BE ESTABLISHED OUTSIDE OF THE MIXING BUT NO MORE THAN 400 FEET FROM THE DISCHARGE POINT.
4. SEE SECTION 2.e OF THE STORMWATER POLLUTION PREVENTION PLAN FOR ADDITIONAL DETAILS ON WATER QUALITY MONITORING PLANS.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RS+H
Reynolds, Smith and Hills, Inc.
3123 W. Commercial Blvd. - Suite 130
Fort Lauderdale, Florida 33309-3448
954-776-3999
FL Cert. No. EB0000520
Christian B. Jackson, P.E. No. 61956

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

EROSION CONTROL PLANS

SHEET NO. EC-10

USER# 4/13/2012 3:02:45 PM

Scanned 05/02/2012 11:42 DROD

EXHIBIT 3 APPLICATION 120327-2 Page 10 of 10

2.b Stormwater Management:

Several storm drain systems will be constructed to convey runoff to 12 separate systems of roadway ditches that will provide attenuation and treatment of stormwater prior to overflow to receiving water bodies. The stormwater facilities have been permitted by the agencies listed in 2.d.4.

2.c Other Controls:

2.c.1 Waste Disposal:

In the Sediment and Erosion Control Plan, the Contractor shall describe the proposed methods to prevent the discharge of solid materials, including building materials, to waters of the United States. The proposed methods shall include at least the following, unless otherwise approved by the Engineer.

* Providing litter control and collection within the project during construction activities.

* Disposing of all fertilizer or other chemical containers according to EPA's standard practices as detailed by the manufacturer.

* Disposing of solid materials including building and construction materials off the project site but not in surface waters or wetlands.

* The Contractor is required to dispose of all solid waste from the project in compliance with local, state and federal laws, by-laws, ordinances and regulations.

2.c.2 Off-Site Vehicle Tracking & Dust Control:

In the Sediment and Erosion Control Plan, the Contractor shall describe the proposed methods for minimizing off site vehicle tracking of sediments and generating dust. The proposed methods shall include at least the following, unless otherwise approved by the Engineer.

* Covering loaded haul trucks with tarpaulins.

* Removing excess dirt from roads daily.

* Stabilizing construction entrances according to Design Standard 106.

* Using roadway sweepers during dust generating activities, such as excavation and milling operations.

2.c.3 State and Local Regulations for Waste Disposal, Sanitary Sewer, or Septic Tank Regulations:

In the Sediment and Erosion Control Plan, the Contractor shall describe the proposed procedures to comply with applicable state and local regulations for waste disposal, and sanitary sewer or septic systems.

2.c.4 Fertilizers and Pesticides:

In the Sediment and Erosion Control Plan, the Contractor shall describe the procedures for applying fertilizers and pesticides. The proposed procedures shall comply with applicable subsections of the standard Specifications.

2.c.5 Toxic Substances:

In the Sediment and Erosion Control Plan, the Contractor shall provide a list of toxic substances that are likely to be used on the job and provide a plan addressing the generation, application, migration, storage, and disposal of these substances.

2.d Approved State and Local Plans and Permits:

* South Florida Water Management District Permit Nos. 85-00070-S, 88-00050-S, and 88-00053-S.

Contractor is required to complete, sign and send FDEP NPDES Notice of Intent and Notice of Termination, as Operator.

2.e Water Quality Monitoring Plan:

Sampling Methodology:

Contractor shall assess turbidity within surface waters of the Snake Creek Canal. Water samples shall be analyzed in the field immediately after collection, in accordance with the Florida Department of Environmental Protection's (FDEP) Standard Operating Procedure (SOP) for surface water sampling (DEP-SOP-001/01; FS 2100 Surface Water Sampling) and turbidity measurement (DEP-SOP-001/01; FT 1600 Field Measurement of Turbidity).

Samples shall be collected immediately at the point of discharge. All samples shall be collected at mid-depth within the water column using FDEP approved depth grab sampling equipment. If water depths are 3-ft or less, samples shall be collected 1-ft above the bottom. Turbidity analysis will be performed using a field turbidimeter (nephelometer) which meets specifications of FDEP Standard Operating Procedures. Turbidity readings will be recorded in Nephelometric Turbidity Units (NTU).

Monitoring Schedule:

Water quality monitoring within the Snake Creek Canal shall be performed for the duration of pile-driving activities associated with the bridge widening. Water quality samples shall be collected a minimum of twice per day with a period of at least four hours between consecutive samples. Additional water quality samples will be required if excessive turbidity is observed within receiving waters or the discharge location.

Sampling Locations:

To ensure protection of surface water quality within the Snake Creek Canal, water quality monitoring stations shall be established for the duration of pile-driving activities.

Compliance monitoring stations shall be established at the immediate discharge point of each pile (see Erosion Control Plans). Sampling shall occur immediately downstream (in the direction of prevailing flow) of the discharge point as determined by tidal effects.

The maximum mixing zone during pile-driving activities shall be a circle with a radius of 200-ft originating from the discharge location.

Background monitoring stations shall also be established a minimum of 300-ft upstream (opposite the direction of prevailing flow) at each discharge location (see Erosion Control Plans). Background sampling will be performed outside of the established mixing zone but no more than 400-ft from the discharge point. All background samples will be collected outside of the visible turbidity plume, and any adjustments to the background sampling location will be recorded.

Water Quality Criteria:

Water quality at the point of discharge shall not exceed 29 NTU's above background concentrations for the duration of dewatering activities. If at any time turbidity concentrations are found to exceed background concentrations by 29 NTU's, dewatering activities shall cease immediately and Contractor shall notify SFWMD. Proper measures and modifications will be taken by the Contractor to ensure that water quality exceedances are prevented before continuing activities.

The Contractor shall intensively monitor water quality and adjust construction activities as necessary to comply with all local, state, and federal regulations.

Reporting:

All water quality measurements collected during pile-driving activities shall be recorded in dedicated water quality monitoring reports. Data from these activities will include the following information:

1. Permit Number
2. Date & Time of Sample
3. Location of Sample (Compliance or Background)
4. Depth of Water
5. Depth of Sample
6. Weather Conditions
7. Wind Speed & Direction
8. Direction of Flow

Water quality monitoring reports shall be maintained at the Contractor's field office and will be made available for review during normal business hours.

3.0 MAINTENANCE:

In the Sediment and Erosion Control Plan, the Contractor shall provide a plan for maintaining all erosion and sediment controls throughout construction. The maintenance plan shall at a minimum, comply with the following.

* Silt fence: Maintain per Section 104. The Contractor should anticipate replacing silt fence on 12 month intervals.

* Synthetic bales: Remove sediment when it reaches ½ the height of the bales or when water ponds in unacceptable amounts or areas.

4.0 INSPECTIONS:

Qualified personnel shall inspect the following items at least once every seven calendar days and within 24 hours of the end of a storm that is 0.25 inches or greater. To comply, the Contractor shall install and maintain rain gages and record the daily rainfall. Where sites have been permanently stabilized, inspections shall be conducted at least once every month. The Contractor shall also inspect that controls installed in the field agree with the latest Stormwater Pollution Prevention Plan.

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

RS•H
Reynolds, Smith and Hills, Inc.
3125 W. Commercial Blvd., Suite 110
Fort Lauderdale, Florida 33309-5644
954-474-3305
Certificate of Authorization No. 1435
Christian B. Jackson, P.E. No. 61686

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

STORMWATER POLLUTION PREVENTION PLAN

SHEET NO.
EC-3

#USER# 4/13/2012 3:04:30 PM X:\P\422796\520\roadway\sheets\01.dgn

Scanned 05/02/2012 11:42 DROD

STAFF REPORT DISTRIBUTION LIST

SR-9/I-95 EXPRESS LANES

Application No: 120327-2

Permit No: 85-00070-S

INTERNAL DISTRIBUTION

X Joseph D. Santangelo
X Robert F. Hopper
X Carlos A. de Rojas, P.E.
X Barbara J. Conmy
X ERC Environmental
X H. Azizi
X Permit File
X R. Karafel

EXTERNAL DISTRIBUTION

X Permittee - Florida Department Of Transportation District 4
X Agent - Reynolds Smith And Hills, Inc

GOVERNMENT AGENCIES

X City Engineer, City of North Miami Beach
X Miami-Dade County - PERA (Maria D. Molina, PE)
X Miami-Dade County Engineer Public Works Department
X Permitting, Environmental and Regulator Affairs Evan Skornick
X Permitting, Environmental and Regulator Affairs Linda Spadafina
X Permitting, Environmental and Regulator Affairs Matt Davis

Scanned 05/02/2012 11:42 DRDD

APPENDIX M

Relevant Portions of

State Job No. 87270-3404

DRAINAGE MAP

Dist.	State	County	Route	Proj.	Sheet No.
3	Fla.	DADE & BROWARD	5	I-95-1(17)15	2

State Job No. was 87270-3404 & 86070-3413

6901 Pf. El. 10.66 Ft. Above

D.H.W. El. 5.08

Sta. 593+94 Ex. 3-132' Bridge Sta. 595+26

NOTE: For Special Ditches See Plan Sheets.

BEGIN PROJECT
BEGIN STATE JOB NO. 87270-3404
STA. 590+00

Sta. 640+00 Const. Inlet, Pipes & End w/ Fl. Lt. 3.46, Fl. Rt. 3.42

Sta. 656+00 Const. Inlet, Pipes & End w/ Fl. Lt. 3.78, Fl. Rt. 3.82

Sta. 678+00 Const. Inlet, Pipes & End w/ Fl. Lt. 6.20, Fl. Rt. 4.10

Sta. 690+00 Const. Inlet, Pipes & End w/ Fl. Lt. 6.60, Fl. Rt. 4.54

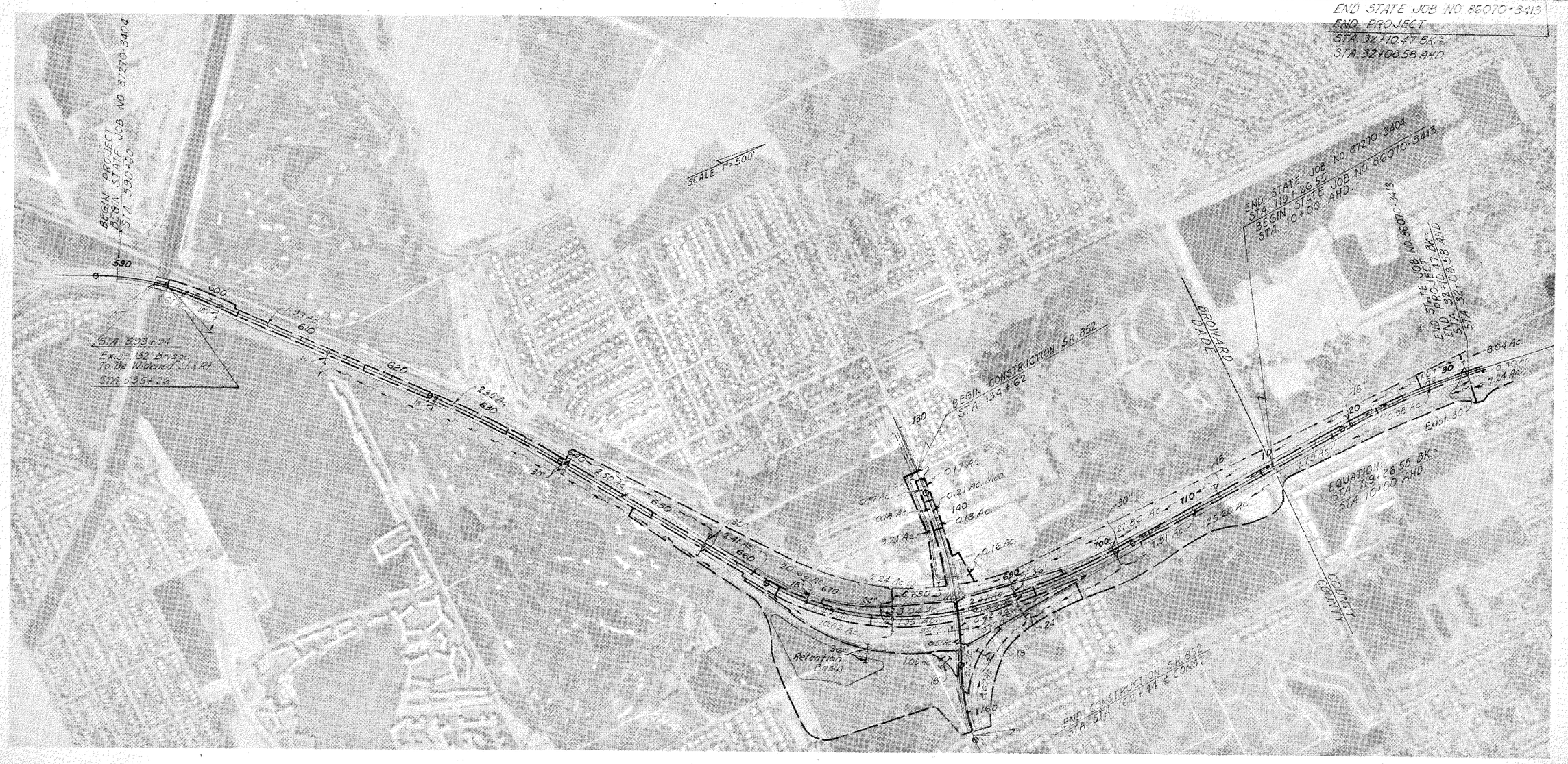
Sta. 701+00 Const. Inlet, Pipes & End w/ Fl. Lt. 6.82, Fl. Rt. 4.82

END STATE JOB NO 87270-3404
STA. 719+26.55 BK.
BEGIN STATE JOB NO 86070-3413
STA. 10+00 AHD.

Sta. 32+50 Cons. Pipes & Endwalls Fl. Lt. El. 6.44

EQUATION
STA. 719+26.55 BK.
STA. 10+00 AHD

END STATE JOB NO 86070-3413
END PROJECT
STA. 32+10.47 BK.
STA. 32+08.58 AHD



FED. ROAD DIVN. NO.	STATE	PROJ. NO.	FISCAL YEAR	SHEET NO.	TOTAL SHEETS
3	FLA.	I-95-1(17)15	68	12	

State Job Nos B7270-3404 & B6070-3413

SCALE: 1"=50'

S C L R R

Exist. R/W Line
Prop. L.A. R/W Line
Limits of Construction

Const. Fence, Type "A"

Const. Paved Shoulder
Shoulder Line

Exist. 18" Conc. To be removed

600 605 610 615

N 47° 08' 47.20" E

Const. 18" Pipe

PRC Sta 600+17.98
Lt Edge Rt. Rdwy.

CURVE DATA Lt EDGE Rt. RDWY.
P.I. Sta. 604+97.29
Δ= 2° 22' 46.13" Lt.
D= 0° 15' 00"
T= 479.32'
L= 958.47'
R= 22,918.33'
No Superel.

EQUATION:
Sta. 609+76.45 Lt. Edge Rt. Rdwy.
Sta. 609+82.60 Lt. Edge Rt. Rdwy.
Survey

Const. Spillway
Const. 3 Cu. Yd. Sand-Cement Riprap. See Index No. 1101

Const. Fence, Type "A"

WATER

PARKING

B.M. #60
Sq. Cut in N.E. Cor. of headwall
93 Lt. & Survey Sta. 602+03.1
El. 6.51

B.M. #61
60d Nail on ℄ Survey
Sta. 610+00
El. 5.60

800' V.C.

0.20%

+0.10% Special Median Ditch

Sta. 601+00
Const. Med. Inlet & 18" Pipe with Endwall Rt.
Grate El. 9.0, I.E. Med. 6.0, F. El. Rt. 5.7

300' V.C. Lt. Rdwy.

Sta. 614+00
Const. Med. Inlet & 18" Pipe with Endwall Rt.
Grate El. 7.1
F.L. Med. 3.2, F.L. Rt. 2.90

Spec. Ditch Rt.

+0.32%

Lt. Rdwy.
Rt. Rdwy.

(EM) El. 12.86 on Lt. Rdwy.

Med. Ditch (200)

13.00 Rt. Rdwy.

12.84 12.60 12.05 12.53 12.60 12.56 (EM)

10.80 10.70 10.61 10.53 10.45 10.38 10.31 10.25 10.20

Med. Ditch (200)

2.92

Lt. El. 2.88

Rt. El. 1.00

15 10 5 0

600 1 2 3 4 605 6 7 8 9 610 1 2 3 4 615