MEMORANDUM

To:	Jennifer Marshall, P.E. FDOT Chief Engineer of Production
From:	Victor Gallo, P.E. – Production Manager Armando Orozco, P.E. – Deputy Project Manager Kimley-Horn & Associates, Inc.
Date:	December 30th, 2025
Subject:	New Stormwater Rule Evaluation for Cove Road Project Development and Environment (PD&E) Study

Introduction & Objective

This project is located on Cove Road from State Road (SR) 76 (Kanner Highway) to SR 5 (US 1, Federal Highway) in Martin County, Florida. This technical memorandum provides a revised analysis of the Final Pond Siting Report (PSR) from December 2024 (FPID: 441700-1-22-02), following the nutrient reduction stormwater rule as set forth in Chapter 62-330, F.A.C and ERP Applicant's Handbook Volume 1 (A.H. Vol. 1). The basis of this project is to improve regional mobility and accommodate the future traffic needs of Cove Road. The proposed improvements primarily consist of widening the existing 2-lane undivided flush shoulder typical section to a 4-lane divided curb-and-gutter typical section roadway with accommodations for bicyclists and pedestrians. The total length of this project is approximately 3.2 miles.

The objective of this task is to review pond site alternatives developed in the original PSR using traditional first flush treatment volume design and performance standards and evaluate required modifications to meet the new nutrient reduction criteria as a function of the new stormwater rule. The new stormwater criteria is quantified differently whereby calculating total nitrogen (TN) and total phosphorus (TP) surface water discharge by Best Management Practice (BMP) nutrient reduction rates depending on the existing ambient water quality conditions of the downstream water bodies, within the boundaries of a HUC-12 sub-watershed, as described in Sections 8.3.2 through 8.3.5 of A.H. Vol. 1. This technical memorandum intends to provide insight findings of the impacts and solutions to the new stormwater rule criteria. No volumetric changes for attenuation are anticipated; therefore, attenuation volumes were not evaluated.

New Stormwater Rule

The new stormwater rule criteria is quantified differently, focusing on the reduction of TN and TP in surface water discharges, as determined by 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 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-watershed. Impaired WBIDs are defined as those that are not meeting their applicable water quality standards at the time of application, have been verified as impaired, and can be used for regulatory

programs 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.

Table 1: New Water Quality Performance Standard Requirements

Project Scenario	Post-Dev. TP Minimum Reduction Rates (%)	Post-Dev. TN Minimum Reduction Rates (%)	Nutrient Reduction Analysis	Presumptive TSS Reduction Efficiencies %	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.

This memorandum assumes the application of the new nutrient reduction standards without the use of any grandfathering provisions within the new rule, in order to fully assess the potential future impacts to the Department's Work Program once the new rule is fully implemented.

Methodology

The proposed drainage system will consist of curb inlets, and storm sewer pipes along with a combination of off-site stormwater ponds, side bank filters, and on-site swales (Alternative 1), or exfiltration trenches (Alternative 2) providing water quality treatment and water quantity attenuation in accordance with South Florida Water Management District (SFWMD) and Martin County requirements.

This project is located within the South St. Lucie and Indian River Lagoon South Coastal watersheds and traverses three Waterbody Identification (WBID) areas: WBID 3210C (South Fork St. Lucie River – Tidal

Segment), WBID 3220 (Basin 2), and WBID 3208C (Manatee Pocket). This roadway was previously permitted under SFWMD Permit No. 43-00642-S for an ultimate four-lane condition that was not constructed. The existing permit included five drainage basins along the corridor. The original permitted drainage basins were modified in the original pond siting analysis, with Basins 4 and 5 now combined into one basin and minor boundary adjustments for other existing basins. Basins 1-4 within the project discharge to South Fork St. Lucie River (Tidal Segment) (WBID 3210C), which is impaired for nutrients, bacteria, and mercury. Part of basin 4 is within Manatee Pocket (WBID 3208C), which is impaired for nutrients, copper, and mercury. The impaired WBIDs are downstream of the project within the same HUC-12 (South Fork of the St. Lucie River); therefore, both scenarios require the same nutrient reduction rates of 80% for TN and TP. Since the ambient water quality analysis yielded no difference, Scenarios 1 and 2 were merged into one. The nutrient reduction rate was considered from a holistic, compensatory standpoint at the HUC-12 sub-watershed to optimize nutrient reduction opportunities. Refer to **Appendix A** for WBID and HUC-12 matrices.

BMPTrains 2020 Version 4.3.5 was used to assess the nutrient reduction rates provided by the stormwater alternatives originally sized and sited in the PSR. Based on the findings, swales, side bank filters, and exfiltration trenches were incorporated and modeled in series with the originally sized facilities to determine the combined overall treatment train efficiency for each basin. The primary focus of the BMPTrains models was to assess the efficiency rates for TN and TP, providing reasonable assurance, with the new reduction rate criteria outlined in Chapter 62-330 F.A.C. and A.H. Vol. I. The pre and post Event Mean Concentration (EMC) values were sourced from the A.H. Vol. I, Table 9.2 for Highways. Adjustments to available permanent pool volume (PPV) were not performed for the nutrient reduction rate analysis performed, as the original ponds sited in the PSR appear to be mostly optimized, except for Pond 2 which exceeded the Annual Residence Time of 200 days. The treatment section incorporated the relevant treatments of wet ponds, side bank filters, swales, and exfiltration trenches. The individual nutrient reduction rates from these analyses were then combined into a final nutrient reduction rate for each basin using **Equation 1**, as presented below.

Individual efficiency rates from BMPTrains were analyzed for each subbasin to properly identify the combined treatment efficiency rate. **Equation 1** (Equation 9-5 from A.H. Vol I) was used to combine efficiency rates for each basin:

$$Overall\ Treatment\ Train\ Efficiency$$
$$= Eff1 + [(1 - Eff1)xEff2] + \left[\left((1 - Eff1) - \left((1 - Eff1)xEff2\right)\right)xEff3\right] \text{ – } \textbf{Equation 1}$$
$$\text{or (simplified form)}$$
$$= 1 - [(1 - Eff1)x(1 - Eff2)x(1 - Eff3)x \dots x(1 - Effn)]$$

Analysis and Results

The original proposed stormwater management systems as described in the PSR and as analyzed in BMPTrains within the PSR did not meet nutrient reduction requirements per the new rule. These systems used wet detention ponds as the BMP treatment option for nutrient reduction within all four basins. To enhance nutrient reduction to meet the minimum standards of the new rule, two alternatives were evaluated for this corridor to increase nutrient reduction efficiency to meet the applicable reduction efficiency targets. Alternative 1 proposes swales in a treatment train with the wet detention ponds. Basin 4 also proposes side bank filters for the wet detention pond for additional treatment. Alternative 2 proposes exfiltration trenches in a treatment train with the wet detention ponds.

Alternative 1 - Swales

Swale opportunities were evaluated to maximize the use of available areas within the corridor and adjacent to the roadway to be used as the primary BMP to improve nutrient reduction rate under Alternative 1 – see **Appendix B** for map figures showing swale locations. By leveraging the existing right-of-way, the analysis team was able to identify swale areas that can be used to enhance nutrient reduction capabilities – see **Figure 1** for an example of the swale areas identified for nutrient reduction. The swale areas available to the nutrient reduction system were estimated in accordance with FDOT standards, featuring 4:1 (horizontal: vertical) side slopes, a minimum 5-foot-wide bottom, and a minimum estimated depth of 1.0-ft to allow for a minimum of 0.5-ft of retention depth within the swale. This geometry was selected to enhance infiltration and provide adequate residence time for nutrient uptake and sedimentation, while also accommodating maintenance access and safety considerations.

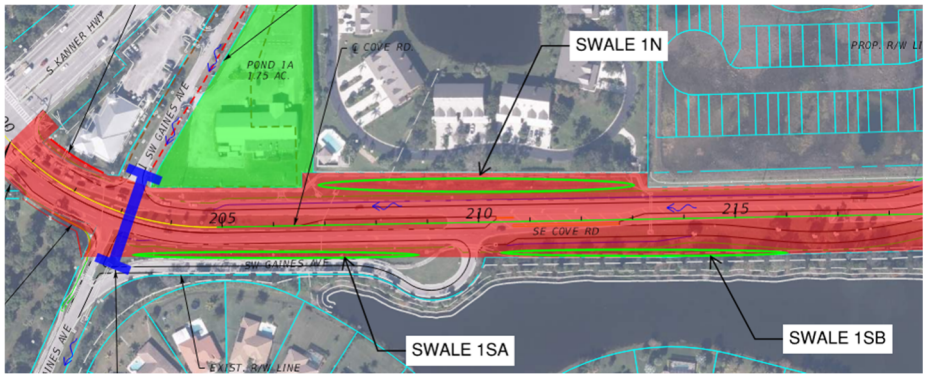


Figure 1: Available Swale Areas within Basin 1 (typ.)

To further support this approach, the modified drainage collection system will use closed flume inlets (per FDOT Standard Index 425-061) in lieu of traditional curb inlets to direct runoff to the swales – see **Figure 2** for a sketch of the proposed revised configuration. To maintain the proposed curbed typical section, closed flume inlets would be implemented to drain runoff from the road towards swales. The placement of the closed flume inlets will be a product of roadway slopes, contributing areas, and spread requirements for the roadway.

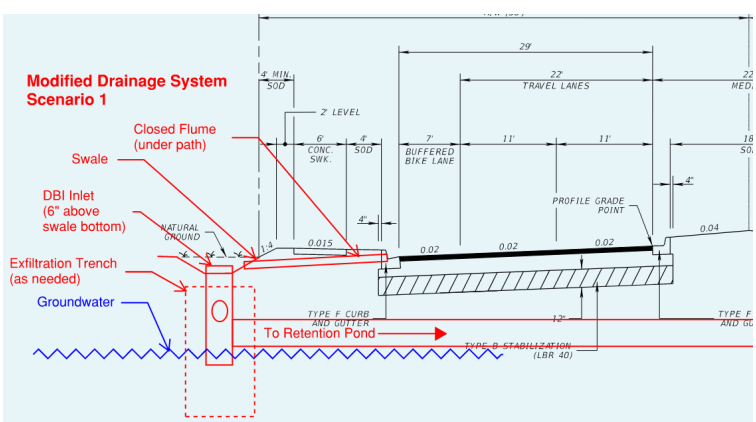


Figure 2: Alternative 1 - System using Swales

Each basin was reviewed to identify areas where swales can be incorporated adjacent to the roadway, shared use path, or sidewalk and within the right of way noted within the Proposed Basin Maps available in **Appendix B**. For the analysis, swales account for a runoff area congruent to the total basin area divided

by the number of swales. Swale nutrient reduction efficiencies were combined based on treatment train configurations. Swales were averaged as one basin to a weighted average swale to find the overall treatment efficiency. Configurations of treatment trains can be found in **Appendix A**. **Table 2** through **Table 5** provide a listing of the available swales per basin.

Table 2: Basin 1 – Available Swale Dimension

Basin 1 Swale Name	Top Width (ft)	Bottom Width (ft)	Swale Length (ft)	Average Runoff Area Per Swale[1] (Ac)	Impervious Width[2] (ft)
1N	32	24	670	2.32	33
2N	13	5	867	2.32	33
1SA	13	5	650	2.32	33
1SB	15	7	650	2.32	33
2S	25	17	1,280	2.32	33

[1] The average treatment area was determined by dividing total roadway basin area by the number of swales.
[2] Composed of vehicular loading roadway width, including shoulder – sidewalks and shared use paths are not included.

Table 3: Basin 2 – Available Swale Dimensions

Basin 2 Swale Name	Top Width (ft)	Bottom Width (ft)	Swale Length (ft)	Average Runoff Area Per Swale (Ac)	Impervious Width (ft)
1N	20	12	1,586	1.80	33
2N	40	32	671	1.80	33
3N	13	5	1,415	1.80	33
1SA	40	32	970	1.80	33
1SB	13	5	567	1.80	33
2S	25	17	180	1.80	33
3S	13	5	701	1.80	33
4S	18	10	120	1.80	33
5S[3]	13	5	677	1.80	33

[3] May require shared use path to move closer to curb in some sections.

Table 4: Basin 3 – Available Swale Dimensions

Basin 3 Swale Name	Top Width (ft)	Bottom Width (ft)	Swale Length (ft)	Average Runoff Area Per Swale (Ac)	Impervious Width (ft)
1N	13	5	794	2.45	33
2N	20	12	360	2.45	33
1SA	18	10	821	2.45	33
1SB	15	7	157	2.45	33
2S	24	16	669	2.45	33

Table 5: Basin 4 – Available Swale Dimensions

Basin 4 Swale Name	Top Width (ft)	Bottom Width (ft)	Swale Length (ft)	Average Runoff Area Per Swale[4] (Ac)	Impervious Width[2] (ft)
1N	13	5	537	1.63	33
2N	23	15	370	1.63	33
1SA	20	12	520	1.63	33
1SB	18	10	795	1.63	33

[4] Only roadway areas draining to swales are considered. East segment drains directly to the pond.

An average swale block height of 0.5-ft (6-inches) was assumed for the swales. This would allow for a reasonable amount of runoff to remain within the swales that will percolate into the soil within 72-hours given an assumed soil infiltration rate of 3.5 in/hr, which was chosen conservatively for in situ soils (FDOT Select Soils A-3 and A-2-4). In Basin 4, the area from station 343+00 to 368+28 (end of project) will be routed directly to Pond 4 due to the lack of available space for swales within the existing right-of-way. In the BMPTrains model for the Basin 4 swales, the modeled runoff area corresponds to the section of roadway extending from station 368+00 to 368+28 – a length of 2,528 feet. When multiplied by the typical roadway width, this results in approximately 6.5 acres of drainage area being treated by the swales in Basin 4. The remainder of the basin, which lies outside of the swale treatment area, will need to bypass this system and discharge directly to the pond via a trunkline. The remainder of the basin was included in the BMPTrains model for the swales of Basin 4 to determine the efficiency of the swales when including the entire loading of the basin.

Alternative 1 allows for efficient flow of runoff to the swales prior to conveyance through the piped conveyance system, promoting greater contact time with vegetation and soil within the swales for nutrient reduction, with the exception of the east most segment of Basin 4 – which will be routed directly to the pond. Spread calculations will be required to determine the spacing between closed flume inlets to drain runoff into proposed swales. It is also important to note that the current swale locations are conservative. There is available space within the typical section to incorporate additional conveyance swales that can direct flow to the main retention swales before ultimately discharging into the wet ponds.

To mitigate the nutrient loading in Basin 4 routed directly to the pond without any swale pretreatment, an additional BMP was added to the Basin 4 treatment train to meet the required nutrient reduction rate at the HUC 12 sub-watershed scale. A side bank filter was added to the preferred Basin 4 wet detention pond (Pond 4A) to provide additional nutrient reduction to the basin. Side bank filters refer to the earthen banks above the Normal Water Level (NWL) of a wet pond that can be used for treatment with the implementation of a weir or grate control structure to mechanically control the stage and volume of water above the permanent pool volume. Refer to **Figure 3**.

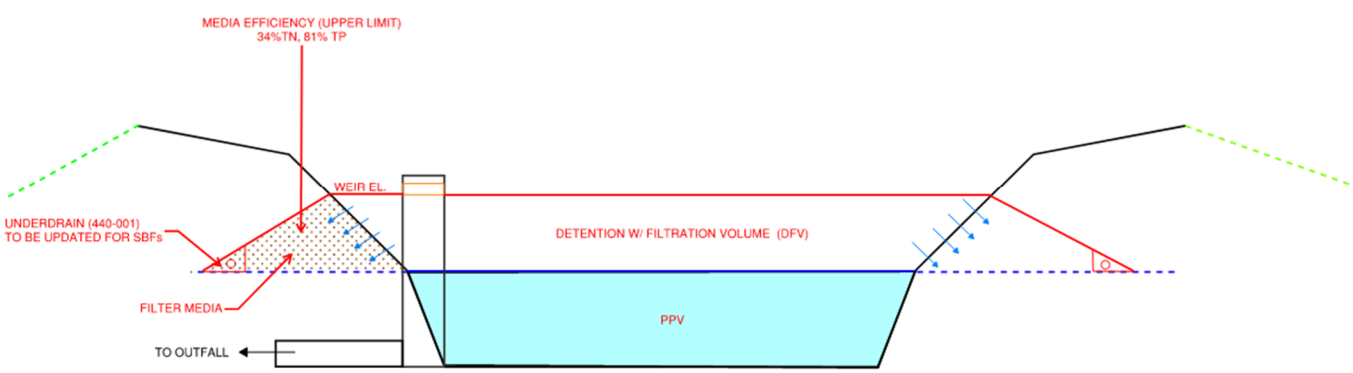


Figure 3: Side Bank Filter Section

The “detention with media filtration” in Appendix O in the A.H Vol. 1 was used to determine the BMP efficiency of the side banks. The following equation was used to determine the efficiency rate of side bank filters:

Detention with Filtration BMP Efficiency = Retention BMP Efficiency[1] X Media Efficiency[2]

1. Retention volume measured from NWL up to the weir or grate elevation of the control structure, treated as “dry retention”. This volumetric value equates to the first flush treatment volume determined in the original PSR.
2. Efficiency of filter media. Upper limits for Total Nitrogen and Phosphorus are 34% and 81% respectively. This assumes 3-feet deep select soils to match the results in BDV24-977-25

These filters, which enhance nutrient removal, were placed in series with the nutrient removal of the wet pond. The detention with filtration equation in Appendix O reflects that side bank filters can provide an additional 30% of TN removal, and 77% TP removal, bringing the overall combined efficiency above the required 55% for TN, and 80% for TP for the two HUC-12 sub-watershed.

Alternative 2 – Exfiltration Trenches

Exfiltration trenches, also commonly referred to as French drains, are subsurface stormwater management systems designed to provide temporary storage and promote infiltration of runoff into the ground – see **Figure 4** for a schematic of a typical exfiltration trench from the FDOT 2024 Drainage Design Guide. These systems consist of perforated pipes placed in a bed of coarse aggregate within a trench excavated below the surface. The trench extends into the ground and typically below the groundwater table. Stormwater enters the perforated pipe within the system and then gradually flows through the pipe perforations and into the surrounding aggregate media. From there, the water infiltrates through the trench bottom and sidewalls into the surrounding natural ground and eventually recharges the groundwater aquifer. The perforated pipe facilitates the even distribution of runoff across the length of the system and it increases the system’s effective storage volume when the pipe is placed above the seasonal high groundwater table (SHGWT). Exfiltration trench systems are particularly beneficial in urbanized areas with limited surface space and are an integral part of meeting water quality and quantity criteria.

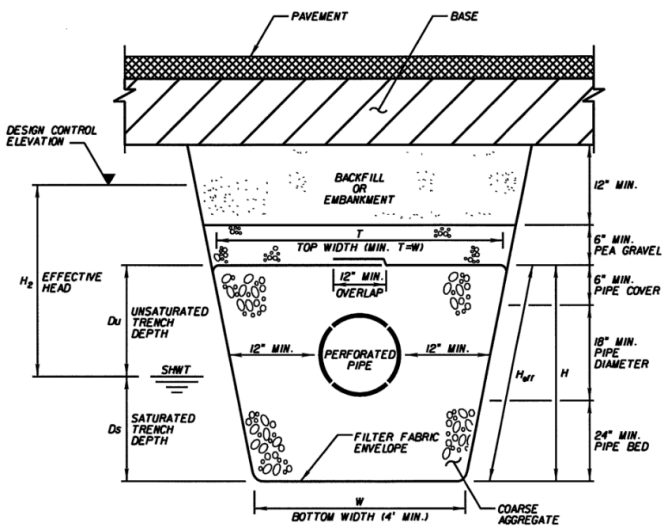


Figure 4: Typical Exfiltration Trench (from FDOT 2024 Drainage Design Guide - Figure 7.2-1)

The original PSR describes the general dimensions of the proposed exfiltration trenches as 8-ft wide by 7-ft tall with 4 to 3-ft of the exfiltration trench sitting above the SHGWT due to the shallow groundwater table elevation. The invert of the perforated pipe will lie above the SHGWT adding additional storage within the system. As it pertains to exfiltration trench systems, nutrient reduction is credited only for treatment

occurring within the dry or unsaturated portion of the trench. This is consistent with the methodologies embedded in the BMPTrains analysis tool, which aligns with the nutrient reduction objectives under the revised FDEP stormwater rule and SFWMD guidance. A typical aggregate void ratio of 0.40 is applied to represent the available open area within the trench media for storage and treatment. Nutrient reduction efficiencies are quantified based on the dry storage volume only, as the saturated zone is not eligible for nutrient reduction credit. The general width of this corridor is approximately 100-ft which will allow for the use of exfiltration trenches along both sides of the typical section, as needed, without the groundwater mounding from each length of exfiltration affecting adjacent exfiltration trenches on the opposite side of the road - see **Figure 5** for a sketch of the proposed revised configuration along one side of the project corridor.

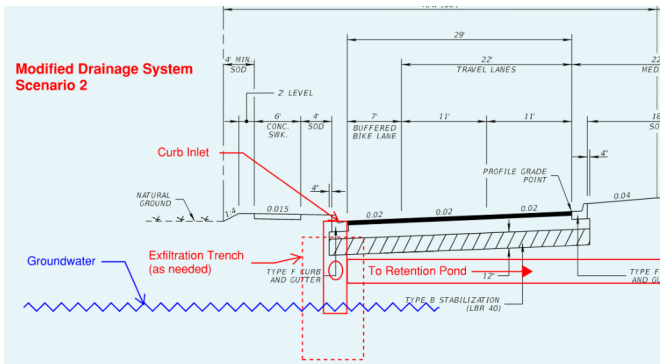


Figure 5: Alternative 2 - System using Exfiltration Trenches

Table 6 provides a listing of the general length of roadway within each of the four basins delineated for this project and also provides a reduction factor of 30% of the available length to account for intersections, lengths of solid pipe connected to inlets and manholes within the system, and other unforeseen items that may result in a reduction in the total length of exfiltration trench that may reasonably be constructed.

Table 6: Length of Roadway & Length Available for Exfiltration Trench per Basin

Basin	Approximate Length of Segment (ft)	Estimated Length Available for Exfiltration Trench (ft per side)
1	3,200	2,240
2	5,300	3,710
3	6,200	4,340
4	2,000	1,400

Results

Nutrient reduction for the modified system were evaluated using BMPTrains to estimate nutrient reduction rates and to assess the effectiveness of the BMPs proposed within this study for achieving the required nutrient reduction target requirements of the new stormwater rule. All of the basins were considered impaired in both scenarios, requiring the 80% nutrient reduction of TN and TP. The analysis used the modified proposed stormwater management systems as described previously under Alternatives 1 and 2. The treatment trains defined for each basin in each alternative were modeled separately in BMPTrains, then used the Overall Treatment Train Efficiency equation (**Equation 1**) to get the overall treatment nutrient reduction rates. Alternative 1 utilizes swales for pre-treatment, whereas Alternative 2 relies on exfiltration trenches for pre-treatment before discharging to wet ponds. The proposed wet pond permanent pool volumes remained unchanged from the original PSR except for the pond within Basin 2 due to the Annual Residence Time exceeding the 200-day threshold. The available permanent pool volume for Basin 2 was reduced from 30.26 ac-ft to 22.8 ac-ft (approximate 25% reduction) to reduce the Annual Residence Time

to 199 days. In Alternative 1, Basin 4 also utilizes an additional BMP of side bank filters in a treatment train with swales and the wet detention pond. The BMPTrains analysis yielded the results noted in **Appendix C** for Alternatives 1 and 2 for all basins.

For Alternative 1, Basins 3 and 4 do not achieve the required TN reduction. For Alternative 2, only Basin 4 does not achieve the required TN reduction. However, since all basins are located within the same HUC-12 sub-watershed, the surplus nutrient reduction from Basins 1–2 for Alternative 1 and Basins 1-3 for Alternative 2 will compensate for this shortfall. Please refer to the compensatory calculations for the combined TN reduction efficiency across the HUC-12 sub-watershed. It is important to note that the BMP efficiency results indicate an overdesign. This is due to the current design plan incorporating all available BMPs. During the final design phase, it may be possible to reduce the number or extent of BMPs, provided that such adjustments do not interfere with the intended hydraulic routing.

Conclusion

The evaluation of the stormwater pond alternatives and associated BMPs originally developed in the PSR confirms that the nutrient reduction performance standards established by the new stormwater rule can be met with along with additional proposed stormwater management alternatives. Through the strategic use of swales, exfiltration trenches, wet detention ponds, and side bank filters in a treatment train configuration, each HUC-12 sub-watershed achieves the required TN and TP reduction rates based on downstream ambient water quality classifications. This approach provides reasonable assurance that future design will remain consistent with the Department's Work Program and the updated performance standards outlined in A.H. Vol. 1 and Chapter 62 330 F.A.C. The findings presented in this memorandum demonstrate that the existing stormwater strategy for the Cove Road corridor is adaptable to new stormwater rule, with additional refinement and optimization as needed.

Kimley»Horn

Appendix A

Nutrient Reduction Analysis
Nutrient Reduction Rate Matrices
Swales Treatment Train Configurations
HUC-12 and WBID Exhibit

Nutrient Reduction Analysis							
Basin ID	WBID	Total Nitrogen			Total Phosphorus		
		Pre Loading (kg/y)	Post Loading (kg/y)	Loading Change (%)	Pre Loading (kg/y)	Post Loading (kg/y)	Loading Change (%)
1	South Fork of St. Lucie River	45.992	52.289	12.0%	6.365	7.237	12.0%
2		63.981	91.563	30.1%	8.855	12.672	30.1%
3		48.128	62.916	23.5%	6.661	8.708	23.5%
4		41.498	63.086	34.2%	5.743	8.731	34.2%

Scenario 1 - Alternative 1 Nutrient Reduction Rates Matrix

HUC-12		PSR Data						BMP Series Train			Nitrogen					Phosphorus				
HUC-12 ID	**HUC-12 Name**	**Basin ID**	**Pond ID**	**WBID**	**Basin Impairments**	**Impairments**	**Impairment Assessment Category**	**BMP Element 1**	**BMP Element 2**	**BMP Element 3**	**BMP Element 1 Nutrient Reduction Rate**	**BMP Element 2 Nutrient Reduction Rate**	**BMP Element 3 Nutrient Reduction Rate**	***Req. Nitrogen Treatment (New Rule)***	**Nitrogen Combined Nutrient Reduction Rate ***	**BMP Element 1 Nutrient Reduction Rate**	**BMP Element 2 Nutrient Reduction Rate**	**BMP Element 3 Nutrient Reduction Rate**	***Req. Phosphorus Treatment (New Rule)***	**Phosphorus Combined Nutrient Reduction Rate**
30902060502	South Fork of the St. Lucie River	Basin 1	Pond 1B	WBID 3210C - South Fork St. Lucie River (Tidal Segment)	Impaired Waters	Nutrients (Chlorophyll-a)	5	Swales	Wet Pond	Side Bank Filter	65%	38%	30%	*80%*	**85%**	65%	64%	73%	*80%*	**97%**
		Basin 2	Pond 2		Impaired Waters			Swales	Wet Pond	Side Bank Filter	61%	43%	30%	*80%*	**84%**	61%	79%	72%	*80%*	**98%**
		Basin 3	Pond 3B		Impaired Waters			Swales	Wet Pond	Side Bank Filter	52%	42%	30%	*80%*	**81%**	52%	76%	71%	*80%*	**97%**
		Basin 4	Pond 4A	WBID 3210C - South Fork St. Lucie River (Tidal Segment), WBID 3220 - Basin 2, WBID 3208C - Manatee Pocket	Impaired Waters			Swales	Wet Pond	Side Bank Filter	33%	42%	30%	*80%*	**73%**	33%	77%	72%	*80%*	**96%**

Note: Swales were implemented for stormwater routing on top of water quality, therefore, some basins will provide treatment beyond minimum requirements. Refer to page 16 for swale sequencing to determine average efficiency.

***Pond 1B, 2, 3B, and 4A will use compensatory treatment for TN since they are all within the same HUC-12 basin. Refer to Compensatory Nutrient Loading & BMP Efficiency Analysis Summary in the following sheet.**

PERFORMANCE EFFICIENCY RATE MATRIX - ALTERNATIVE 1

Project: *Cove Road*
FPID: *441700-1-22-02* *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	South Fork of the St. Lucie River	**45.992**	**6.365**	**52.289**	**7.237**	Swale + Wet Detention + Side Bank Filter	65%	38%	30%	65%	64%	73%	**85%**	**97%**
BASIN System 2	South Fork of the St. Lucie River	**63.981**	**8.550**	**91.563**	**12.672**	Swale + Wet Detention + Side Bank Filter	61%	43%	30%	61%	79%	72%	**84%**	**98%**
BASIN System 3	South Fork of the St. Lucie River	**48.128**	**6.661**	**62.916**	**8.708**	Swale + Wet Detention + Side Bank Filter	52%	42%	30%	52%	76%	71%	**81%**	**97%**
BASIN System 4	South Fork of the St. Lucie River	**41.498**	**5.743**	**63.086**	**8.731**	Swale + Wet Detention + Side Bank Filter	33%	42%	30%	33%	77%	72%	**73%**	**96%**

* Retention System provided in ponds in Golden Glades Reconstruction Project
** Included to match PSR but can be removed upon addition of dry retention BMP

Required BMP Efficiency Rate Evaluation Summary

Development Type: Development
Ambient Water Quality Impaired/TMDL/BMAP/RAP
TMDL/BMAP/RAP? No

	TN	TP
Minimum BMP Efficiency:	80%	80%

Outfall (HUC 12)	Pre-Dev. Nutrient Loading (kg/yr)		Post-Dev. Nutrient Loading (kg/yr)		Minimum Required Treatment Summary								Provided Treatment Summary					
					Development Loading Increase (kg/yr)		Post-Dev. BMP Load Allowable (kg/yr)		Project Specific Nutrient Loading Change (%)		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
South Fork of the St. Lucie River	199.6	27.3	269.9	37.3	70.3	10.0	54.0	7.5	**26.0%**	**26.9%**	**80%**	**80%**	51.8	1.2	**81%**	**97%**	74%	96%

Scenario 1 - Alternative 2 Nutrient Reduction Rates Matrix

HUC-12		PSR Data						BMP Series Train		Nitrogen				Phosphorus			
HUC-12 ID	**HUC-12 Name**	**Basin ID**	**Pond ID**	**WBID**	**Basin Impairments**	**Impairments**	**Impairment Assessment Category**	**BMP Element 1**	**BMP Element 2**	**BMP Element 1 Nutrient Reduction Rate**	**BMP Element 2 Nutrient Reduction Rate**	***Req. Nitrogen Treatment (New Rule)***	**Nitrogen Combined Efficiency Rate**	**BMP Element 1 Nutrient Reduction Rate**	**BMP Element 2 Nutrient Reduction Rate**	***Req. Phosphorus Treatment (New Rule)***	**Phosphorus Combined Efficiency Rate**
30902060502	South Fork of the St. Lucie River	Basin 1	Pond 1B	WBID 3210C - South Fork St. Lucie River (Tidal Segment)	Impaired Waters	Nutrients (Chlorophyll-a), Bacteria (Enterococci), Mercury (in fish tissue)	5, 4a	Exfiltration Trench	Wet Pond	77%	38%	*80%*	**86%**	77%	64%	*80%*	**92%**
		Basin 2	Pond 2		Impaired Waters			Exfiltration Trench	Wet Pond	76%	43%	*80%*	**86%**	76%	79%	*80%*	**95%**
		Basin 3	Pond 3B		Impaired Waters			Exfiltration Trench	Wet Pond	81%	42%	*80%*	**89%**	81%	76%	*80%*	**95%**
		Basin 4	Pond 4A	WBID 3210C - South Fork St. Lucie River (Tidal Segment), WBID 3220 - Basin 2, WBID 3208C - Manatee Pocket	Impaired Waters	Nutrients (Chlorophyll-a), Copper, Mercury (in fish tissue)	5, 4a	Exfiltration Trench	Wet Pond	52%	42%	*80%*	**72%**	52%	77%	*80%*	**89%**

Pond 4 will receive TN compensatory treatment from basins 1-3 since they are in the same HUC 12 basin. Refer to Compensatory Nutrient Loading & BMP Efficiency Analysis Summary in the following sheet

PERFORMANCE EFFICIENCY RATE MATRIX - ALTERNATIVE 2

Project: *Cove Road*
FPID: *441700-1-22-02* *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	South Fork of the St. Lucie River	**45.992**	**6.365**	**52.289**	**7.237**	Exfiltration Trench + Wet Detention	77%	38%	-	77%	64%	-	**86%**	**92%**
BASIN System 2	South Fork of the St. Lucie River	**63.981**	**8.550**	**91.563**	**12.672**	Exfiltration Trench + Wet Detention	76%	43%	-	76%	79%	-	**86%**	**95%**
BASIN System 3	South Fork of the St. Lucie River	**48.128**	**6.661**	**62.916**	**8.708**	Exfiltration Trench + Wet Detention	81%	42%	-	81%	76%	-	**89%**	**95%**
BASIN System 4	South Fork of the St. Lucie River	**41.498**	**5.743**	**63.086**	**8.731**	Exfiltration Trench + Wet Detention	52%	42%	-	52%	77%	-	**72%**	**89%**

* Retention System provided in ponds in Golden Glades Reconstruction Project
** Included to match PSR but can be removed upon addition of dry retention BMP

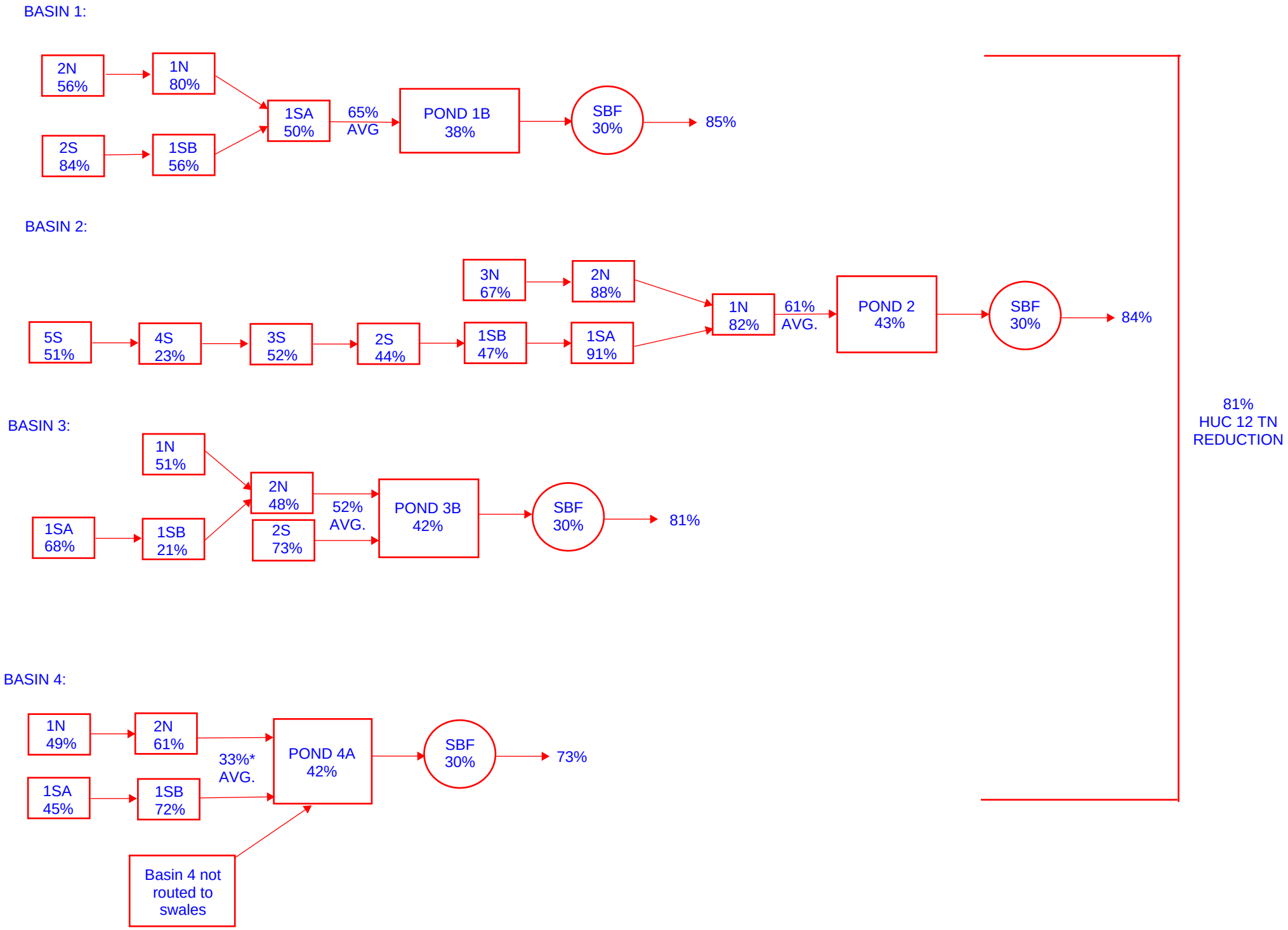
Required BMP Efficiency Rate Evaluation Summary

Development Type: Development
Ambient Water Quality Impaired/TMDL/BMAP/RAP
TMDL/BMAP/RAP? No

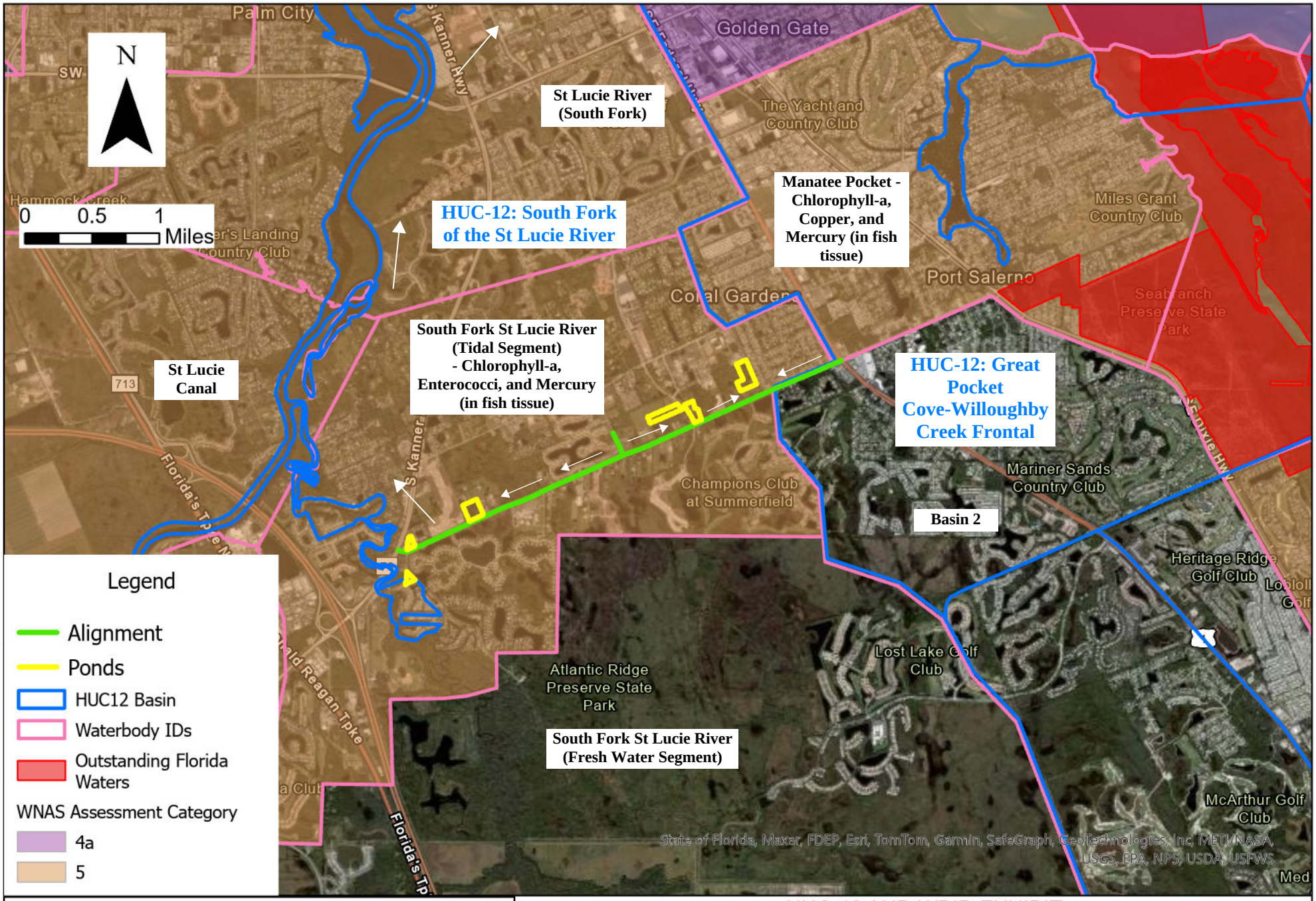
	TN	TP
Minimum BMP Efficiency:	80%	80%

Outfall (HUC 12)	Pre-Dev. Nutrient Loading (kg/yr)		Post-Dev. Nutrient Loading (kg/yr)		Minimum Required Treatment Summary: Development Loading Increase (kg/yr)		Post-Dev. BMP Load Allowable (kg/yr)		Project Specific Nutrient Loading Change (%)		Required BMP Efficiency Rate		Provided Treatment Summary: 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
South Fork of the St. Lucie River	199.6	27.3	269.9	37.3	70.3	10.0	54.0	7.5	**26.0%**	**26.9%**	**80%**	**80%**	44.5	2.6	**84%**	**93%**	78%	90%

Swales Treatment Train Configurations for Total Nitrogen Reduction Rate



*This is the weighted average accounting for the fact part of Basin 4 is not being treated.



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

HUC-12 AND WBID EXHIBIT

SE COVE ROAD
MARTIN COUNTY, FLORIDA

Scale: As Noted	FPID: 441700-1-22-01	September, 2025	Figure 1

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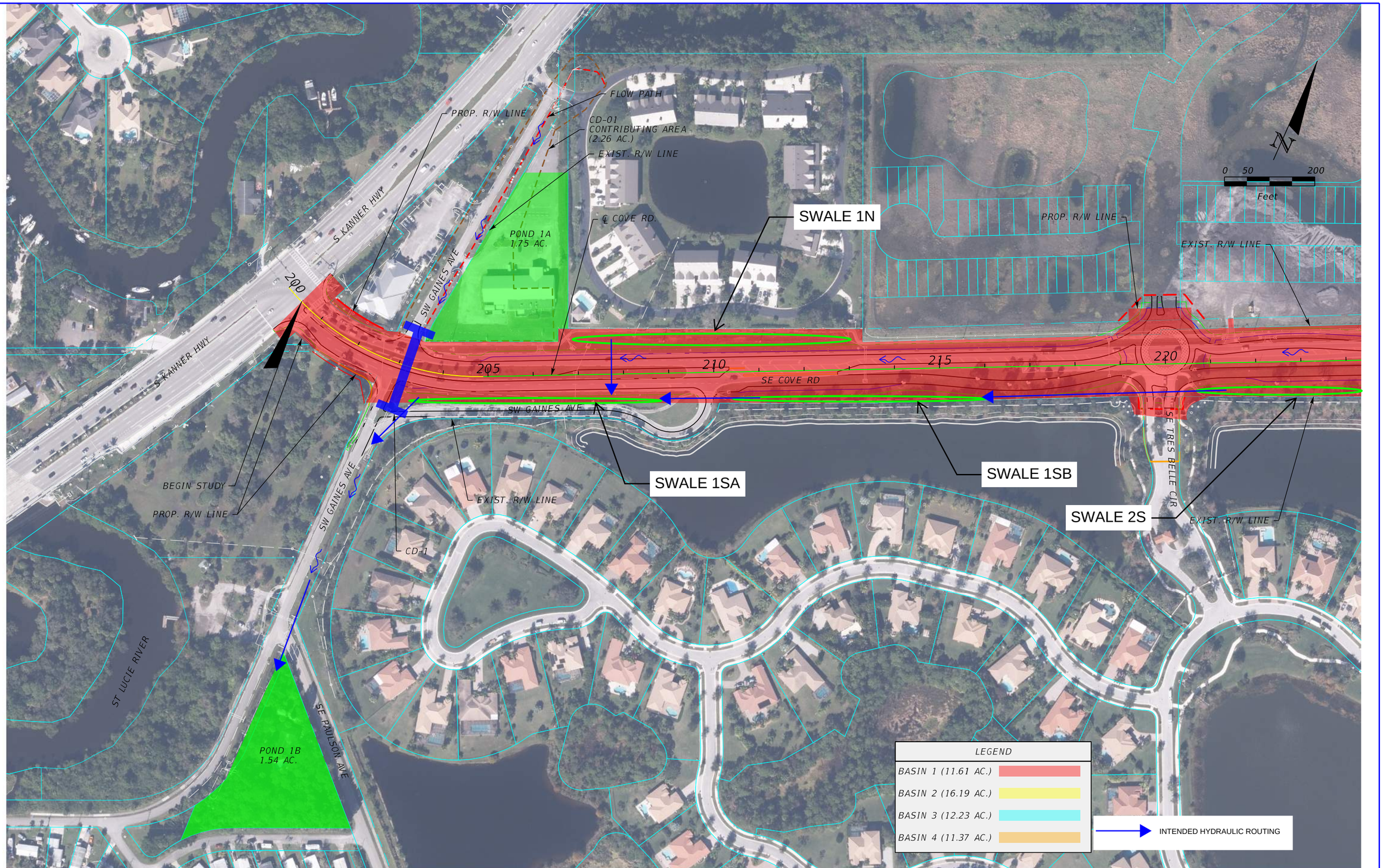
Appendix B

Basin Maps with Swale Locations



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
LICENSE NUMBER: 80498
ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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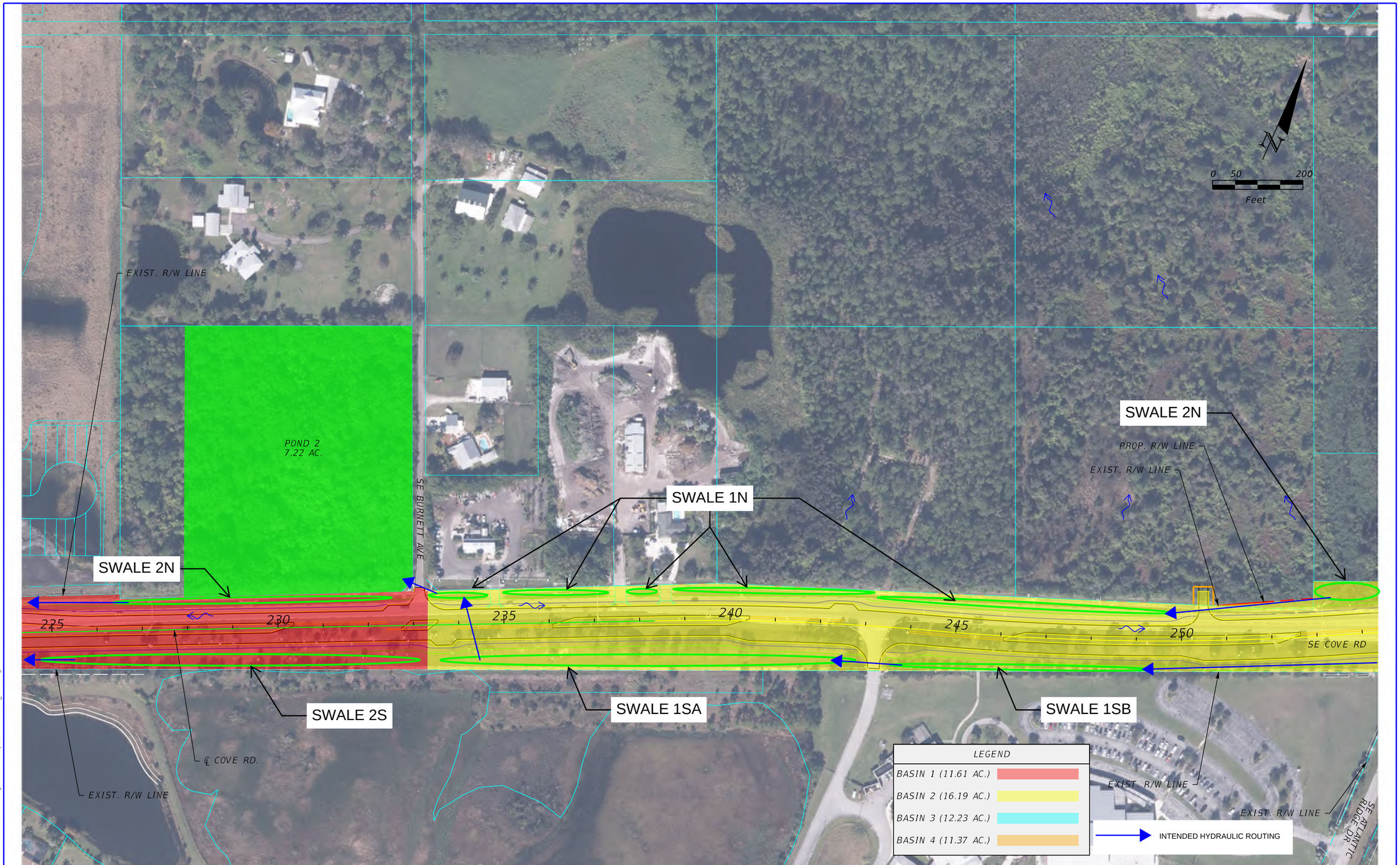

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ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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FAC NOTE

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3000 DOVERA DRIVE
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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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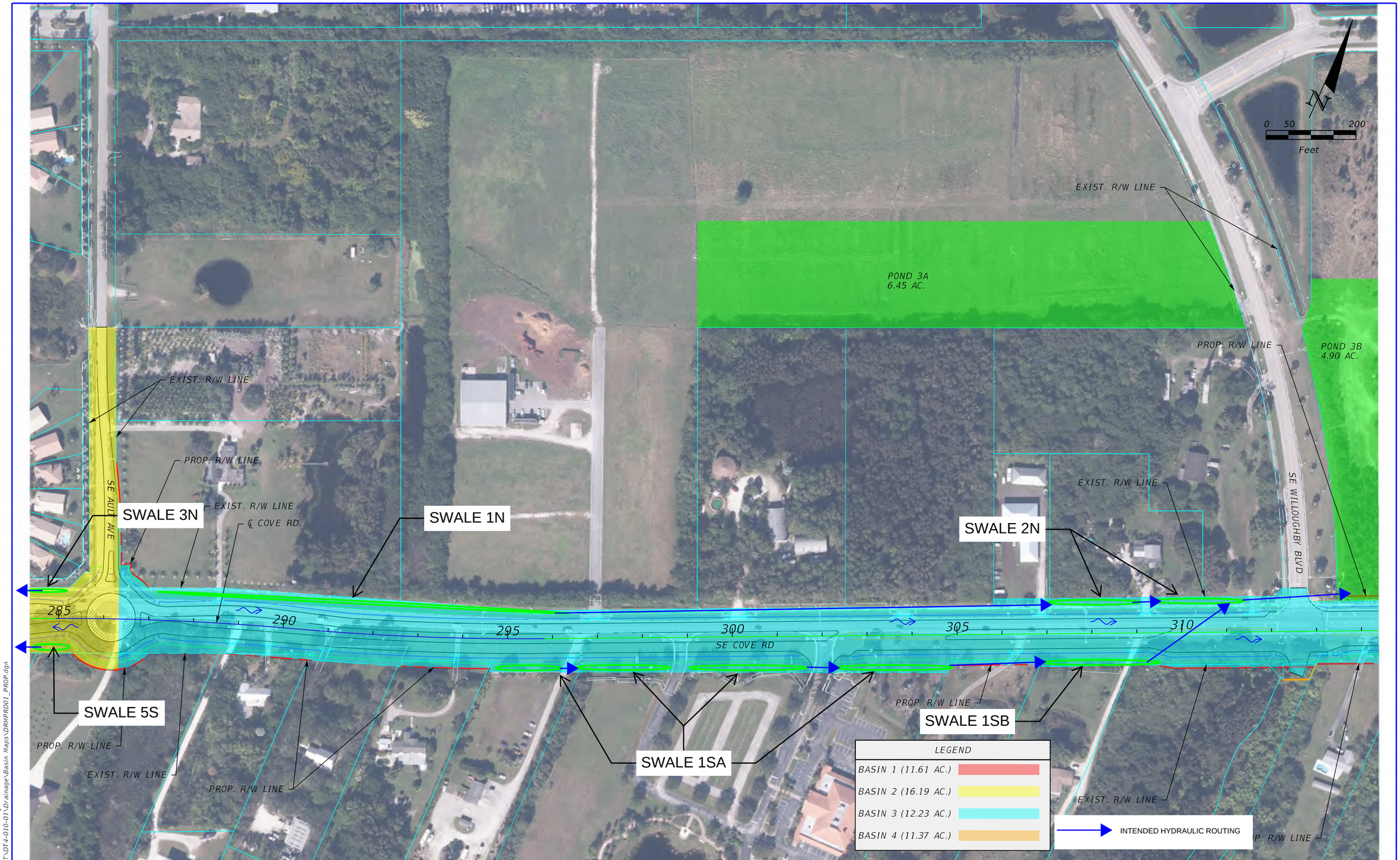

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OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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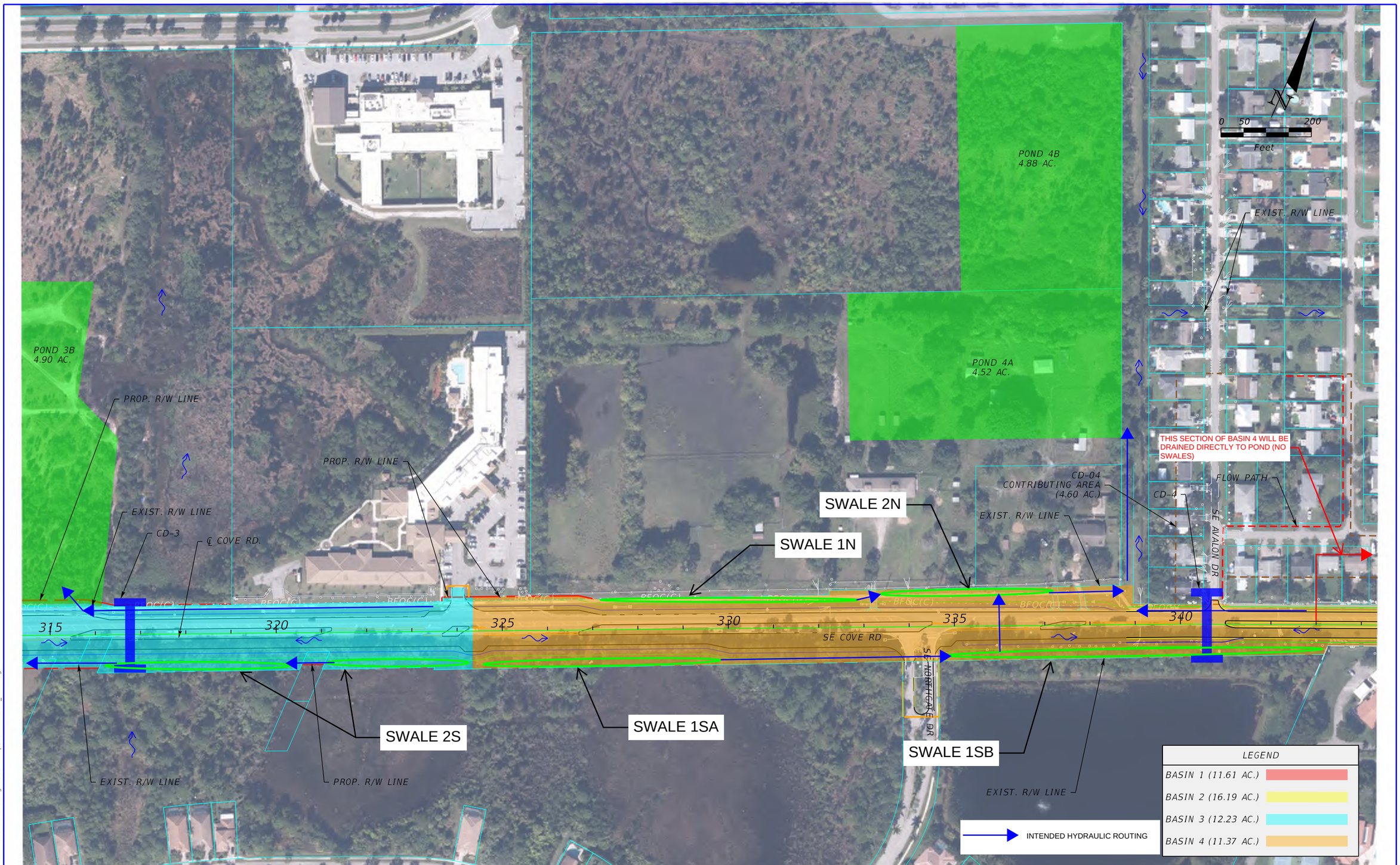

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PROFESSIONAL TYPE

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ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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Appendix C

BMPTrains Reports

BMPTrains Reports

Basin 1 Swales

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 1 - 1N	Basin 1 - 2N	Basin 1 - 1SA	Basin 1 - 1SB	Basin 1 - 2S
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	57.00	57.00	57.00	57.00	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	2.32	2.32	2.32	2.32	2.32
Rational Coefficient (0-1)	0.49	0.49	0.49	0.49	0.49
Non DCIA Curve Number	84.00	84.00	84.00	84.00	84.00
DCIA Percent (0-100)	47.27	47.27	47.27	47.27	47.27
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	5.367	5.367	5.367	5.367	5.367
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	8.272	8.272	8.272	8.272	8.272
Phosphorus Loading (kg/yr)	1.145	1.145	1.145	1.145	1.145

Post-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	2.32	2.32	2.32	2.32	2.32
Rational Coefficient (0-1)	0.55	0.55	0.55	0.55	0.55
Non DCIA Curve Number	85.30	85.30	85.30	85.30	85.30
DCIA Percent (0-100)	57.25	57.25	57.25	57.25	57.25
Wet Pond Area (ac)	0.00	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	6.101	6.101	6.101	6.101	6.101
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	9.404	9.404	9.404	9.404	9.404
Phosphorus Loading (kg/yr)	1.301	1.301	1.301	1.301	1.301

Catchment Number: 1 Name: Basin 1 - 1N

Project: Basin 1
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	32.000
Swale Bottom Width - **B** (ft)	24.000
Swale Length - **L** (ft)	670.000
Average Impervious Length (ft)	1,556.000
Average Impervious Width (ft)	33.000

Average Pervious Width (ft)	32.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.322
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.32
Contributing Area (acres)	2.320
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

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

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.714
TN Mass Load (kg/yr)	7.548
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	1.045
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 9.40 kg/yr
P: 1.30 kg/yr

→

Treatment
N: 80 %
P: 80 %

→

Surface Discharge
N: 1.86 kg/yr
P: 0.26 kg/yr

↓

Mass Reduction
N: 7.55 kg/yr
P: 1.04 kg/yr

Catchment Number: 2 Name: Basin 1 - 2N

Project: Basin 1
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	867.000
Average Impervious Length (ft)	1,556.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	32.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.322
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.32
Contributing Area (acres)	2.320
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5

Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	56
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	56

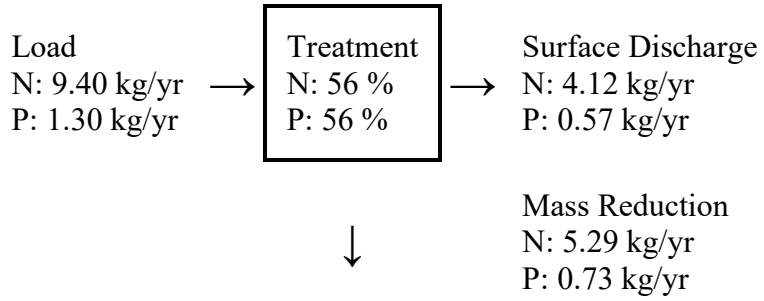
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.379
TN Mass Load (kg/yr)	5.286
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.732
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 3 Name: Basin 1 - 1SA

Project: Basin 1
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	650.000
Average Impervious Length (ft)	1,521.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	33.500
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.322
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.32
Contributing Area (acres)	2.320
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	50
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	50

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.292
TN Mass Load (kg/yr)	4.702
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.651
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 9.40 kg/yr
P: 1.30 kg/yr

→

Treatment
N: 50 %
P: 50 %

→

Surface Discharge
N: 4.70 kg/yr
P: 0.65 kg/yr

↓

Mass Reduction
N: 4.70 kg/yr
P: 0.65 kg/yr

Catchment Number: 4 Name: Basin 1 - 1SB

Project: Basin 1
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	15.000
Swale Bottom Width - **B** (ft)	7.000
Swale Length - **L** (ft)	650.000
Average Impervious Length (ft)	1,521.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	33.500
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000

Runoff Area (acres)	2.322
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.32
Contributing Area (acres)	2.320
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	56
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	56

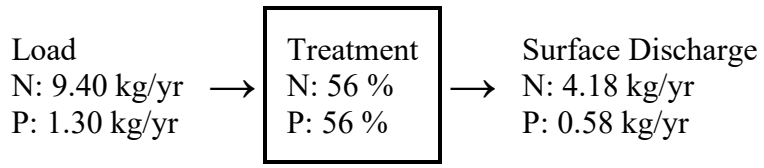
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.370
TN Mass Load (kg/yr)	5.228
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.724
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



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Mass Reduction
N: 5.23 kg/yr
P: 0.72 kg/yr

Catchment Number: 5 Name: Basin 1 - 2S

Project: Basin 1
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	25.000
Swale Bottom Width - **B** (ft)	17.000
Swale Length - **L** (ft)	1,280.000
Average Impervious Length (ft)	1,521.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	33.500
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.322
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.32
Contributing Area (acres)	2.320
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	84
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	84

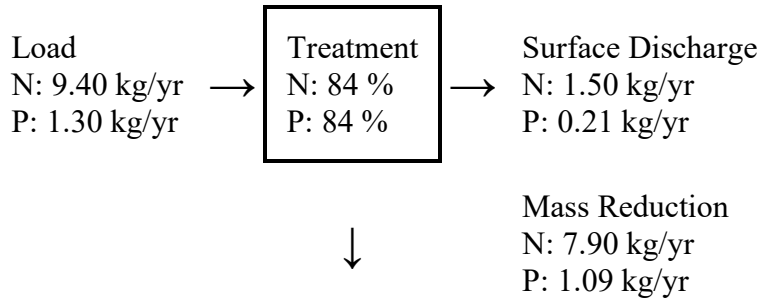
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.766
TN Mass Load (kg/yr)	7.899
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	1.093
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Basin 2 Swales

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	1N	2N	3N	1SA	1SB	2S	3S	4S	5S
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Rational Coefficient (0-1)	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
Non DCIA Curve Number	81.17	81.17	81.17	81.17	81.17	81.17	81.17	81.17	81.17
DCIA Percent (0-100)	36.20	36.20	36.20	36.20	36.20	36.20	36.20	36.20	36.20
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250	1.250	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	3.424	3.424	3.424	3.424	3.424	3.424	3.424	3.424	3.424
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Nitrogen Loading (kg/yr)	5.278	5.278	5.278	5.278	5.278	5.278	5.278	5.278	5.278
Phosphorus Loading (kg/yr)	0.730	0.730	0.730	0.730	0.730	0.730	0.730	0.730	0.730

Post-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80	1.80
Rational Coefficient (0-1)	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57	0.57
Non DCIA Curve Number	88.11	88.11	88.11	88.11	88.11	88.11	88.11	88.11	88.11
DCIA Percent (0-100)	57.10	57.10	57.10	57.10	57.10	57.10	57.10	57.10	57.10
Wet Pond Area (ac)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250	1.250	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	4.901	4.901	4.901	4.901	4.901	4.901	4.901	4.901	4.901
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	7.553	7.553	7.553	7.553	7.553	7.553	7.553	7.553	7.553
Phosphorus Loading (kg/yr)	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045	1.045

Catchment Number: 1 Name: 1N

Project: Basin 2
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	20.000
Swale Bottom Width - **B** (ft)	12.000
Swale Length - **L** (ft)	1,586.000
Average Impervious Length (ft)	1,400.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	82
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	82

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.395
TN Mass Load (kg/yr)	6.185
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.856
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 7.55 kg/yr
P: 1.05 kg/yr

→

Treatment
N: 82 %
P: 82 %

→

Surface Discharge
N: 1.37 kg/yr
P: 0.19 kg/yr

↓

Mass Reduction
N: 6.19 kg/yr
P: 0.86 kg/yr

Catchment Number: 2 Name: 2N

Project: Basin 2
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	40.000
Swale Bottom Width - **B** (ft)	32.000
Swale Length - **L** (ft)	671.000
Average Impervious Length (ft)	1,074.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	40.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000

Runoff Area (acres)	1.800
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	88
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	88

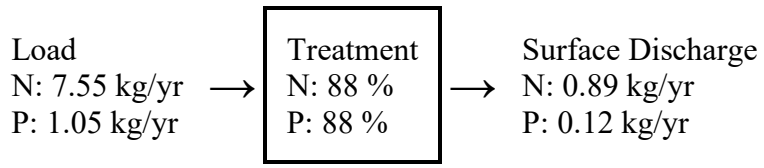
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.465
TN Mass Load (kg/yr)	6.664
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.922
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



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Mass Reduction
N: 6.66 kg/yr
P: 0.92 kg/yr

Catchment Number: 3 Name: 3N

Project: Basin 2
Date: 12/15/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	1,415.000
Average Impervious Length (ft)	1,400.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	67
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	67

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.227
TN Mass Load (kg/yr)	6.083
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.842
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 7.55 kg/yr
P: 1.05 kg/yr

→

Treatment
N: 67 %
P: 67 %

→

Surface Discharge
N: 2.50 kg/yr
P: 0.35 kg/yr

↓

Mass Reduction
N: 5.05 kg/yr
P: 0.70 kg/yr

Catchment Number: 4 Name: 1SA

Project: Basin 2
Date: 12/17/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	40.000
Swale Bottom Width - **B** (ft)	32.000
Swale Length - **L** (ft)	970.000
Average Impervious Length (ft)	1,074.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	40.000
Swale Slope (foot drop/foot length) - **S**	0.001

Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	91
Required TP Treatment Efficiency (%)	80
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)	1.500
TN Mass Load (kg/yr)	6.896
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.954
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 7.55 kg/yr
P: 1.05 kg/yr

→

Treatment
N: 91 %
P: 91 %

→

Surface Discharge
N: 0.66 kg/yr
P: 0.09 kg/yr

↓

Mass Reduction
N: 6.90 kg/yr
P: 0.95 kg/yr

Catchment Number: 5 Name: 1SB

Project: Basin 2
Date: 12/15/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	567.000
Average Impervious Length (ft)	1,400.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	47
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	47

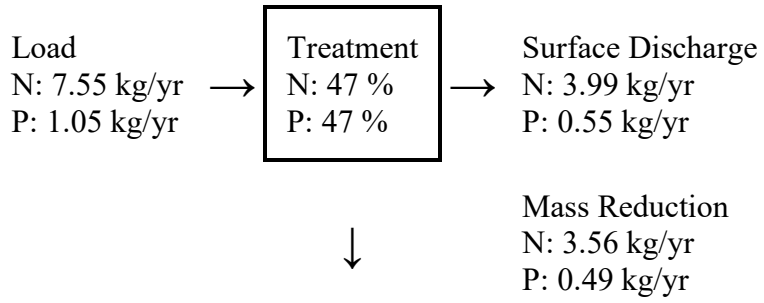
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.006
TN Mass Load (kg/yr)	4.843
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.670
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 6 Name: 2S

Project: Basin 2
Date: 12/17/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	25.000
Swale Bottom Width - **B** (ft)	17.000
Swale Length - **L** (ft)	180.000
Average Impervious Length (ft)	1,352.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	25.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	1

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	44
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	44

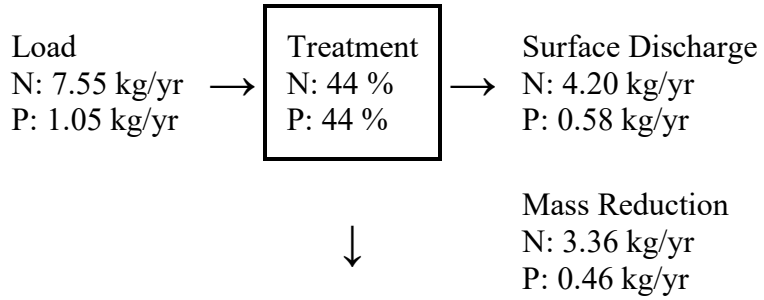
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.976
TN Mass Load (kg/yr)	3.357
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.465
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 7 Name: 3S

Project: Basin 2
Date: 12/15/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	701.000
Average Impervious Length (ft)	1,400.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800

Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	52
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	52

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.059
TN Mass Load (kg/yr)	3.920
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.543
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load		Treatment		Surface Discharge
N: 7.55 kg/yr	→	N: 52 %	→	N: 3.63 kg/yr
P: 1.05 kg/yr		P: 52 %		P: 0.50 kg/yr

↓

Mass Reduction
N: 3.92 kg/yr
P: 0.54 kg/yr

Catchment Number: 8 Name: 4S

Project: Basin 2
Date: 12/15/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	18.000
Swale Bottom Width - **B** (ft)	10.000
Swale Length - **L** (ft)	120.000
Average Impervious Length (ft)	1,400.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	1

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	23
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	23

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.738
TN Mass Load (kg/yr)	2.033
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.281
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 7.55 kg/yr
P: 1.05 kg/yr

→

Treatment
N: 23 %
P: 23 %

→

Surface Discharge
N: 5.81 kg/yr
P: 0.80 kg/yr

↓

Mass Reduction
N: 1.75 kg/yr
P: 0.24 kg/yr

Catchment Number: 9 Name: 5S

Project: Basin 2
Date: 12/15/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	677.000
Average Impervious Length (ft)	1,400.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500

Length of Berm Upstream of Crest - L_b	0.000
Runoff Area (acres)	1.800
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.80
Contributing Area (acres)	1.800
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	51
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	51

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.050
TN Mass Load (kg/yr)	5.159
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.714
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 7.55 kg/yr
P: 1.05 kg/yr

→

Treatment
N: 51 %
P: 51 %

→

Surface Discharge
N: 3.69 kg/yr
P: 0.51 kg/yr

↓

Mass Reduction
N: 3.86 kg/yr
P: 0.53 kg/yr

Basin 3 Swales

Complete Report (not including cost) Ver 4.3.5

Project: Basin 3
Date: 11/3/2025 5:23:15 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 3 - 1N	Basin 3 - 2N	Basin 3 - 1SA	Basin 3 - 1SB	Basin 3 - 2S
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	57.00	57.00	57.00	57.00	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	2.45	2.45	2.45	2.45	2.45
Rational Coefficient (0-1)	0.40	0.40	0.40	0.40	0.40
Non DCIA Curve Number	78.74	78.74	78.74	78.74	78.74
DCIA Percent (0-100)	37.70	37.70	37.70	37.70	37.70
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	4.614	4.614	4.614	4.614	4.614
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000	0.000

Groundwater P (kg/yr)	0.000	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	7.112	7.112	7.112	7.112	7.112
Phosphorus Loading (kg/yr)	0.984	0.984	0.984	0.984	0.984

Post-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	2.45	2.45	2.45	2.45	2.45
Rational Coefficient (0-1)	0.52	0.52	0.52	0.52	0.52
Non DCIA Curve Number	85.65	85.65	85.65	85.65	85.65
DCIA Percent (0-100)	50.70	50.70	50.70	50.70	50.70
Wet Pond Area (ac)	0.00	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	6.032	6.032	6.032	6.032	6.032
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	9.297	9.297	9.297	9.297	9.297
Phosphorus Loading (kg/yr)	1.287	1.287	1.287	1.287	1.287

Catchment Number: 1 Name: Basin 3 - 1N

Project: Basin 3
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft) 13.000

Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	794.000
Average Impervious Length (ft)	1,903.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.446
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.45
Contributing Area (acres)	2.450
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	51
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	51

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.291
TN Mass Load (kg/yr)	4.740
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.656

TP Concentration (mg/L) 0.000

Load Diagram for Swale (stand-alone)

Load
N: 9.30 kg/yr
P: 1.29 kg/yr

→

Treatment
N: 51 %
P: 51 %

→

Surface Discharge
N: 4.56 kg/yr
P: 0.63 kg/yr

↓

Mass Reduction
N: 4.74 kg/yr
P: 0.66 kg/yr

Catchment Number: 2 Name: Basin 3 - 2N

Project: Basin 3
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	20.000
Swale Bottom Width - **B** (ft)	12.000
Swale Length - **L** (ft)	360.000
Average Impervious Length (ft)	1,903.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.446
Number of Swale Blocks	1

Watershed Characteristics

Catchment Area (acres)	2.45
Contributing Area (acres)	2.450
Non-DCIA Curve Number	85.65

DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	48
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	48

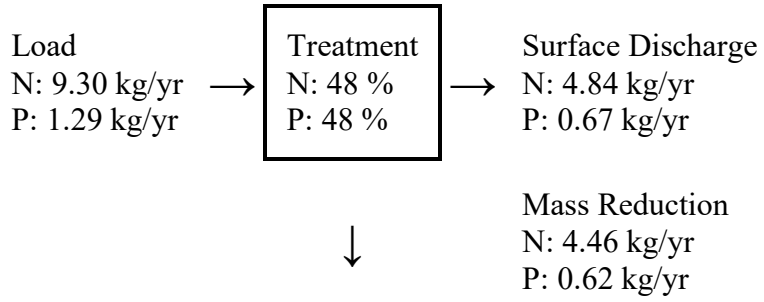
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.250
TN Mass Load (kg/yr)	4.461
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.617
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 3 Name: Basin 3 - 1SA

Project: Basin 3
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	18.000
Swale Bottom Width - **B** (ft)	10.000
Swale Length - **L** (ft)	821.000
Average Impervious Length (ft)	1,602.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	33.500
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.446
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.45
Contributing Area (acres)	2.450
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	68
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	68

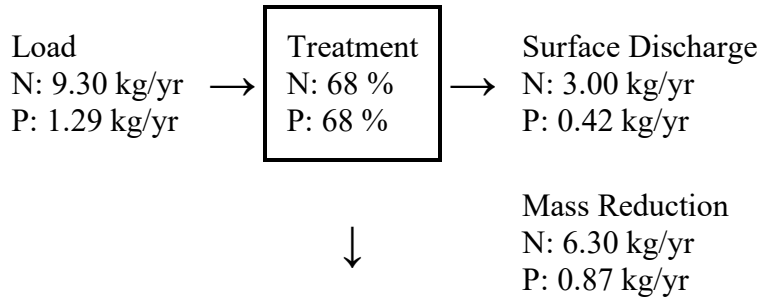
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.522
TN Mass Load (kg/yr)	6.297
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.872
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 4 Name: Basin 3 - 1SB

Project: Basin 3
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	15.000
Swale Bottom Width - **B** (ft)	7.000
Swale Length - **L** (ft)	157.000
Average Impervious Length (ft)	1,602.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	33.500
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000

Runoff Area (acres)	2.446
Number of Swale Blocks	1

Watershed Characteristics

Catchment Area (acres)	2.45
Contributing Area (acres)	2.450
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	21
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	21

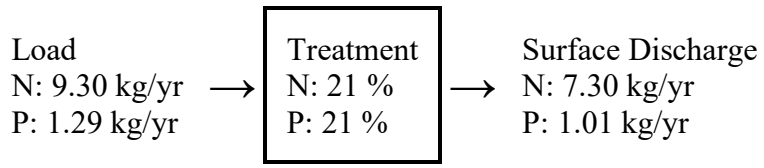
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.885
TN Mass Load (kg/yr)	1.998
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.277
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



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Mass Reduction
N: 2.00 kg/yr
P: 0.28 kg/yr

Catchment Number: 5 Name: Basin 3 - 2S

Project: Basin 3
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	24.000
Swale Bottom Width - **B** (ft)	16.000
Swale Length - **L** (ft)	669.000
Average Impervious Length (ft)	1,602.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	33.500
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	2.446
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	2.45
Contributing Area (acres)	2.450
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	73
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	73

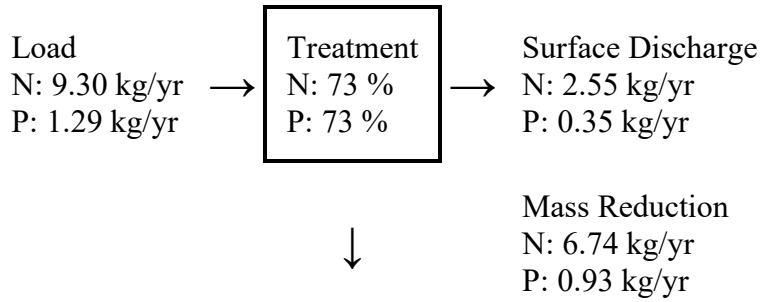
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.588
TN Mass Load (kg/yr)	6.745
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.933
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Basin 4 Swales

Complete Report (not including cost) Ver 4.3.5

Project: Basin 4
Date: 11/3/2025 5:25:49 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 4 - 1N	Basin 4 - 2N	Basin 4 - 1SA	Basin 4 - 1SB
Rainfall Zone	Florida Zone 5	Florida Zone 5	Florida Zone 5	Florida Zone 5
Annual Mean Rainfall	57.00	57.00	57.00	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	1.63	1.63	1.63	1.63
Rational Coefficient (0-1)	0.36	0.36	0.36	0.36
Non DCIA Curve Number	78.87	78.87	78.87	78.87
DCIA Percent (0-100)	32.70	32.70	32.70	32.70
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	2.821	2.821	2.821	2.821
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	4.347	4.347	4.347	4.347
Phosphorus Loading (kg/yr)	0.602	0.602	0.602	0.602

Post-Condition Landuse Information

Landuse	User Defined Values	User Defined Values	User Defined Values	User Defined Values
Area (acres)	1.63	1.63	1.63	1.63
Rational Coefficient (0-1)	0.55	0.55	0.55	0.55
Non DCIA Curve Number	87.37	87.37	87.37	87.37
DCIA Percent (0-100)	54.60	54.60	54.60	54.60
Wet Pond Area (ac)	0.00	0.00	0.00	0.00
Nitrogen EMC (mg/l)	1.250	1.250	1.250	1.250
Phosphorus EMC (mg/l)	0.173	0.173	0.173	0.173
Runoff Volume (ac-ft/yr)	4.288	4.288	4.288	4.288
Groundwater N (kg/yr)	0.000	0.000	0.000	0.000
Groundwater P (kg/yr)	0.000	0.000	0.000	0.000
Nitrogen Loading (kg/yr)	6.609	6.609	6.609	6.609
Phosphorus Loading (kg/yr)	0.915	0.915	0.915	0.915

Catchment Number: 1 Name: Basin 4 - 1N

Project: Basin 4
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	13.000
Swale Bottom Width - **B** (ft)	5.000
Swale Length - **L** (ft)	537.000
Average Impervious Length (ft)	1,268.000
Average Impervious Width (ft)	33.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000

Runoff Area (acres)	1.630
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.63
Contributing Area (acres)	1.630
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	49
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	49

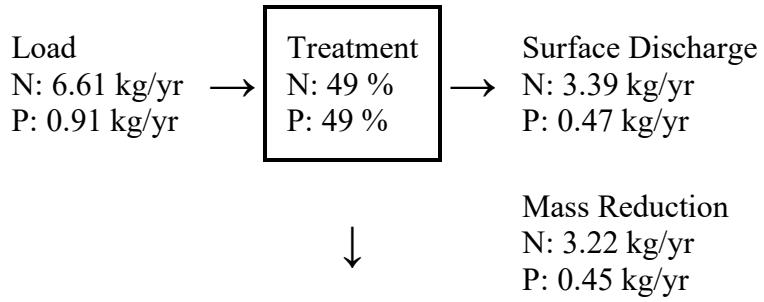
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.896
TN Mass Load (kg/yr)	3.220
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.446
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 2 Name: Basin 4 - 2N

Project: Basin 4
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	23.000
Swale Bottom Width - **B** (ft)	15.000
Swale Length - **L** (ft)	370.000
Average Impervious Length (ft)	1,142.000
Average Impervious Width (ft)	39.000
Average Pervious Width (ft)	23.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.625
Number of Swale Blocks	1

Watershed Characteristics

Catchment Area (acres)	1.63
Contributing Area (acres)	1.630
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	61
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	61

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.012
TN Mass Load (kg/yr)	4.003
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.554
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 6.61 kg/yr
P: 0.91 kg/yr

→

Treatment
N: 61 %
P: 61 %

→

Surface Discharge
N: 2.61 kg/yr
P: 0.36 kg/yr

↓

Mass Reduction
N: 4.00 kg/yr
P: 0.55 kg/yr

Catchment Number: 3 Name: Basin 4 - 1SA

Project: Basin 4
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	20.000
Swale Bottom Width - **B** (ft)	12.000
Swale Length - **L** (ft)	250.000
Average Impervious Length (ft)	1,268.000
Average Impervious Width (ft)	36.000
Average Pervious Width (ft)	20.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.630
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.63
Contributing Area (acres)	1.630
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	45
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	45

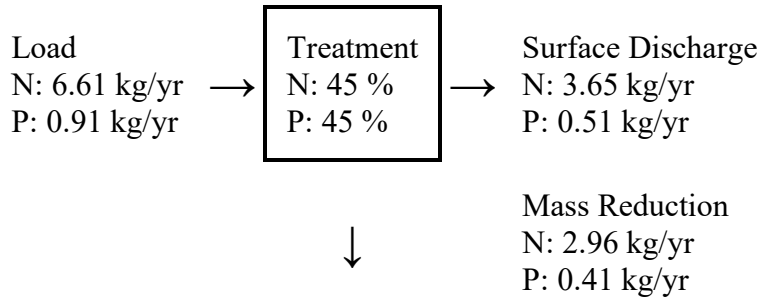
Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.857
TN Mass Load (kg/yr)	2.957
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.409
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)



Catchment Number: 4 Name: Basin 4 - 1SB

Project: Basin 4
Date: 12/12/2025

Swale Design

Swale Top Width for Flood Conditions - **W** (ft)	18.000
Swale Bottom Width - **B** (ft)	10.000
Swale Length - **L** (ft)	795.000
Average Impervious Length (ft)	1,093.000
Average Impervious Width (ft)	36.000
Average Pervious Width (ft)	29.000
Swale Slope (foot drop/foot length) - **S**	0.001
Mannings N	0.060
Soil Infiltration Rate (in/hr)	3.500
Side Slope of Swale horizontal/vertical - **Z**	4.000
Average Height of Swale Block - **H**	0.500
Length of Berm Upstream of Crest - $\mathbf{L_b}$	0.000
Runoff Area (acres)	1.631
Number of Swale Blocks	2

Watershed Characteristics

Catchment Area (acres)	1.63
Contributing Area (acres)	1.630
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	72
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	72

Media Mix Information

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

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	1.121
TN Mass Load (kg/yr)	4.741
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.656
TP Concentration (mg/L)	0.000

Load Diagram for Swale (stand-alone)

Load
N: 6.61 kg/yr
P: 0.91 kg/yr

→

Treatment
N: 72 %
P: 72 %

→

Surface Discharge
N: 1.87 kg/yr
P: 0.26 kg/yr

↓

Mass Reduction
N: 4.74 kg/yr
P: 0.66 kg/yr

Basin 1 Exfiltration Trench

Complete Report (not including cost) Ver 4.3.5

Project: Basin 1
Date: 9/18/2025 1:13:48 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 1
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	12.90
Rational Coefficient (0-1)	0.49
Non DCIA Curve Number	84.00
DCIA Percent (0-100)	47.27
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	29.841
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	45.992
Phosphorus Loading (kg/yr)	6.365

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	12.90
Rational Coefficient (0-1)	0.55
Non DCIA Curve Number	85.30
DCIA Percent (0-100)	57.25
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173

Runoff Volume (ac-ft/yr)	33.926
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	52.289
Phosphorus Loading (kg/yr)	7.237

Catchment Number: 1 Name: Basin 1

Project: Basin 1
Date: 9/18/2025

Exfiltration Trench Design

Pipe Span (in)	24.0
Pipe Rise (in)	24.0
Pipe Length (ft)	4,480.0
Trench Width (ft)	8.0
Trench Depth (ft)	4.0
Trench Length (ft)	4,480.0
Aggregate Void %	0.40
Storage Volume (Ac-ft)	1.51
Retention Depth (in over CA)	1.405

Watershed Characteristics

Catchment Area (acres)	12.90
Contributing Area (acres)	12.900
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	77
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	77

Media Mix Information

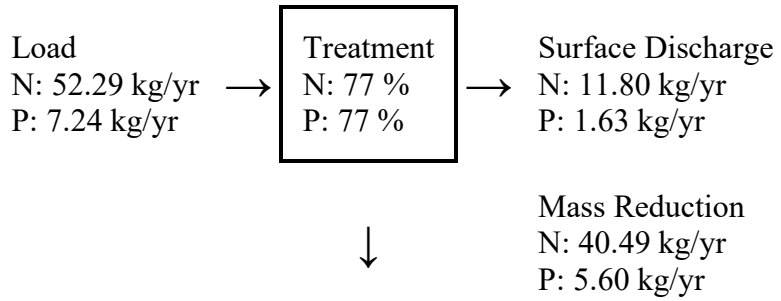
Type of Media Mix	Not Specified

Media N Reduction (%)	
Media P Reduction (%)	

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	0.000
TN Mass Load (kg/yr)	40.491
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	5.604
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



Basin 2 Exfiltration Trench

Complete Report (not including cost) Ver 4.3.5

Project: Basin 2
Date: 11/4/2025 3:56:08 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 2

Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	21.82
Rational Coefficient (0-1)	0.40
Non DCIA Curve Number	81.17
DCIA Percent (0-100)	36.20
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	41.512
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	63.981
Phosphorus Loading (kg/yr)	8.855

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	21.82
Rational Coefficient (0-1)	0.57
Non DCIA Curve Number	88.11
DCIA Percent (0-100)	57.10
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	59.408
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	91.563
Phosphorus Loading (kg/yr)	12.672

Catchment Number: 1 Name: Basin 2

Project: Basin 2
Date: 11/4/2025

Exfiltration Trench Design

Pipe Span (in)	24.0

Pipe Rise (in)	24.0
Pipe Length (ft)	7,420.0
Trench Width (ft)	8.0
Trench Depth (ft)	4.0
Trench Length (ft)	7,420.0
Aggregate Void %	0.40
Storage Volume (Ac-ft)	2.50
Retention Depth (in over CA)	1.376

Watershed Characteristics

Catchment Area (acres)	21.82
Contributing Area (acres)	21.820
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	76
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	76

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)	69.519
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	9.621
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)

Load
N: 91.56 kg/yr
P: 12.67 kg/yr

→

Treatment
N: 76 %
P: 76 %

→

Surface Discharge
N: 22.04 kg/yr
P: 3.05 kg/yr

↓

Mass Reduction
N: 69.52 kg/yr
P: 9.62 kg/yr

Basin 3 Exfiltration Trench

Complete Report (not including cost) Ver 4.3.5

Project: Basin 3
Date: 9/18/2025 1:23:48 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 3
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	16.58
Rational Coefficient (0-1)	0.40
Non DCIA Curve Number	78.74
DCIA Percent (0-100)	37.70
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	31.227
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	48.128
Phosphorus Loading (kg/yr)	6.661

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	16.58
Rational Coefficient (0-1)	0.52
Non DCIA Curve Number	85.65
DCIA Percent (0-100)	50.70
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	40.822
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	62.916
Phosphorus Loading (kg/yr)	8.708

Catchment Number: 1 Name: Basin 3

Project: Basin 3
Date: 9/18/2025

Exfiltration Trench Design

Pipe Span (in)	24.0
Pipe Rise (in)	24.0
Pipe Length (ft)	8,680.0
Trench Width (ft)	8.0
Trench Depth (ft)	3.0
Trench Length (ft)	8,680.0
Aggregate Void %	0.40
Storage Volume (Ac-ft)	2.29
Retention Depth (in over CA)	1.656

Watershed Characteristics

Catchment Area (acres)	16.58
Contributing Area (acres)	16.580
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	81
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	81

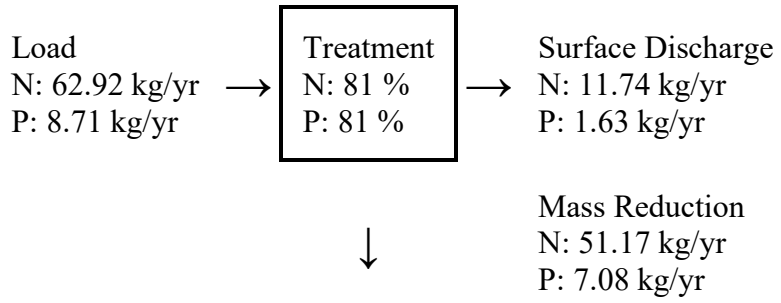
Media Mix Information

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)	51.175
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	7.083
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



Basin 4 Exfiltration Trench

Complete Report (not including cost) Ver 4.3.5

Project: Basin 4
Date: 12/11/2025 12:58:33 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 4
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	15.56
Rational Coefficient (0-1)	0.36
Non DCIA Curve Number	78.87
DCIA Percent (0-100)	32.70
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	26.925
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	41.498
Phosphorus Loading (kg/yr)	5.743

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	15.56
Rational Coefficient (0-1)	0.55
Non DCIA Curve Number	87.37
DCIA Percent (0-100)	54.60
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250

Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	40.932
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	63.086
Phosphorus Loading (kg/yr)	8.731

Catchment Number: 1 Name: Basin 4

Project: Basin 4
Date: 12/11/2025

Exfiltration Trench Design

Pipe Span (in)	24.0
Pipe Rise (in)	24.0
Pipe Length (ft)	2,800.0
Trench Width (ft)	8.0
Trench Depth (ft)	3.0
Trench Length (ft)	2,800.0
Aggregate Void %	0.40
Storage Volume (Ac-ft)	0.74
Retention Depth (in over CA)	0.569

Watershed Characteristics

Catchment Area (acres)	15.56
Contributing Area (acres)	15.560
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	80
Provided TN Treatment Efficiency (%)	52
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	52

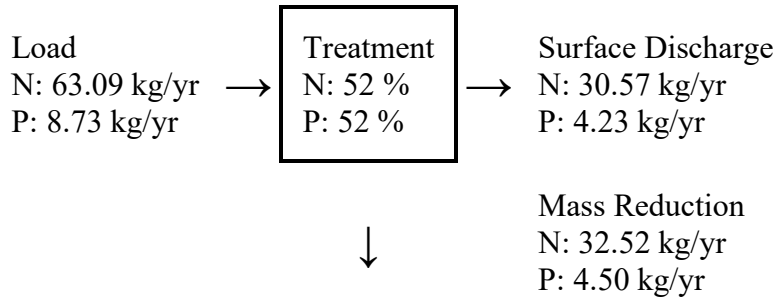
Media Mix Information

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)	32.517
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	4.500
TP Concentration (mg/L)	0.000

Load Diagram for Exfiltration Trench (stand-alone)



Basin 1 Wet Pond

Complete Report (not including cost) Ver 4.3.5

Project: Basin 1
Date: 9/18/2025 1:32:50 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 1
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	12.90
Rational Coefficient (0-1)	0.49
Non DCIA Curve Number	84.00
DCIA Percent (0-100)	47.27
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	29.841
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	45.992
Phosphorus Loading (kg/yr)	6.365

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	12.90
Rational Coefficient (0-1)	0.55
Non DCIA Curve Number	85.30
DCIA Percent (0-100)	57.25
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173

Runoff Volume (ac-ft/yr)	33.926
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	52.289
Phosphorus Loading (kg/yr)	7.237

Catchment Number: 1 Name: Basin 1

Project: Basin 1
Date: 9/18/2025

Wet Detention Design

Permanent Pool Volume (ac-ft)	2.850
Permanent Pool Volume (ac-ft) for 31 days residence	2.881
Annual Residence Time (days)	31
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	12.90
Contributing Area (acres)	12.900
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	38
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)	0.000
TN Mass Load (kg/yr)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)

Load
N: 52.29 kg/yr
P: 7.24 kg/yr

→

Treatment
N: 38 %
P: 64 %

→

Surface Discharge
N: 32.27 kg/yr
P: 2.57 kg/yr

↓

Mass Reduction
N: 20.02 kg/yr
P: 4.66 kg/yr

Project: Basin 1
Date: 12/12/2025

Surface Discharge Filtration Design

Treatment Depth (in)	2.580
Hydraulic Capture Efficiency (%)	90
Media Type	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Watershed Characteristics

Catchment Area (acres)	12.90
Contributing Area (acres)	12.900
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%) 55

Provided TN Treatment Efficiency (%)	30
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	73

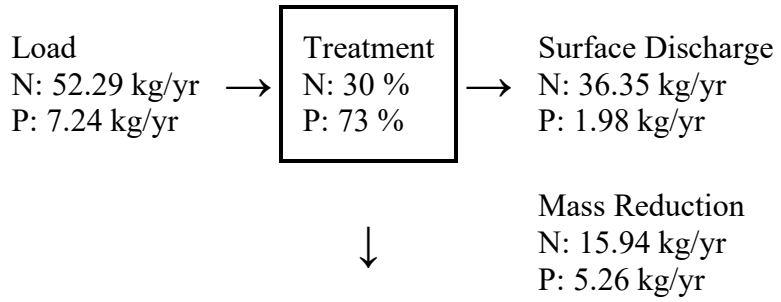
Media Mix Information

Type of Media Mix	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	9.913
TN Mass Load (kg/yr)	36.347
TN Concentration (mg/L)	0.969
TP Mass Load (kg/yr)	1.981
TP Concentration (mg/L)	0.053

Load Diagram for Surface Discharge Filtration (stand-alone)



Basin 2 Wet Pond

Complete Report (not including cost) Ver 4.3.5

Project: Basin 2
Date: 9/18/2025 1:34:04 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 2
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	21.82
Rational Coefficient (0-1)	0.40
Non DCIA Curve Number	81.17
DCIA Percent (0-100)	36.20
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	41.512
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	63.981
Phosphorus Loading (kg/yr)	8.855

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	21.82
Rational Coefficient (0-1)	0.57
Non DCIA Curve Number	88.11
DCIA Percent (0-100)	57.10
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173

Runoff Volume (ac-ft/yr)	59.408
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	91.563
Phosphorus Loading (kg/yr)	12.672

Catchment Number: 1 Name: Basin 2

Project: Basin 2
Date: 9/18/2025

Wet Detention Design

Permanent Pool Volume (ac-ft)	30.260
Permanent Pool Volume (ac-ft) for 31 days residence	5.046
Annual Residence Time (days)	186
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	21.82
Contributing Area (acres)	21.820
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	43
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	79

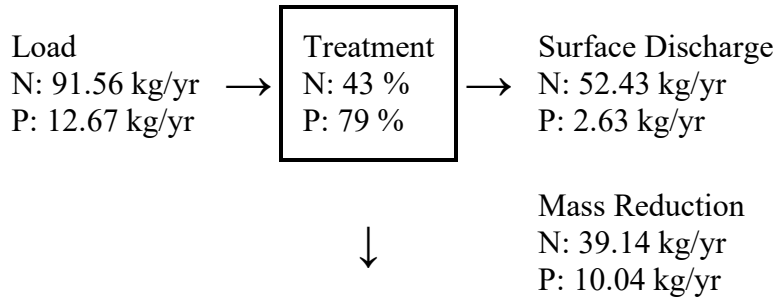
Media Mix Information

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)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)



Project: Basin 2
Date: 12/12/2025

Surface Discharge Filtration Design

Treatment Depth (in)	2.570
Hydraulic Capture Efficiency (%)	89
Media Type	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Watershed Characteristics

Catchment Area (acres)	21.82
Contributing Area (acres)	21.820
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	30
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	72

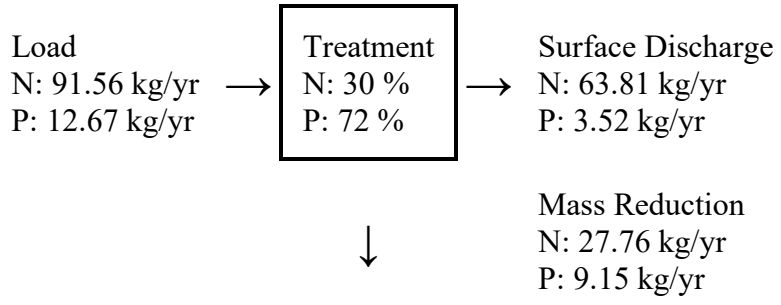
Media Mix Information

Type of Media Mix	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	17.260
TN Mass Load (kg/yr)	63.808
TN Concentration (mg/L)	0.977
TP Mass Load (kg/yr)	3.521
TP Concentration (mg/L)	0.054

Load Diagram for Surface Discharge Filtration (stand-alone)



Basin 3 Wet Pond

Complete Report (not including cost) Ver 4.3.5

Project: Basin 3
Date: 9/18/2025 1:34:43 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 3
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	16.58
Rational Coefficient (0-1)	0.40
Non DCIA Curve Number	78.74
DCIA Percent (0-100)	37.70
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	31.227
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	48.128
Phosphorus Loading (kg/yr)	6.661

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	16.58
Rational Coefficient (0-1)	0.52
Non DCIA Curve Number	85.65
DCIA Percent (0-100)	50.70
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173

Runoff Volume (ac-ft/yr)	40.822
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	62.916
Phosphorus Loading (kg/yr)	8.708

Catchment Number: 1 Name: Basin 3

Project: Basin 3
Date: 9/18/2025

Wet Detention Design

Permanent Pool Volume (ac-ft)	14.430
Permanent Pool Volume (ac-ft) for 31 days residence	3.467
Annual Residence Time (days)	129
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	16.58
Contributing Area (acres)	16.580
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	42
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	76

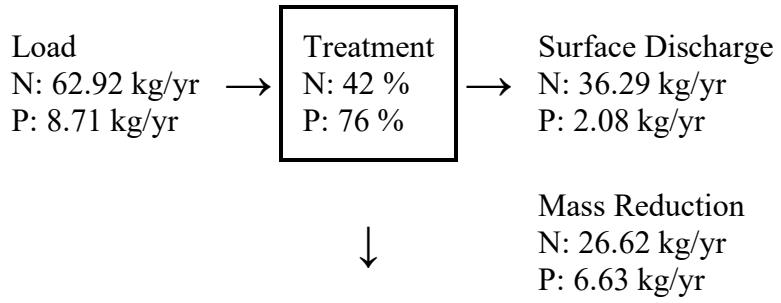
Media Mix Information

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)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)



Project: Basin 3
Date: 12/15/2025

Surface Discharge Filtration Design

Treatment Depth (in)	2.280
Hydraulic Capture Efficiency (%)	88
Media Type	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Watershed Characteristics

Catchment Area (acres)	16.58
Contributing Area (acres)	16.580
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	30
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	71

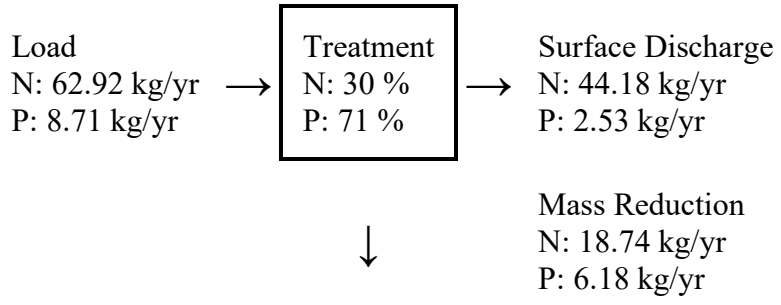
Media Mix Information

Type of Media Mix	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	11.651
TN Mass Load (kg/yr)	44.180
TN Concentration (mg/L)	1.002
TP Mass Load (kg/yr)	2.530
TP Concentration (mg/L)	0.057

Load Diagram for Surface Discharge Filtration (stand-alone)



Basin 4 Wet Pond

Complete Report (not including cost) Ver 4.3.5

Project: Basin 4
Date: 9/18/2025 1:35:17 PM

Site and Catchment Information

Analysis: Specified Removal Efficiency

Catchment Name	Basin 4
Rainfall Zone	Florida Zone 5
Annual Mean Rainfall	57.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	15.56
Rational Coefficient (0-1)	0.36
Non DCIA Curve Number	78.85
DCIA Percent (0-100)	32.70
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173
Runoff Volume (ac-ft/yr)	26.918
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	41.487
Phosphorus Loading (kg/yr)	5.742

Post-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	15.56
Rational Coefficient (0-1)	0.55
Non DCIA Curve Number	87.37
DCIA Percent (0-100)	54.60
Wet Pond Area (ac)	0.00
Nitrogen EMC (mg/l)	1.250
Phosphorus EMC (mg/l)	0.173

Runoff Volume (ac-ft/yr)	40.932
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	63.086
Phosphorus Loading (kg/yr)	8.731

Catchment Number: 1 Name: Basin 4

Project: Basin 4
Date: 9/18/2025

Wet Detention Design

Permanent Pool Volume (ac-ft)	15.500
Permanent Pool Volume (ac-ft) for 31 days residence	3.476
Annual Residence Time (days)	138
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	15.56
Contributing Area (acres)	15.560
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	42
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	77

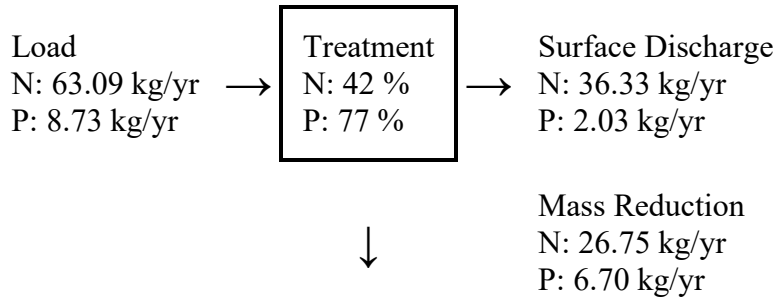
Media Mix Information

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)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)



Project: Basin 4
Date: 12/12/2025

Surface Discharge Filtration Design

Treatment Depth (in)	2.460
Hydraulic Capture Efficiency (%)	89
Media Type	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Watershed Characteristics

Catchment Area (acres)	15.56
Contributing Area (acres)	15.560
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 5
Rainfall (in)	57.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	55
Provided TN Treatment Efficiency (%)	30
Required TP Treatment Efficiency (%)	80
Provided TP Treatment Efficiency (%)	72

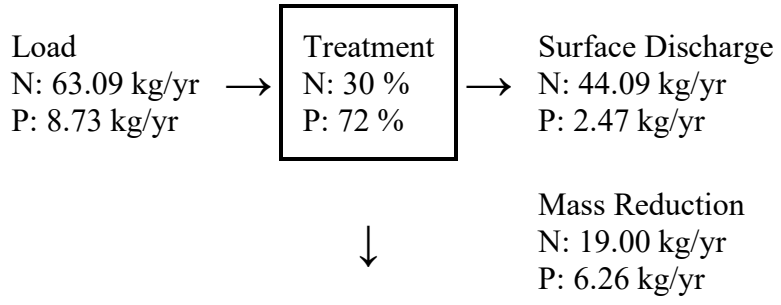
Media Mix Information

Type of Media Mix	User Defined
Media N Reduction (%)	34
Media P Reduction (%)	81

Groundwater Discharge (Stand-Alone)

Treatment Rate (MG/yr)	11.815
TN Mass Load (kg/yr)	44.087
TN Concentration (mg/L)	0.986
TP Mass Load (kg/yr)	2.467
TP Concentration (mg/L)	0.055

Load Diagram for Surface Discharge Filtration (stand-alone)



Kimley»Horn

Appendix D

Cove Road Project Development and Environment (PD&E) Study – Pond Siting Report

STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION

TECHNICAL REPORT COVERSHEET

650-050-38
ENVIRONMENTAL
MANAGEMENT
08/22

FINAL POND SITING REPORT

Florida Department of Transportation

District Four

Cove Road Project Development and Environment (PD&E) Study

Limits of Project: FROM SR 76/Kanner Highway to SR 5/US 1/Federal Highway

Martin County, Florida

Financial Management Number: 441700-1-22-02

ETDM Number: 14479

Date: December 2024

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

FINAL

POND SITING REPORT

COVE ROAD PD&E STUDY

FROM SR 76/Kanner Highway to SR 5/US 1/Federal Highway
Martin County, Florida

Financial Project ID No.: 441700-1-22-02

Prepared for:

FLORIDA DEPARTMENT OF TRANSPORTATION

Prepared by:

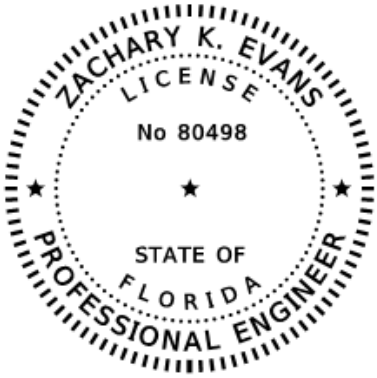
Ardurra Group, Inc.
3000 Dovera Drive
Oviedo, FL 32765

December 2024

Professional Engineer Certificate

I hereby certify that I am a registered professional engineer in the State of Florida practicing with Ardurra Group, Inc., a corporation authorized to operate as an engineering business, FEID No. 59-1782900, by the State of Florida, Department of Professional Regulation, and Board of Professional Engineers. I have reviewed or approved the evaluation, findings, opinions and conclusions as reported in this Pond Siting Report.

The Pond Siting Report includes a summary of data collection efforts and design analysis for Cove Road PD&E Study from SR 76/Kanner Highway to SR 5/US 1/Federal Highway. I acknowledge that the procedures and references used to develop the results contained in this report are standard to the professional practice of civil engineering as applied through design standards and criteria set forth by the federal, state, and local regulatory agencies as well as professional judgment and experience.



Ardurra Group, Inc.
3000 Dovera Drive, Suite 200
Oviedo, Florida 32765
Phone: (407) 971-8850
Fax: (407) 971-8955

Signature:_____

Name: **Zachary Evans, P. E.**

P.E. Number: 80498

Date: December 5th 2024

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EXECUTIVE SUMMARY

This project involves the proposed widening of Cove Road, from State Road (SR) 76/Kanner Highway to SR 5/US 1/Federal Highway in Martin County, Florida. This 3.2-mile segment of Cove Road is a two-lane, undivided, rural roadway with 12-foot-wide travel lanes. A six-foot sidewalk is located on the north side of the roadway for the entire project limits and a six-foot sidewalk is located on the south side of the roadway from Kanner Highway to Atlantic Ridge Drive and from west of Montego Cove to Federal Highway. There are no existing bike lanes or shared-use paths within the project limits. Signalized intersections within the project limits are located at Kanner Highway, Atlantic Ridge, Legacy Cove Circle/Classical Way, Willoughby Boulevard, and Federal Highway. Martin County also classifies Cove Road as a major arterial roadway.

The proposed improvements include widening Cove Road from Kanner Highway to Federal Highway from a two-lane undivided to a four-lane divided roadway with accommodations for bicyclists and pedestrians through the entire project limits. Stormwater management needs will be determined, and the addition of roadway lighting will be considered. Intersection improvements within the project limits will also be evaluated to accommodate anticipated future traffic needs.

The purpose of this Pond Siting Report is to discuss, analyze, and identify the stormwater management plan for the proposed roadway improvements based on environmental impacts, hydrology and hydraulics, and economic factors. This report will evaluate and make recommendations for proposed stormwater management facilities to provide adequate treatment and attenuation for the proposed roadway improvements.

Existing Drainage Conditions

The study area is located within the South St. Lucie and Indian River Lagoon South Coastal watersheds and traverses three WBID's; WBID 3210C (South Fork St. Lucie River (Tidal Segment), WBID 3220 (Basin 2), and WBID 3208C (Manatee Pocket). Manatee Pocket is an Outstanding Florida Water (OFW). The St. Lucie River and Estuary Basin has adopted a Basin Management Action Plan (BMAP) for nutrients and dissolved oxygen.

The existing roadway was permitted under SFWMD Permit No. 43-00642-S for an ultimate 4-lane condition. The ultimate condition was not built out and Cove Road exists in an interim condition as a 2-lane roadway. The existing permit has 5 basins along the corridor and provides treatment within swales along the roadway.

Future Drainage Conditions

The proposed stormwater management facilities analyzed consist of off-site stormwater ponds and onsite exfiltration trenches to provide water quality treatment and water quantity attenuation of the stormwater runoff in accordance with both South Florida Water Management District and Martin County criteria. The proposed project consists of four drainage basins within the study limits, combining Basins 4 and 5. The limits of Basin 1 and 2 will be shifted to shorten Basin 1 to assist with the limited stormwater treatment options for the basin. The stormwater runoff from the project limits will be collected and conveyed in closed drainage

systems consisting of curb and gutter, inlets, and pipes to the stormwater management alternatives. The treatment facilities will discharge to the existing outfall locations along the corridor. The proposed roadway will impact the existing stormwater treatment swales along the corridor. Water quality treatment and water quantity attenuation will be provided in the treatment alternatives to replace the impacted volume in the existing swales and for the proposed roadway improvements. The stormwater treatment alternatives investigated are wet detention ponds, treatment swales, and exfiltration trenches.

Summary

The proposed stormwater management facilities have been identified along the project limits. Please note that the recommendations were based on pond sizes and locations determined from preliminary data calculations, reasonable engineering judgment, and assumptions. Stormwater management sizes and configurations may change during final design as more detailed information on SHWT, wetland hydrologic information, and final roadway profile become available.

Table 1 – Pond Siting Summary

Basin Name	Treatment Name	Roadway Basin (Acres)	Pond Area (Acres)	Exfiltration Length (Feet)	Total Required TV (Acre-Feet)	Total Provided TV (Acre-Feet)	Total Required TV+Attenuation (Acre-Feet)	Total Provided TV+Attenuation (Acre-Feet)
Basin 1	Pond 1A	11.61	1.75	N/A	2.77	2.77	3.66	3.86
	Pond 1B		1.54	N/A	2.77	2.77	3.81	3.83
	Exfil. 1		1.07*	7,450	2.31	3.27	3.27	3.27
Basin 2	**Pond 2**	16.19	7.22	N/A	4.67	4.67	7.68	8.52
	Exfil. 2		N/A	17,920	3.11	5.03	5.03	5.03
Basin 3	Pond 3A	12.23	6.55	N/A	3.15	3.15	5.51	6.27
	Pond 3B		4.90	N/A	3.15	3.15	5.23	5.77
	Exfil. 3		N/A	17,100	2.10	3.53	3.53	3.53
Basin 4	**Pond 4A**	11.37	4.52	N/A	3.19	3.19	5.08	5.59
	Pond 4B		4.86	N/A	3.19	3.19	5.30	5.88
	Exfil. 4		N/A	17,100	2.13	3.53	3.53	3.53

Note: TV = Treatment Volume
Preferred alternative in bold
* Accounts for the swale area providing treatment in parallel with exfiltration

SECTION 1 INTRODUCTION

The Florida Department of Transportation (FDOT), District Four, is proposing to widen Cove Road from SR 76/Kanner Highway to SR 5/US 1/Federal Highway in Martin County, Florida. The improvements consist of widening Cove Road from two to four lanes and include accommodations for bicyclists and pedestrians. The project is split into two roadway segments. Segment 1 extends from the beginning of the study to the Hibiscus Park Ditch. Segment 2 is from the Hibiscus Park Ditch to the end of the study. There are two alternatives being investigated within Segment 1. Four alternatives are being investigated for Segment 2.

The study area is located within the South St. Lucie and Indian River Lagoon South Coastal watersheds and traverses three WBID's; WBID 3210C (South Fork St. Lucie River (Tidal Segment), WBID 3220 (Basin 2), and WBID 3208C (Manatee Pocket). Manatee Pocket is an Outstanding Florida Water (OFW). The St. Lucie River and Estuary Basin has adopted a Basin Management Action Plan (BMAP) for nutrients and dissolved oxygen.

The existing roadway was permitted under SFWMD Permit No. 43-00642-S for an ultimate 4-lane condition. The ultimate condition was not built out and Cove Road exists in an interim condition as a 2-lane roadway. The existing permit has 5 basins along the corridor and provides treatment within swales along the roadway.

The purpose of this Pond Siting Report is to discuss, analyze, and identify the stormwater management plan for the proposed roadway improvements based on environmental impacts, hydrology and hydraulics, and economic factors. This report will evaluate and make recommendations for proposed stormwater management facilities to provide adequate treatment and attenuation for the proposed roadway improvements.

SECTION 2 PROJECT DESCRIPTION

This project involves the proposed widening of Cove Road, from State Road (SR) 76/Kanner Highway to SR 5/US 1/Federal Highway in Martin County, Florida. This 3.2-mile segment of Cove Road is a two-lane, undivided, rural roadway with 12-foot-wide travel lanes. A six-foot sidewalk is located on the north side of the roadway for the entire project limits and a six-foot sidewalk is located on the south side of the roadway from Kanner Highway to Atlantic Ridge Drive and from west of Montego Cove to Federal Highway. There are no existing bike lanes or shared-use paths within the project limits. Signalized intersections within the project limits are located at Kanner Highway, Atlantic Ridge, Legacy Cove Circle/Classical Way, Willoughby Boulevard, and Federal Highway. Martin County also classifies Cove Road as a major arterial roadway. Please see **Exhibit 1** for the **Project Location Map** in **Appendix 1.**

Stormwater management needs will be determined, and the addition of roadway lighting will be considered. Intersection improvements within the project limits will also be evaluated to accommodate anticipated future traffic needs.

2.1 PURPOSE AND NEED

The primary purpose of widening Cove Road from two lanes to four lanes is to add capacity and improve the local transportation network. Additional elements that the proposed project will provide include support for economic and social demands along Cove Road, enhanced multimodal connectivity, and improved emergency evacuation. The study area for the proposed improvements includes Cove Road from Kanner Highway to Federal Highway.

2.1.1 Project Status

Within the project limits, Cove Road is located within the Martin Metropolitan Planning Area. This project is identified as Priority Project #1 within the Martin Metropolitan Planning Organization (MPO) Transportation Improvement Program (TIP) Fiscal Year (FY) 2020/21-2024/25. The project is also included within Martin MPO's Martin in Motion 2045 Long Range Transportation Plan (LRTP). This project is currently funded for a Project Development and Environment (PD&E) Study for FY 2022/23, FY 2023/24, and FY 2024/25. Project funding includes Other Federal Aid - Regular Funds. As listed in the LRTP, the estimated total project cost is $35,948,639. The segment of Cove Road from Kanner Highway to Willoughby Boulevard has an estimated construction date of 2026-2030. The segment of Cove Road from Willoughby Boulevard to Federal Highway has an estimated construction date of 2031-2035.

2.1.2 System Linkage

Cove Road is a rural undivided road connecting the cities of Stuart and Port Salerno to I-95 and other areas within unincorporated Martin County. Although Cove Road is not a designated road in the state's Strategic Intermodal System (SIS), Cove Road provides access to I-95 (through Kanner Highway), which is a part of the SIS system. The reconstruction of Cove Road will help reduce traffic along Cove Road and other local roads. The proposed improvements will provide enhanced connectivity among the local and regional road network.

2.1.3 Capacity

According to the FDOT District 4 2020 Level of Service (LOS) Update, Cove Road is currently operating at an overall Level of Service D with Annual Average Daily Traffic (AADT) of 15,500 vehicles. In the past four years, the AADT has increased by 1,500 vehicles. Additionally, according to Martin MPO's Martin in Motion 2045 LRTP, within the Cost Feasible Plan, the proposed two additional lanes along Cove Road are needed to address capacity deficiencies. According to the Volume to Capacity (V/C) Ratio Map within the LRTP, Cove Road from Kanner Highway to Federal Highway is over capacity (V/C is between 1.01 and 1.25) by 2045. Roadways are deemed deficient if the V/C ratio exceeds 0.9. Therefore, Cove Road within the project limits will experience congestion by 2045 if additional improvements are not made.

The future traffic demand is projected to increase due to population growth along Cove Road. According to the Martin County Roadway Level of Service Inventory Reports, Cove Road from Kanner Highway to Willoughby Boulevard is experiencing an average annual growth rate of 1.5%. This growth can be attributed to planned developments along Cove Road, including a residential development called Cove Royal. The AADT is expected to increase by the year 2045, triggering the need for additional lanes of traffic along Cove Road.

2.1.4 Modal Interrelationships

Cove Road includes a sidewalk along the entire north side, but intermittently along the south side of the road. Cove Road also does not provide designated bike lanes within the entire project limits. Two schools are located along the south side of Cove Road: Dr. David L. Anderson Middle School and Treasure Coast Classical Academy. According to the Martin County Bicycle and Pedestrian Safety Action Plan (2016), Cove Road at Dr. David L. Anderson Middle is a bicycle and pedestrian crash hot spot. The Martin County Bicycle and Pedestrian Safety Action Plan includes countermeasures for reducing conflicts with bicycles, pedestrians, and vehicles, which will be considered for the project improvements. Adding multimodal improvements to Cove Road within the project limits will increase safety of the local community.

2.1.5 Emergency Evacuation

Based on Martin County's Evacuation Routes Map, Cove Road is classified as an evacuation route within the entire project limits. Therefore, improvements to Cove Road, will help to improve mobility to I-95 and decrease evacuation times. Additionally, emergency response times will be decreased by the proposed improvements.

2.1 ALTERNATIVES CONSIDERED

2.1.1 Segment 1

2.1.1.1 Segment 1, Alternative 1A

Segment 1, Alternative 1A proposes to widen the roadway from a two-lane rural roadway to a four-lane urban roadway, from SR 76 (Kanner Highway) east to the Hibiscus Park Ditch, approximately 175 feet west of Avalon Drive.

The proposed four-lane urban typical section includes two 11-foot-wide travel lanes and a 7-foot-wide buffered bike lane in each direction separated by a 22-foot-wide raised median. A 6-foot-wide sidewalk is included on the north side of the roadway, and a 12-foot-wide shared-use path is included on the south side of the roadway. Please see **Exhibit 2A** for the **Typical Section** in **Appendix 1.** Stormwater runoff will be collected in an enclosed drainage system using curb and gutter, and pipes to offsite stormwater ponds. The SR 76 intersection will be signalized, and roundabouts are proposed at Lost Pine Dr / Tres Belle Cir and Ault Ave. The proposed improvements require a minimum of 122.5 feet of right-of-way and will generally fit within the existing right-of-way with the exception of minor impacts due to the proposed shared-use path.

2.1.1.2 Segment 1, Alternative 1B

Segment 1, Alternative 1B proposes to widen the roadway from a two-lane rural roadway to a four-lane urban roadway, from Kanner Highway east to the Hibiscus Park Ditch, approximately 175 feet west of Avalon Drive.

The proposed typical section is a four-lane urban typical section that includes two 11-foot-wide travel lanes in each direction of Lost Pine Dr / Tres Belle Cir and Ault Ave. Twelve-foot-wide shared-use path are included along both sides of the road. Please see **Exhibit 2B** for the **Typical Section** in **Appendix 1.** Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. The SR 76 intersection will be signalized and roundabouts are proposed at Lost Pine Dr / Tres Belle Cir and Ault Ave. The proposed improvements require a minimum of 119 feet of right-of-way and will generally fit

within the existing right-of-way with the exception of minor impacts due to the proposed shared-use path.

2.1.2 Segment 2

2.1.2.1 Segment 2, Alternative 2A
Segment 2, Alternative 2A proposes to widen the roadway from a two-lane rural roadway to a four-lane urban roadway, from the Hibiscus Park Ditch, approximately 175 feet west of Avalon Drive, to SR 5/US 1 (Federal Highway).
The proposed typical section includes two 11-foot-wide travel lanes in each direction separated by a 19.5-foot-wide raised median. The north side of the roadway will include a 7-foot-wide buffered bike lane and a 6-foot-wide sidewalk, while the south side will include a 10-foot-wide shared-use path. Please see **Exhibit 2C** for the **Typical Section** in **Appendix 1.** Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. This typical section requires a minimum of 108.5 of right-of-way and additional right-of-way will be required from the north and south sides of the roadway.

2.1.2.2 Segment 2, Alternative 2B
Segment 2, Alternative 2B proposes to widen the roadway from a two-lane rural roadway to a four-lane urban roadway, from the Hibiscus Park Ditch, approximately 175 feet west of Avalon Drive, to SR 5/US 1 (Federal Highway).
The proposed typical section includes two 11-f,oot-wide travel lanes in each direction separated by a 19.5-foot-wide raised median. A 10-foot wide shared-use path will be provided along both sides of the road. Please see **Exhibit 2D** for the **Typical Section** in **Appendix 1.** Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. This typical section requires a minimum of 107.5 feet of right-of-way and additional right-of-way will be required from the north and south sides of the roadway.

2.1.2.3 Segment 2, Alternative 2C
Segment 2, Alternative 2C proposes to widen the roadway from a two-lane rural roadway to a four-lane urban roadway, from the Hibiscus Park Ditch, approximately 175 feet west of Avalon Drive, to SR 5/US 1 (Federal Highway).
The proposed typical section includes an 11-foot-wide outside lane and a 10-foot-wide inside lane in each direction, separated by a 15.5-foot-wide raised median. A 10-foot wide shared-use path will be provided along both sides of the road. Please see **Exhibit 2E** for the **Typical Section** in **Appendix 1.** Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. This typical section requires a minimum of 101.5 feet of right-of-way and additional right-of-way will be required from the north and south sides of the roadway.

2.1.2.4 Segment 2, Alternative 2D
Segment 2, Alternative 2D proposes to widen the roadway from a two-lane rural roadway to a four-lane urban roadway, from the Hibiscus Park Ditch, approximately 175 feet west of Avalon Drive to SR 5/US 1 (Federal Highway).
There are three variations to this typical section options being proposed.
Option 1 includes an 11-foot-wide outside lane and a 10-foot wide inside lane in each direction separated by a 15.5-foot-wide raised median. A 6-foot-wide buffered bike lane and 6-foot-wide

sidewalk with a concrete gravity wall are proposed on the north side of the roadway. A 10-foot-wide shared-use path is proposed on the south side of the roadway. Please see **Exhibit 2F** for the **Typical Section** in **Appendix 1.** Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. This option requires a minimum of 96.25 feet of right-of-way. Additional right-of-way will be required from the south side of the roadway.

Option 2 includes an 11-foot-wide outside travel lane and a 10-foot wide inside travel lane in each direction separated by a 15.5-foot-wide raised median. A 6-foot-wide buffered bike lane and 6-foot-wide sidewalk with a concrete gravity wall are proposed on the north side of the roadway. A 10-foot-wide sidewalk at the back of curb is proposed on the south side of the roadway. Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. This typical section requires a minimum of 90.25 feet of right-of-way and additional right-of-way will be required from the south side of the roadway.

Option 3 includes an 11-foot-wide outside lane and a 10-foot wide inside lane in each direction separated by a 15.5-foot-wide raised median. A 6-foot-wide buffered bike lane and 6-foot-wide sidewalk with a concrete gravity wall are proposed on the north side of the roadway. A 10-foot-wide shared-use path is proposed on the south side of the roadway, however, it will swing out away from the roadway to avoid impacts to existing electrical transmission poles. Stormwater runoff will be collected in an enclosed drainage system using curb and gutter and pipes to offsite stormwater ponds. This typical section requires as much as 96.25 feet of right-of-way and additional right-of-way will be required from the south side of the roadway.

SECTION 3 DESIGN CRITERIA

The design of the stormwater management facilities for the project is governed by the rules set forth by the SFWMD and Martin County. Water quality treatment and attenuation requirements will comply with the guidelines as defined in Chapter 62-330 of the Florida Administrative Code (F.A.C), the Martin County Stormwater Management and Flood Protection Standards, and the Statewide Environmental Resource Permit Manual (SWERP).

Wet detention pond and exfiltration trench alternatives have been analyzed to provide for water quality improvements as well as water quantity attenuation for the project runoff. Please refer to the summary below for the water quality, water quantity, and retention pond facilities configuration criterion used for the project:

3.1 SFWMD CRITERIA

- **Water Quality** – Coordination with SFWMD determined that water quality volume would be required to replace the impacted permitted volume for each basin plus provide an additional 2.5" over the new impervious area. The new impervious area will be required to provide an additional fifty percent (50%) treatment volume since the project limits are within the St. Lucie River and Estuary Basin, which has adopted a Basin Action Management Plan (BMAP). The BMAP requires the additional treatment volume and will require a nutrient loading analysis.

- **Water Quantity** – The SFWMD requires that the post development peak discharge shall be at or below pre-development peak discharge for the 25-year/72-hour storm event.

- **Wet Detention Pond Facilities Configuration** – The proposed pond shall have a minimum area of 0.5 acre and 100 feet minimum width for linear areas in excess of 200 feet length (measured at the control elevation). The pond will include a 20-foot maintenance berm width (15-foot minimum), minimum 1:4 (Vertical:Horizontal) for pond side slopes and tie up/down slopes to existing ground, and a minimum 1-foot freeboard from the inside maintenance berm to the Design High Water (DHW) stage. The pond area shall be 0.5 acres at the control elevation. The littoral area shall be shallower than 6 feet as measured from below the control elevation. The minimum shallow, littoral area shall be the lesser of 20 percent of the wet detention area or 2.5 percent of the total of the detention area (including side slopes) plus the basin contributing area.

- **Exfiltration Trench** – The proposed exfiltration trench will be designed using the Empirical Equations Method developed by the SFWMD. These formulas calculate the required length of exfiltration trench based on a one-hour exfiltration time, which is representative of the majority of small magnitude and short duration rainfall events. A safety factor of 2 is provided for the required length of exfiltration trench per the FDOT Drainage Design Guide.

3.2 MARTIN COUNTY CRITERIA

- **Water Quality**: Martin County requires that treatment be provided for three inches (3”) over the impervious areas for dry retention. This requirement is increased by twenty-five percent (25%) for dry detention and by fifty percent (50%) for wet detention. The county requires recovery of half of the treatment volume between 24 hours and five days, and 90 percent of the 25-year three-day runoff volume in 12 days from cessation of the storm event.
- **Water Quantity**: Martin County requires that the post development peak discharge shall be at or below pre-development peak discharge for the 25-year/72-hour storm event and the 3-year/24-hour storm event.
- **Wet Detention Pond Facilities Configuration**: Martin County requires the 1:4 pond side slopes in wet systems be extended to three feet below the control elevation.

SECTION 4 DATA COLLECTION

The design team collected and reviewed data from the following sources:

- FDOT Drainage Manual, January 2024
- FDOT Drainage Design Guide, January 2024
- SFWMD Permit No. 43-00642-S, Cove Road Widening

- SFWMD Environmental Resource Permit Applicant's Handbook Volume II – May 2016
- SWERP Environmental Resource Permit Information Manual, 2020
- National Flood Insurance Program (NFIP) Flood Insurance Rate Map (FIRM), Panels Nos. 12085C0282H, 12085C0301H, 12085C0163H, and 12085C0164H, Martin County, Florida dated February 19, 2020.
- U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) Soil Survey of Martin County, Florida
- USDA NRCS Soil Survey Geographic (SSURGO) Database
- United States Geological Survey (USGS) Quadrangle Maps
- Martin County Stormwater and Flood Protection Standards
- Article 4, Site Design Standards, Division 8, Excavating, Filling, and Mining, Division 9, Stormwater Management, Division 10, Flood protection, Division 19, Roadway Design, Martin County Land Development Regulations
- Field Reconnaissance (June 2024)

SECTION 5 EXISTING SITE CONDITIONS

5.1 TOPOGRAPHY & HYDROLOGIC FEATURES

The topography of the project area general slopes to the west towards Kanner Highway/SR 76 from Ault Avenue with elevations ranging from elevation 18 feet at Ault Avenue to elevation 9.0 feet at the roadway low point near SW Gaines Avenue. From Ault Avenue east to SR 5/US 1 relatively flat with elevations ranging from a high of approximately 18 feet to a low of 17 feet NAVD 88. Please refer to the **USGS Quadrangle Map**, **Exhibit 3** in **Appendix 1**.

There are four existing cross drains within the project limits. The cross drains allow for conveyance of offsite flow and interconnectivity of offsite wetland systems along the corridor. Please refer to the **Basin Maps** in **Appendix 2** and to **Table 2** for a **Summary of Existing Cross Drains**.

Table 2 – Summary of Existing Cross Drains

Structure Number	Station	Description
CD-1	203+20	15" RCP
CD-2	255+35	26"x42" ERCP
CD-3	316+80	Double 18" RCP
CD-4	340+60	18" RCP

5.1.1 SOILS DATA & GEOTECHNICAL INVESTIGATIONS

The Soil Survey of Martin County Area, Florida, published by the USDA NRCS (dated 1980) has been reviewed for the project vicinity. According to the soil survey there are four (4) different

soil types encountered along the project limits and are classified as Hydrological Soil Group (HSG) A, A/D and B/D soils. Group A soils have low runoff potential and high infiltration rates even when thoroughly wetted. They consist chiefly of deep, well to excessively drained sand or gravel and have a high rate of water transmission. Group B soils have moderate infiltration rates when thoroughly wetted and consist chiefly of moderately deep or deep, moderately drained or well drained soils and have moderate runoff potential. Group D soils have high runoff potential when thoroughly wet and have slow infiltration rates. If a soil is assigned a dual HSG, the first letter is for drained areas and the second is for un-drained areas. Only the soils that in their natural condition are in group D are assigned to dual classes. Please refer to the **NRCS Soils Map**, **Exhibit 4** in **Appendix 1**. **Table 3 – USDA NRCS Soil Survey Information** summarizes and lists the soil types and relevant information. The ground water is at a depth of 0.0′ – 1.0′ below the existing ground throughout the majority of the project.

Table 3 – USDA NRCS Soil Survey Information

Soil No.	Martin County USDA Soil Name	SOIL NAME	Seasonal High Ground Water		HSG	Soil Classification		
			Depth (feet)	Duration (months)		Depth (inches)	Unified	AASHTO
2	LAWNWOOD AND MYAKKA FINE SANDS	LAWNWOOD	0.5-1.5	Jun-Sep	A/D	0-5 5-28 28-52 52-64 64-80	SP, SP-SM SP SM, SP-SM SM, SP SP-SM	A-3 A-3 A-3 A-3 A-2-4, A-3
		MYAKKA	0.5-1.5	Jun-Sep	B/D	0-6 6-20 20-36 36-80	SP, SP-SM SP, SP-SM SM, SP-SM SP, SP-SM	A-3 A-3 A-2-4, A-3 A-3
4	WAVELAND AND IMMOKALEE FINE SANDS	WAVELAND	0.5-3.0	May-Oct	A/D	0-4 4-43 43-47 47-77 77-91 91-99	SP, SP-SM SP SM, SP-SM SM, SP-SM SM, SP-SM SP-SM	A-3 A-3 A-2-4 A-2-4, A-3 A-2-4 A-2-4, A-3
		IMMOKALEE	0.5-1.5	Jun-Sep	B/D	0-6 6-35 35-54 54-80	SP, SP-SM SP-SM, SP SM, SP-SM SP, SP-SM	A-3 A-3 A-2-4, A-3 A-3
5	WAVELAND AND LAWNWOOD FINE SANDS, DEPRESSIONAL	WAVELAND	0.0	Jun-Dec	A/D	0-2 2-43 43-77 77-91 91-99	SP, SP-SM SP SM, SP-SM SP-SM SP-SM	A-3 A-3 A-2-4 A-2-4, A-3 A-2-4, A-3
		LAWNWOOD	0.0	Jun-Dec	B/D	0-3 3-22 22-29 29-80	SP, SP-SM SP SM, SP-SM SP-SM	A-3 A-3 A-2-4, A-3 A-2-4, A-3
36	ARENTS, 0 TO 2 PERCENT SLOPES	ARENTS	1.5-3.0	Jun-Nov	A	0-30 30-36 36-60	SP, SP-SM SP, SP-SM SP-SM, SP	A-2-4, A-3 A-2-4, A-3 A-3, A-2-4

5.2 ENVIRONMENTAL CHARACTERISTICS

5.2.1 Land Use Data

The project corridor is a mixture of Low Density, Rural Density, Estate Density, and Commercial/Office/Residential land uses along the study corridor. The proposed widening will not alter any existing or future land uses in the area. Please see **Exhibit 5** for the **Future Land Use Map** in **Appendix 1.**

5.2.2 Cultural Features

Cultural features preserve and enhance the cultural nature of a community and include parks, schools, churches and other religious institutions. Also included are historic sites, archaeologically significant sites and neighborhood gathering places. Community services include facilities that provide necessary services such as fire stations, police stations, public and private schools, hospitals, cemeteries, public buildings, and civic facilities. The Cultural Resource Assessment Report did not find any previously recorded historic resources within the area of potential effect (APE). Most of the pond sites have low to medium ranking for archaeological potential. Pond 1B has a high archaeological potential but has been heavily disturbed by previous construction. Additional information regarding cultural features can be found in the **Cultural Resource Assessment Report** conducted as part of this study and submitted under a separate cover.

5.2.3 Natural and Biological Features

The proposed project avoids and minimizes impacts to wetlands, other surface waters (OSWs), protected species, and their habitats to the greatest extent practicable. Based on the existing information and both general and species-specific surveys, the stormwater treatment alternatives will not jeopardize the continued existence of a protected species and/or result in the destruction or adverse modification of critical habitat. However, additional coordination with wildlife and habitat conservation agencies will be required during the design and permitting phase and additional wildlife surveys may be required prior to or during construction. No Essential Fish Habitat (EFH) is located within the project area. No involvement with EFH resources is anticipated.

The preferred pond alternatives will impact approximately 8.15 acres of wetlands. During the design and permitting phase, final impacts will be calculated along with the appropriate mitigation to satisfy the requirements of 33 U.S.C. § 1344 and Part IV of Chapter 373, F.S. More information regarding wetlands, OSWs, and protected species can be found in the **Natural Resources Evaluation Report** conducted as part of this study and submitted under a separate cover.

5.2.4 Contamination Screening

A Contamination Screening Evaluation Report (CSER) was performed for the potential pond areas for the study. The risk rankings for the recommended pond sites vary from "Low" to "No" with Pond 3 having a risk ranking of "Low" and Ponds 2, 4A, and 4B having a risk ranking of

"No." There is no additional work recommended for the sites with a risk ranking of "No." A Level 2 field screening for Pond 3 is recommended because of its risk ranking of "Low" and required purchase of new right-of-way. More information regarding contamination screening can be found in the **Contamination Screening Evaluation Report** conducted as part of this study and submitted under a separate cover.

5.3 EXISTING DRAINAGE CONDITIONS

5.3.1 Existing Conditions

The study area is located within the South St. Lucie and Indian River Lagoon South Coastal watersheds and traverses three WBID's; WBID 3210C (South Fork St. Lucie River (Tidal Segment)), WBID 3220 (Basin 2), and WBID 3208C (Manatee Pocket). Manatee Pocket is an Outstanding Florida Water (OFW). The St. Lucie River and Estuary Basin has adopted a Basin Management Action Plan (BMAP) for nutrients and dissolved oxygen. Please see **Exhibit 7** for the **Water Body Identification Map (WBID)** in **Appendix 1.**

The existing roadway was permitted under SFWMD Permit No. 43-00642-S for an ultimate 4-lane condition. The ultimate condition was not built out and Cove Road exists in an interim condition as a 2-lane roadway. The existing permit has 5 basins along the corridor and provides treatment within swales along the roadway. The limits of the existing basins and permitted areas are shown in **Table 4 - Summary of Existing Drainage Basins** and are also included on the **Basin Maps** in **Appendix 2.**

Table 4 – Summary of Existing Drainage Basins

Basin Name	From Station	To Station	Basin Area (ac.)	Imperv. Area (ac.)	Outfall Location
Basin 1	200+00	233+27	11.61	6.10	St. Lucie River via Gaines Avenue Ditch
Basin 2	233+27	286+28	16.19	7.89	St. Lucie River via Fern Creek Wetlands
Basin 3	286+28	324+20	12.23	6.25	St. Lucie River via Wetland System
Basin 4	324+20	348+20	6.19	3.24	Manatee Pocket via Hibiscus Park Ditch
Basin 5	348+20	368+28	5.18	2.18	Manatee Pocket via Cross Drain under US 1

5.3.1.1 Basin 1

Basin 1 begins at SR 76/Kanner Highway and continues to just east of SE Burnett Avenue. Stormwater runoff from the roadway is collected and routed through swales, inlets, and culverts, which provide the required 1.27 acre-feet of treatment for the basin. The basin outfalls into the Gaines Ave roadside ditch through a control structure located at the intersection. Stormwater flows south along the Gaines Avenue ditch before discharging into the South Fork of the St. Lucie River through a culvert.

5.3.1.2 Basin 2

Basin 2 begins just east of SE Burnett Avenue and continues east to Ault Avenue. Stormwater runoff from the roadway is collected and routed through swales and culverts which provide the required 1.64 acre-feet of treatment for the basin. The basin discharges through a control structure north to a wetland system that ultimately outfalls into the South Fork of the St. Lucie River.

5.3.1.3 Basin 3

Basin 3 begins at Ault Avenue and continues east to east of Willoughby Blvd near the Discovery Village at Stuart entrance. Stormwater runoff from the roadway is collected and routed through swales and culverts which provide the required 1.30 acre-feet of treatment for the basin. The basin discharges through a control structure north to a wetland system, which is now the Cove Road Land Trust Wetlands Restoration. The wetland system ultimately outfalls north into the Tower Road Ditch.

5.3.1.4 Basin 4

Basin 4 begins near the Discovery Village at Stuart entrance, east of Willougby Road, and continues east to Montego Cove. Stormwater runoff from the roadway is collected and routed through roadside swales and culverts which provide the required 0.68 acre-feet of treatment for the basin. The basin discharges through a control structure north to the Hibiscus Park Ditch, along the west side of Hibiscus Park, which then flows to the large ditch bisecting the community. The large ditch discharges through a cross drain under US 1, ultimately outfalling to Manatee Pocket.

5.3.1.5 Basin 5

Basin 5 begins at Montego Cove and extends to the end of the project. Stormwater runoff from the roadway is collected and routed through roadside swales, inlets, culverts, and exfiltration trenches which provide the required 0.38 acre-feet of treatment for the basin. The basin discharges to the US 1 stormsewer system at the intersection of Cove Road and US 1. The stormsewer system flows north to the cross drain under US 1, which conveys the Hibiscus Park Ditch, and ultimately outfalls to Manatee Pocket.

5.3.2 FLOODPLAINS

The Federal Emergency Management Agency (FEMA) has developed a Flood Insurance Rate Map (FIRM) for the study area. The relevant FIRM panel numbers are 12085C0282H, 12085C0301H, 12085C0163H and 12085C0164H, for Martin County, Florida dated February 19, 2020. The project is designated Zone X and will not have any floodplain impacts. Please see the **FEMA Map in Appendix 1, Exhibit 6**.

SECTION 6 PROPOSED DRAINAGE CONDITIONS

The stormwater runoff from the project limits will be collected and conveyed in closed drainage systems consisting of curb and gutter, inlets, and pipes to the proposed stormwater management site. The treatment facilities will discharge to the existing outfall locations along the corridor. The proposed roadway will impact the existing stormwater treatment swales along the corridor. Water quality treatment and water quantity attenuation will be provided in the proposed treatment site to replace the impacted volume in the existing swales and for the proposed roadway improvements. For the attenuation analysis, impacts to the existing swales required the historical roadway condition to be used for the pre-condition. The stormwater treatment alternatives investigated are wet detention ponds, treatment swales, and exfiltration trenches.

6.1 OVERVIEW

6.1.1 Stormwater Ponds

The proposed project consists of four drainage basins within the study limits, combining existing Basins 4 and 5. Stormwater runoff will be routed to proposed stormwater treatment facilities for water quality treatment and attenuation before ultimately discharging to the existing outfall locations. Please refer to **Post-Development Basin Maps** in **Appendix 2**. **Table 5 – Summary of Proposed Drainage Basins** provides a summary of the proposed basin limits and their outfall locations.

Table 5 – Summary of Proposed Drainage Basins

Basin Name	From Station	To Station	Outfall Location
Basin 1	200+00	233+27	St. Lucie River via Gaines Avenue Ditch
Basin 2	233+27	286+28	St. Lucie River via Fern Creek Wetlands
Basin 3	286+28	324+20	St. Lucie River via Wetland System
Basin 4	324+20	368+28	Manatee Pocket via Hibiscus Park Ditch

6.2 STORMWATER POND EVALUATION

6.2.1 Basin 1

Basin 1 in the proposed condition begins at SR 76/Kanner Highway and continues to east of South Burnett Avenue, maintaining the same limits as in the existing condition. The basin slopes to the west with the low point located near Gaines Avenue. The basin area is made up of poorly drained Waveland and Immokalee fine sands (HSG A/D) with ground elevations ranging from 9 feet to 12 feet NAVD. The particulars of the stormwater approach are discussed in the following sections. All calculations and parameters for each alternative are located in **Appendix 3**. This

basin is located within WBID 3210C which is impaired for nutrients and within the St. Lucie River and Estuary BMAP; therefore, a pollutant loading analysis has been provided for this basin.

6.2.1.1 Exfiltration Trench

An exfiltration trench alternative has been investigated for the basin to provide treatment and attenuation for stormwater runoff. The exfiltration trench will be constructed underneath the proposed shared use path, outside of the roadway. The exfiltration trench will have an 8-foot width and a height of 7 feet. Where feasible the perforated pipe invert will be set at the seasonal high-water table, which is assumed to be approximately 3-5 feet below the roadway elevation based on geotechnical and existing permit data. The preliminary analysis utilized a 30" pipe diameter, however, the final pipe sizing will be determined in design. Preliminary geotechnical investigations found the soils within the basin to have a low infiltration rate, limiting the amount of storage available within a proposed exfiltration trench. To offset the volume required within an exfiltration trench, alternative treatment options have been investigated within the basin to use in conjunction with exfiltration. These options include dry detention swales and compensatory treatment, which are discussed in the following sections.

6.2.1.2 Swales

The proposed roadway improvements will impact the existing treatment swales along the project corridor. However, between Cove Road and SE Gaines Avenue there is space available for a small swale to provide treatment volume for the roadway runoff. Additionally, the proposed roadway will minimally impact the existing swale north of Cove Road from station 204+00 to station 211+00, which can continue to provide treatment volume for the basin as it does in the existing condition. The existing swale bottom ranges from elevation 5.50 feet to 6.0 feet NAVD and back of berm elevation ranges from elevation 9.0 feet to 10 feet. The proposed swale area between Cove Road and SE Gaines Avenue will provide 0.24 acre-feet of treatment and the swale area along the north side of Cove Road will provide 0.87 acre-feet of treatment.

6.2.1.3 Compensation

Stormwater runoff from SW Gaines Avenue, north of Cove Road, currently flows untreated to the Gaines Avenue outfall ditch through the cross-drain underneath Cove Road. To assist in offsetting impacts to the existing treatment along Cove Road, swales will be constructed along SW Gaines Avenue to provide treatment for runoff from the existing roadway. The swales will be constructed within the existing R/W and provide 0.06 acre-feet of treatment for 0.28 acres of existing pavement to compensate for the proposed improvements along Cove Road. The swale bottom will have an elevation of 8.0 feet NAVD and back of berm elevation of 12 feet NAVD.

After review of the treatment alternatives discussed and additional volume required through exfiltration it was found that the length of exfiltration trench needed to meet the additional treatment and attenuation volume would be 7,450 feet. The length of exfiltration required exceeds the basin length making construction of this alternative impractical.

6.2.1.4 Pond 1A

Pond 1A is located north of Cove Road at approximately station 205+00. The pond site sits within parcel 553841000042000821. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site has a structure and parking lot, which are situated on Waveland and Immokalee fine sands (HSG A/D) and has an existing ground elevation from 8 feet to 9 feet NAVD. From the existing permit information for Cove Road and the observed highwater mark at the structure out-falling to the Gaines Avenue ditch the WSWT elevation is approximately at elevation 4.00 feet NAVD. To account for anticipated impacts to the St. Lucie River and downstream condition due to sea level rise the proposed pond is controlled one foot above the WSWT. Preliminary pond sizing calculations indicates that the wet detention pond will require 1.75 acres to provide treatment and attenuation for the basin. The total parcel is 2.09 acres.

6.2.1.5 Pond 1B

Pond 1B is located south of Cove Road along Gaines Avenue at the intersection of Paulson Avenue. The pond site sits within parcel 043941000000000807. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site has an existing structure, which is situated on Waveland and Immokalee fine sands (HSG A/D) and Arents, 0 to 2 percent slopes (HSG A) and has existing ground elevations of 6 feet NAVD. The site is partially within Zone AE Floodplains according to FEMA Firm Maps, however, there are no anticipated floodplain impacts since the floodplain elevation is 5.9 feet NAVD, which is below the existing ground elevation. Review of the NRCS web soil survey and existing permits along the St. Lucie River identified the anticipated WSWT to be approximately 3.50 feet NAVD. Preliminary pond sizing calculations indicates that the wet detention pond will require 1.54 acres, which encompasses the entire parcel, to provide treatment and attenuation for the basin. Pond 1B is the recommended stormwater treatment alternative for the basin.

6.2.2 Basin 2

Basin 2 in the proposed condition will maintain the same basin limits as in the existing condition. The basin slopes to the west away from the highpoint at Ault Avenue. The basin area is made up of somewhat poorly drained Arents (HSG A) and poorly drained Waveland and Immokalee fine sands (HSG A/D) with ground elevations ranging from 12 feet to 18 feet NAVD. The particulars of the stormwater approach are discussed in the following sections. All calculations and parameters for each alternative are located in **Appendix 3**. This basin is located within WBID 3210C which is impaired nutrients and within the St. Lucie River and Estuary BMAP; therefore, a pollutant loading analysis has been provided for this basin.

6.2.2.1 Exfiltration Trench

An exfiltration trench alternative has been investigated for the basin to provide treatment and attenuation for stormwater runoff. The exfiltration trench will be constructed underneath the proposed shared use path, outside of the roadway. The exfiltration trench will have an 8-foot width and a height of 7 feet. Where feasible the perforated pipe invert will be set at the seasonal high-water table, which is assumed to be approximately 3-5 feet below the roadway

elevation based on geotechnical and existing permit data. The preliminary analysis utilized a 30" pipe diameter, however, the final pipe sizing will be determined in design. Preliminary geotechnical investigations found the soils within the basin to have a low infiltration rate, limiting the amount of storage available within a proposed exfiltration trench. To both replace the permitted treatment volume within the swales impacted by the proposed design and meet the requirements for the additional improvements the total length of the exfiltration trench required would be 17,920 feet, which greatly exceeds the total length of the basin, creating difficulty in the feasibility of the construction. It is not anticipated that an exfiltration trench will meet the stormwater requirements for the basin.

6.2.2.2 Pond 2

Pond 2 is located north of Cove Road at approximately station 230+00. The pond site sits within parcel 553841000043000801. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site is situated on Waveland and Immokalee fine sands (HSG A/D) and has an existing ground elevation from 11 feet to 12 feet NAVD. The NRCS Web Soil Survey defines the seasonal high-water depth in these soils to be 0.0-1.0 feet below the ground elevation. From the existing permit information for the adjacent Showcase PUD to the west the WSWT elevation ranges from elevation 8.50 feet to 9.0 feet NAVD and existing permit information for the Fern Creek outfall and downstream condition of the Cove Isle permit range from 10.50 feet to 11.00 feet NAVD. The pond has been sized with the control elevation set at the higher permitted outfall control elevation. Preliminary pond sizing calculations indicates that the wet detention pond will require 7.22 acres to provide treatment and attenuation for the basin. The total parcel is 8.75 acres. Pond 2 is the recommended stormwater treatment alternative for the basin.

6.2.3 Basin 3

Basin 3 maintains the same limits as in the existing permitted condition, beginning at Ault Avenue and continues east to east of Willoughby Blvd near the Discovery Village at Stuart entrance. The basin area is mostly flat with elevations ranging from 18 feet to 17 feet NAVD. The basin area is made up of poorly drained Lawnwood and Myakka fine sands (HSG A/D) and poorly drained Waveland and Immokalee fine sands (HSG A/D). The particulars of the stormwater approach are discussed in the following sections. All calculations and parameters for each alternative are located in **Appendix 3**. This basin is located within WBID 3210C which is impaired nutrients and within the St. Lucie River and Estuary BMAP; therefore, a pollutant loading analysis has been provided for this basin.

6.2.3.1 Exfiltration Trench

An exfiltration trench alternative has been investigated for the basin to provide treatment and attenuation for stormwater runoff. The exfiltration trench will be constructed underneath the proposed shared use path, outside of the roadway. The exfiltration trench will have an 8-foot width and a height of 6 feet. Where feasible the perforated pipe invert will be set at the seasonal high-water table, which is assumed to be approximately 3-5 feet below the roadway elevation based on geotechnical and existing permit data. The preliminary analysis utilized a 30" pipe diameter, however, the final pipe sizing will be determined in design. Preliminary

geotechnical investigations found the soils within the basin to have a low infiltration rate, limiting the amount of storage available within a proposed exfiltration trench. To both replace the permitted treatment volume within the swales impacted by the proposed design and meet the requirements for the additional improvements the total length of the exfiltration trench required would be 17,100 feet, which greatly exceeds the total length of the basin, creating difficulty in the feasibility of the construction. It is not anticipated that an exfiltration trench will meet the stormwater requirements for the basin.

6.2.3.2 Pond 3A

Pond 3A is located north of Cove Road and west of Willoughby Blvd within parcel 553841000066000107. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site is situated on Waveland and Lawnwood fine sands (HSG A/D) and Lawnwood and Myakka find sands (HSG A/D) and has existing ground elevation of 17 feet NAVD. The NRCS Web Soil Survey defines the seasonal high-water depth in these soils to be 0.0-1.0 feet below the ground elevation. However, the property has been developed and was previously in use for agriculture. Review of existing permit information for the adjacent County owned ponds providing treatment and attenuation for Willoughby Blvd, the WSWT elevation is approximately 14 feet NAVD. Preliminary pond sizing calculations indicates that the wet detention pond will require 6.55 acres to provide treatment and attenuation for the basin. The total parcel is 35.04 acres.

6.2.3.3 Pond 3B

Pond 3B is located at the northeast corner of the intersection of Cove Road and Willoughby Blvd within parcel 553841000067000400. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site is situated on Lawnwood and Myakka find sands (HSG A/D) and has an existing ground elevation from 16 feet to 17 feet NAVD. The NRCS Web Soil Survey defines the seasonal high-water depth in these soils to be 0.0-1.0 feet below the ground elevation. The parcel sits adjacent to the Cove Road Land Trust Wetlands Restoration and the proposed pond will be shaped to maintain a 50' buffer from the wetland. Review of existing permit information for stormwater treatment ponds surrounding the wetland restoration project and for the adjacent County owned ponds providing treatment and attenuation for Willoughby Blvd, the WSWT elevation is approximately 14 feet NAVD. Preliminary pond sizing calculations indicates that the wet detention pond will require 4.90 acres to provide treatment and attenuation for the basin. The total parcel is 16.26 acres. Pond 3B is the recommended stormwater treatment alternative for the basin.

6.2.4 Basin 4

Basin 4 in the proposed condition combines Basins 4 and 5 from the existing condition beginning near the Discovery Village at Stuart entrance, east of Willougby Road and extending to the end of the project at SE Federal Highway. Both basins have a shared outfall to the large ditch and cross drain underneath Federal Highway, which ultimately discharge to Manatee Pocket. The basin area is mostly flat with elevations ranging from 18 feet to 17 feet NAVD. The basin area is made up of poorly drained Lawnwood and Myakka fine sands (HSG A/D) and poorly drained Waveland and Immokalee fine sands (HSG A/D). The particulars of the

stormwater approach are discussed in the following sections. All calculations and parameters for each alternative are located in **Appendix 3**. This basin is outfalls to WBID 3208C, which is an OFW and impaired for nutrients. It is also within the St. Lucie River and Estuary BMAP; therefore, a pollutant loading analysis has been provided for this basin.

6.2.4.1 Exfiltration Trench

An exfiltration trench alternative has been investigated for the basin to provide treatment and attenuation for stormwater runoff. The exfiltration trench will be constructed underneath the proposed shared use path, outside of the roadway. The exfiltration trench will have an 8-foot width and a height of 6 feet. Where feasible the perforated pipe invert will be set at the seasonal high-water table, which is assumed to be approximately 3-5 feet below the roadway elevation based on geotechnical and existing permit data. The preliminary analysis utilized a 30" pipe diameter, however, the final pipe sizing will be determined in design. Preliminary geotechnical investigations found the soils within the basin to have a low infiltration rate, limiting the amount of storage available within a proposed exfiltration trench. To both replace the permitted treatment volume within the swales impacted by the proposed design and meet the requirements for the additional improvements the total length of the exfiltration trench required would be 17,100 feet, which greatly exceeds the total length of the basin, creating difficulty in the feasibility of the construction. It is not anticipated that an exfiltration trench will meet the stormwater requirements for the basin.

6.2.4.2 Pond 4A

Pond 4A is located north of Cove Road and adjacent to the Hibiscus Park outfall ditch within parcel 553841000067000105. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site is situated on Lawnwood and Myakka find sands (HSG A/D) and has existing ground elevation from 16 feet to 19 feet NAVD. The NRCS Web Soil Survey defines the seasonal high-water depth in these soils to be 0.0-1.0 feet below the ground elevation. Review of existing permit information for the area defined the WSWT elevation to be approximately 14 feet NAVD. Preliminary pond sizing calculations indicates that the wet detention pond will require 4.52 acres to provide treatment and attenuation for the basin. The pond will sit at the east end of the parcel, which totals 17.90 acres. Pond 4A is the recommended stormwater treatment alternative for the basin.

6.2.4.3 Pond 4B

Pond 4B is located north of Cove Road and adjacent to the Hibiscus Park outfall ditch within parcel 553841000067000110. Water quality treatment and attenuation will be provided via wet detention. The proposed pond site is situated on Lawnwood and Myakka find sands (HSG A/D) and has existing ground elevation from 16 feet to 19 feet NAVD. The NRCS Web Soil Survey defines the seasonal high-water depth in these soils to be 0.0-1.0 feet below the ground elevation. Review of existing permit information for the area defined the WSWT elevation to be approximately 14 feet NAVD. Preliminary pond sizing calculations indicates that the wet detention pond will require 4.86 acres to provide treatment and attenuation for the basin. The pond will sit at the northeast corner of the parcel, which totals 17.60 acres.

6.2.5 Nutrient Loading Analysis

A nutrient loading analysis has been performed on all basins to show there will be no adverse effects to the downstream waters. The analysis was performed for the preferred ponds using BMPTRAINS 2020 software, developed by the University of Central Florida Stormwater Management Academy. Results of the analysis are included in **Appendix 6 – Nutrient Loading Analysis** and summarized in **Table 6.** All of the recommended pond sites showed a reduction in nutrient loading when compared with the permitted conditions. It should be noted that the permitted condition utilizes dry detention swales, which do not provide nutrient removal credit. This project meets requirements for both Phosphorus and Nitrogen removal.

Table 6 – Summary of Nutrient Removal

Basin Name	Recommended Pond Name	Pre-Development Nitrogen Loading (kg/yr)	Post-Development Nitrogen Loading (kg/yr)	Pre-Development Phosphorus Loading (kg/yr)	Post-Development Phosphorus Loading (kg/yr)	Nitrogen/ Phosphorus Removal Met?
Basin 1	Pond 1B	54.420	37.010	7.348	2.784	Yes
Basin 2	Pond 2	69.477	51.210	11.809	2.231	Yes
Basin 3	Pond 3B	51.919	36.740	8.415	1.881	Yes
Basin 4	Pond 4B	50.673	39.360	9.015	2.013	Yes
Total		226.489	163.320	36.587	8.909	Yes

6.2.6 Floodplain Compensation

There are no anticipated floodplain impacts for this study and therefore, floodplain compensation sites are not necessary. The study limits are located within FEMA Flood Zone X. Pond 1B sits partially within Zone AE Floodplains according to FEMA Firm Maps, however, the existing ground at the pond location is elevation 6 feet NAVD, which is above the floodplain elevation of 5.9 feet NAVD. Therefore, there are no anticipated floodplain impacts. Please see the **FEMA Map, Exhibit 6 in Appendix 1.** More information regarding floodplains can be found in the **Location Hydraulics Report** conducted as part of this study and submitted under a separate cover.

6.3 METHODOLOGY OF POND DETERMINATION

Based on the available information, only the hydraulically feasible and environmentally permissible alternative pond sites are considered. Alternative pond sites are analyzed and evaluated for the following parameters:

- Hydrologic and hydraulic factors such as existing ground elevation, soil types, estimated Seasonal High Water Table (SHWT) established by a review of the USDA NRCS soils and geotechnical investigations, stormwater conveyance feasibility, allowable hydraulic grade line (HGL), and basin outfalls;
- Environmental resource impacts including wetlands and threatened or endangered species;
- Floodplain impacts;
- Major utility conflict potential;
- Estimated right-of-way acquisition;
- Impacts to cultural resources; and
- Hazardous materials and contamination

Please note that the information for environmental impacts, hazardous materials contamination impacts, estimated SHWT, and cultural resources impacts are provided under separate covers as part of this study. All the information were gathered and in incorporated into the **Engineering Analysis Matrix in Appendix 4**.

6.4 ENVIRONMENTAL LOOK AROUNDS (ELAs)

Environmental Look Arounds (ELAs) provide a unique opportunity to team up with regional stakeholders to explore watershed wide stormwater needs and alternative permitting approaches for the project. Areas of potential cooperation are documented in this report for future follow up as the design moves forward. During the FDOT drainage methodology meeting discussions were held with Martin County regarding a joint use facility for the future extension of Willoughby Boulevard and Cove Road widening. It was stated that the County would prefer to have separate facilities for Cove Road and Willoughby Blvd. Separate discussions were held with Indian River State College regarding a joint use facility for planned development by the College and for the Cove Road Improvements in Pond 4B. Indian River State College stated at this time they did not have plans for future development at the site but are willing to work with the County and FDOT regarding parcel 53841000067000110. Coordination with Indian River State College will continue as the project moves to design and if Pond 4B is pursued as the design alternative for the project.

SECTION 7 CONCLUSION

Potential stormwater management facilities have been identified along the project limits for this PD&E Study and show that they can accommodate the proposed improvements. The analysis estimates stormwater management size requirements using a volumetric analysis, which accounts for water quality treatment and water quantity for runoff attenuation. The proposed stormwater facilities were also sized to account for the impacted permitted treatment volume in the existing roadway swales. Stormwater management sizing calculations as well as graphics showing the roadway alignment and associated sites are included in **Appendices 2 and 3** of this Pond Siting Report. Please note that the recommendations were based on pond sizes and locations determined from preliminary data calculations, reasonable engineering judgment, and assumptions. Pond sizes and configurations may change during final design as more detailed information on SHWT, wetland normal pool elevation, final roadway profile design, etc. become available. The recommended treatment alternatives for each basin are shown in the following table, **Table 7 – Summary of Recommended Treatment Alternatives**.

Table 7 – Summary of Recommended Treatment Alternatives

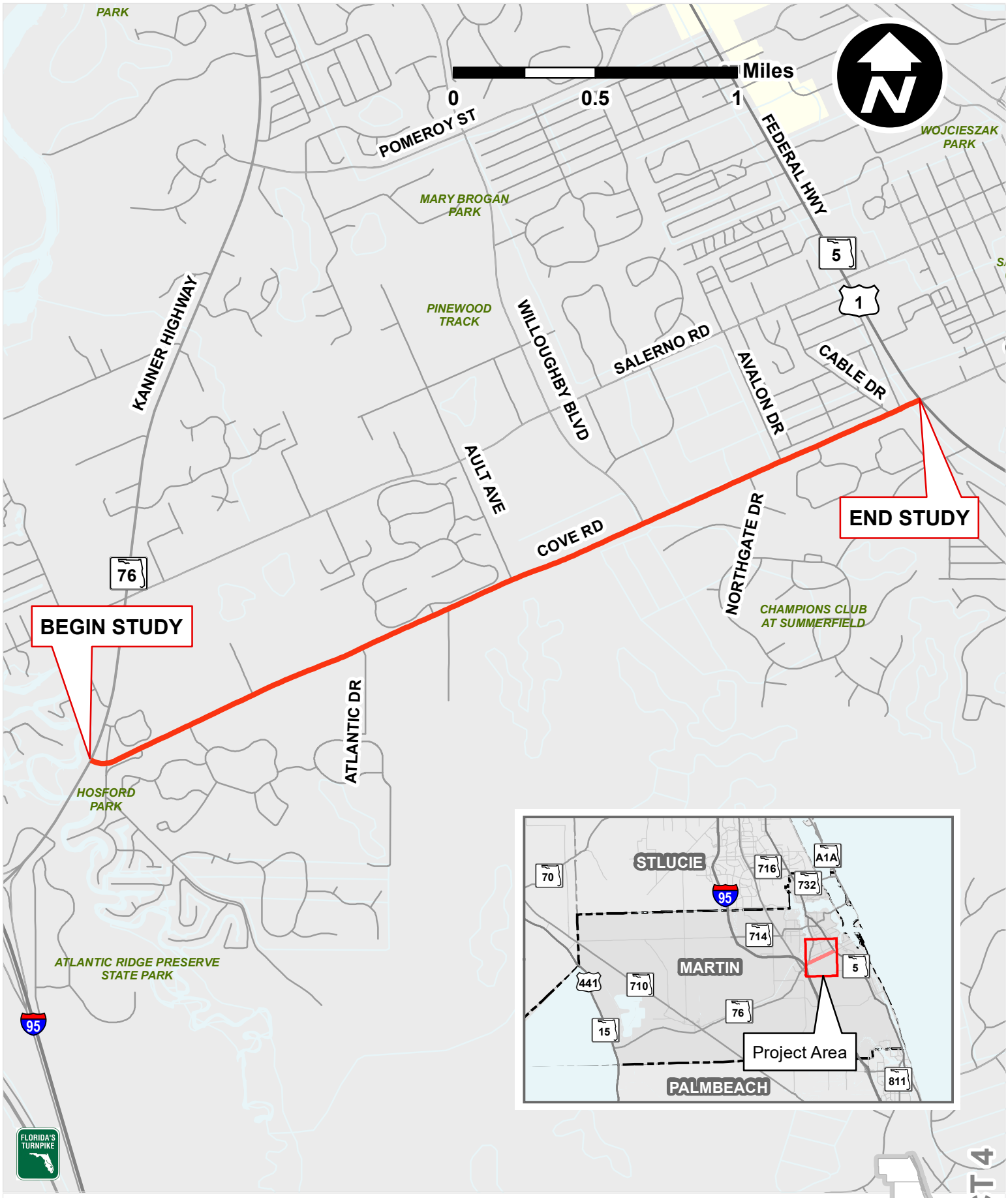
Basin Name	Pond Name	Roadway Basin Area (Acres)	Pond Area (Acres)	Total Required TV (Acre-Feet)	Total Provided TV (Acre-Feet)	Total Required TV+Attenuation (Acre-Feet)	Total Provided TV+ Attenuation (Acre-Feet)
Basin 1	Pond 1B	11.61	1.54	2.77	2.77	3.81	3.83
Basin 2	Pond 2	16.19	7.22	4.67	4.67	7.68	8.52
Basin 3	Pond 3B	12.23	4.90	3.15	3.15	5.23	5.59
Basin 4	Pond 4A	11.37	4.52	3.19	3.19	5.08	5.59
Total		51.40	18.18	13.78	13.78	21.80	23.53

Note: TV = Treatment Volume

Exhibit 1 – Project Location Map
Exhibit 2 – Proposed Typical Section
Exhibit 3 – USGS Quadrangle Map
Exhibit 4 – NRCS Soils Map
Exhibit 5 – Future Land Use Map
Exhibit 6 – FEMA Map
Exhibit 7 – WBID Map

APPENDIX 1

Exhibits



Cove Road PD&E Study

from SR 76/Kanner Hwy. to SR 5/US 1

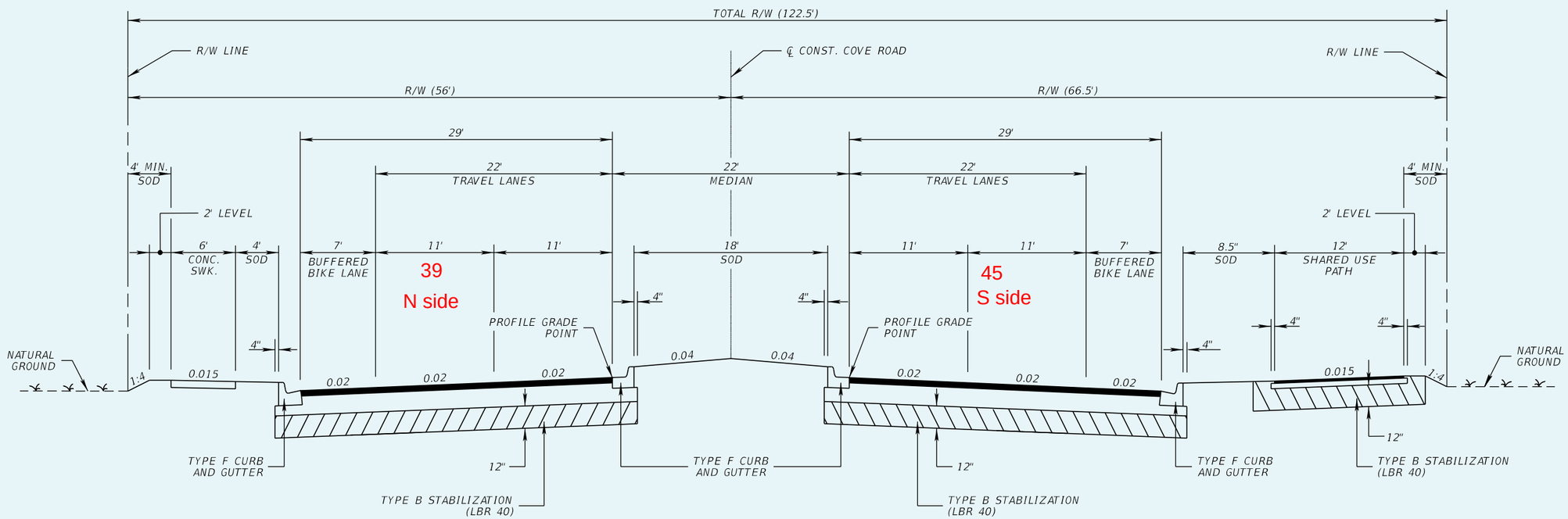
Martin County, Florida

FPID: 441700-1

Federal ID: D421-137-B

Project Location Map
EXHIBIT 1

DISTRICT 4



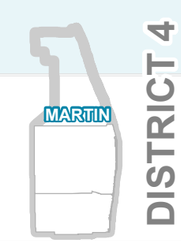
SEGMENT 1
KANNER HIGHWAY (SR 76) TO AVALON DRIVE

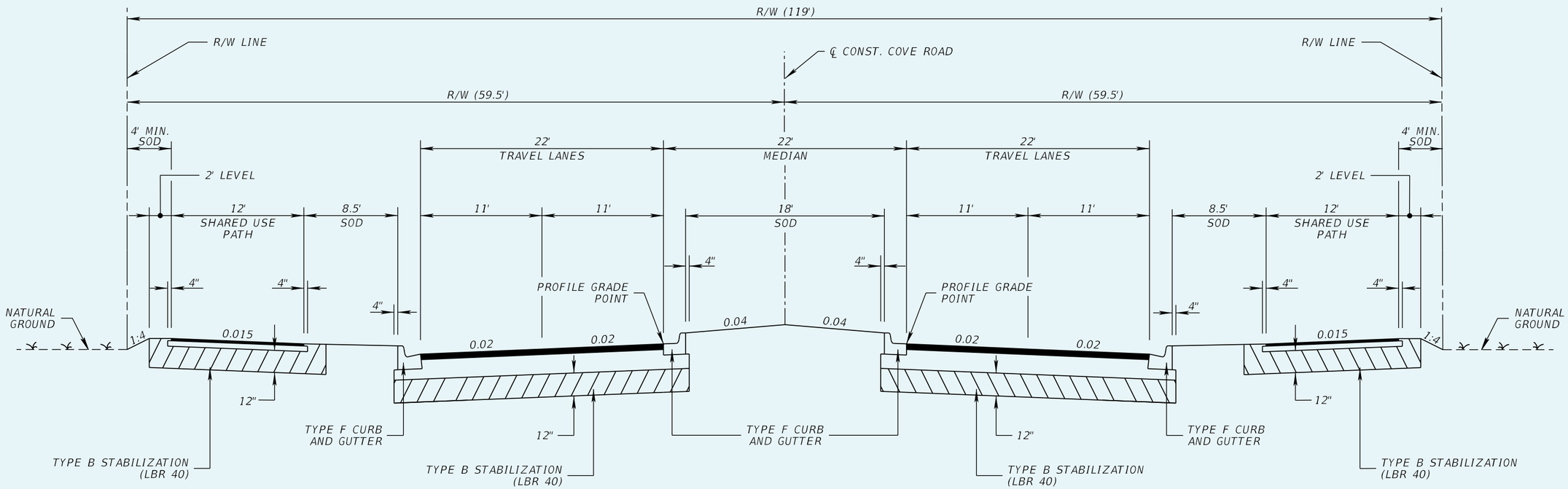
TYPICAL SECTION ALTERNATIVE 1A

DESIGN SPEED = 40 MPH

Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Typical Section
EXHIBIT 2A





SEGMENT 1

KANNER HIGHWAY (SR 76) TO AVALON DRIVE

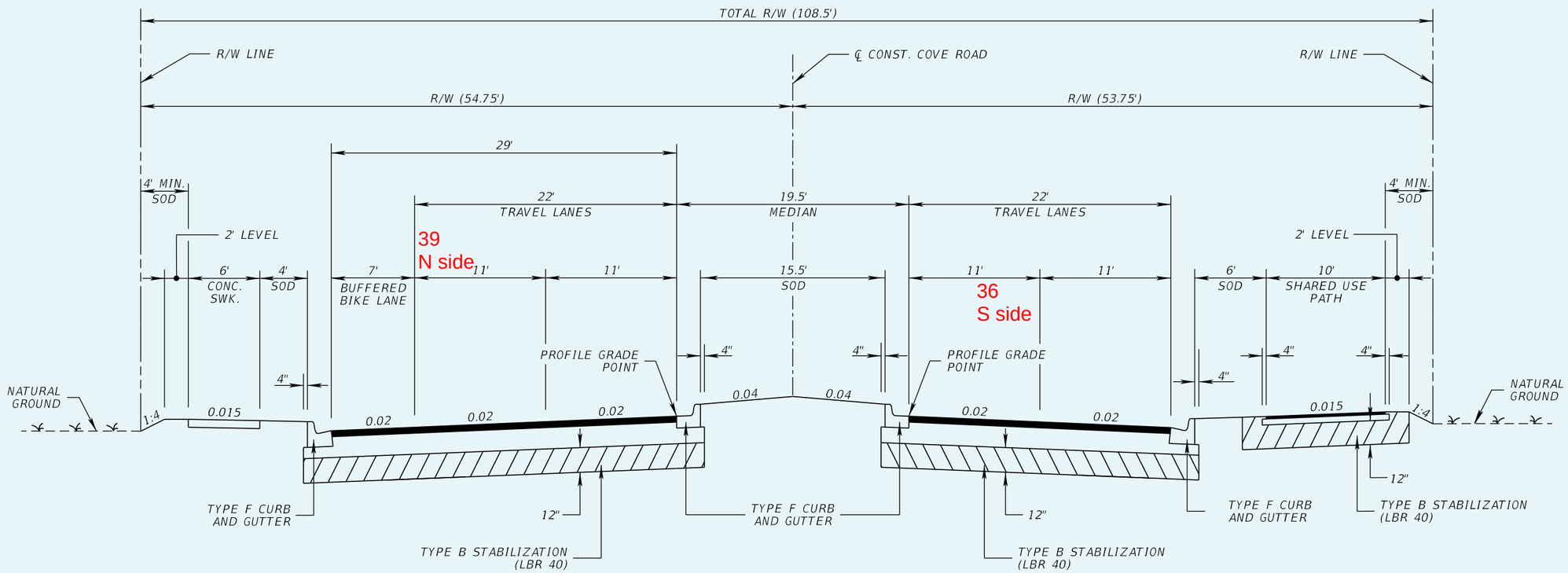
TYPICAL SECTION ALTERNATIVE 1B

DESIGN SPEED = 40 MPH

Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Typical Section
EXHIBIT 2B

DISTRICT 4



SEGMENT 2
AVALON DRIVE TO US-1 (SR 5)

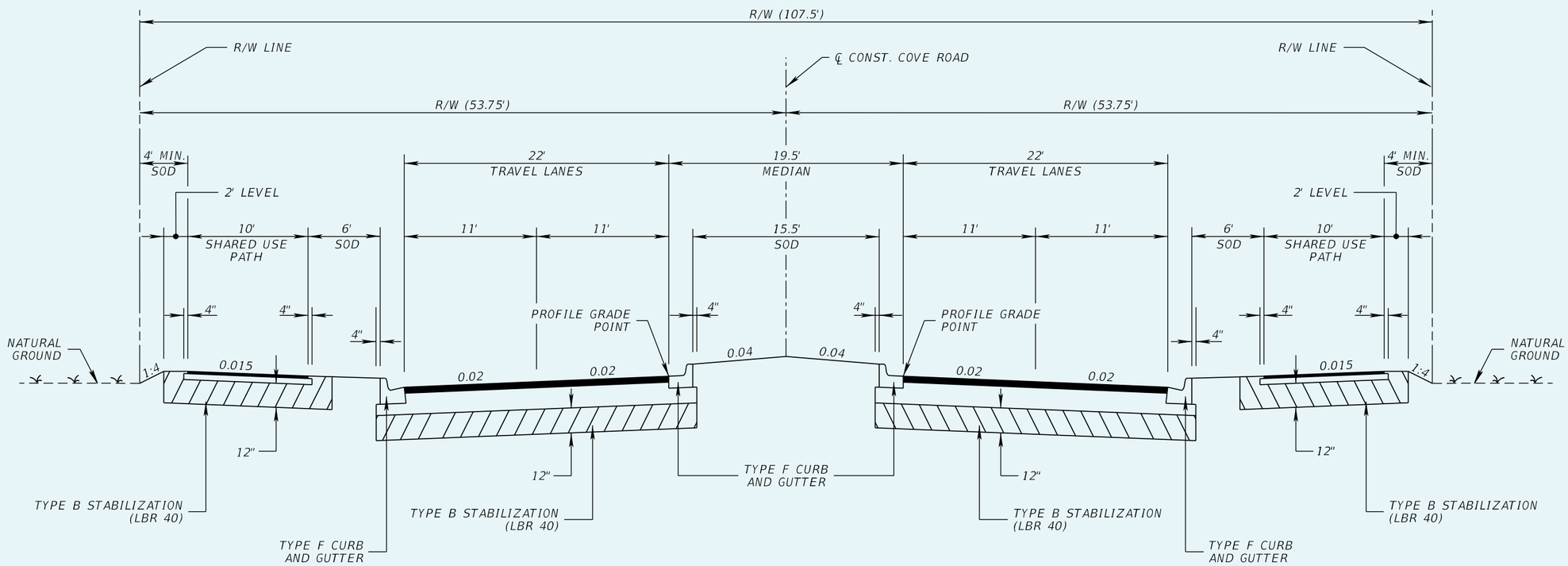
TYPICAL SECTION ALTERNATIVE 2A

DESIGN SPEED = 35 MPH

Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Typical Section
EXHIBIT 2C

MARTIN
DISTRICT 4

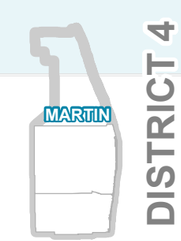


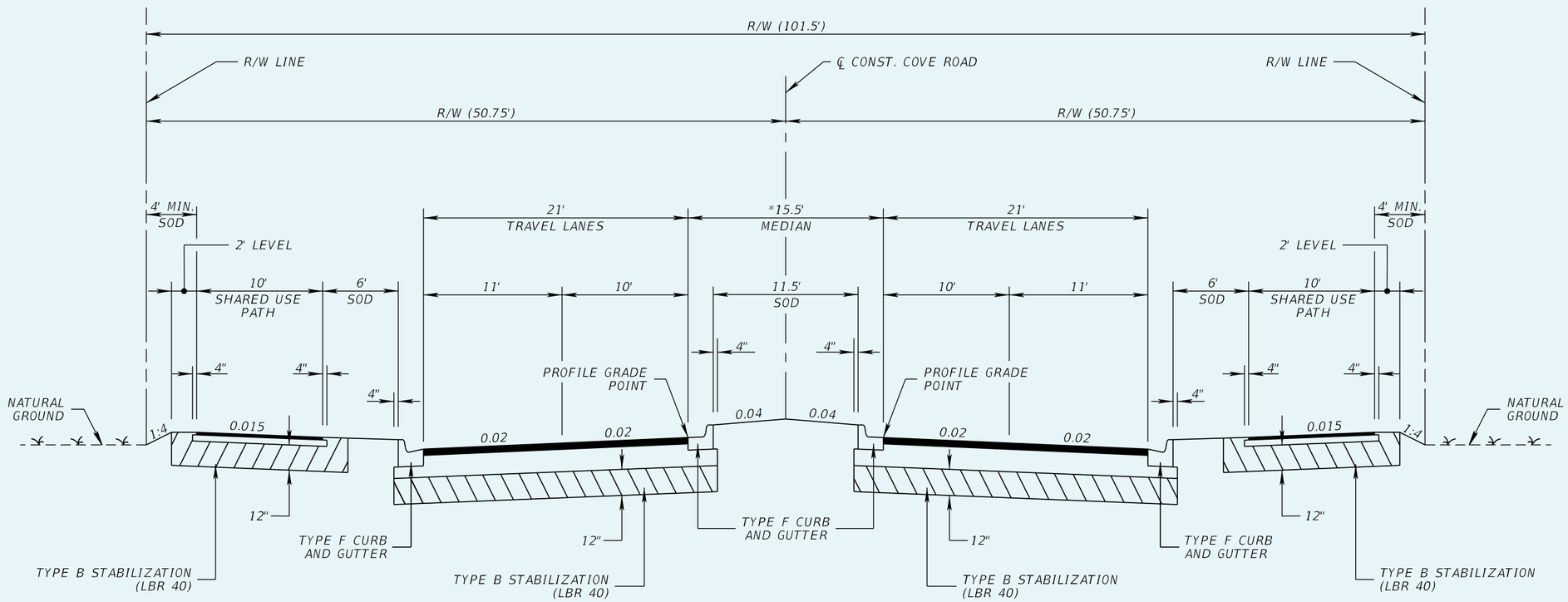
SEGMENT 2
AVALON DRIVE TO US-1 (SR 5)

TYPICAL SECTION ALTERNATIVE 2B
DESIGN SPEED = 35 MPH

Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Typical Section
EXHIBIT 2D





SEGMENT 2
AVALON DRIVE TO US-1 (SR 5)

TYPICAL SECTION ALTERNATIVE 2C

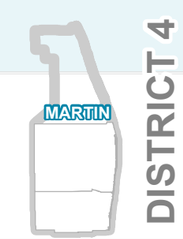
DESIGN SPEED = 35 MPH

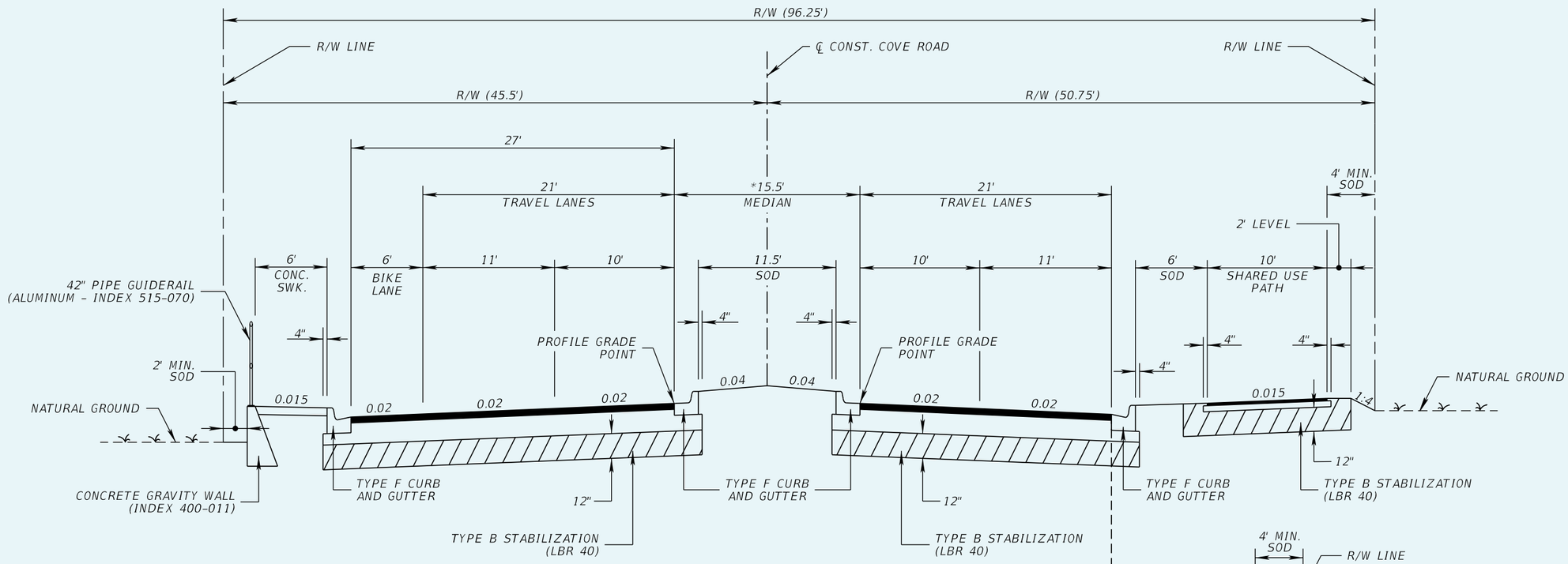
DESIGN VARIATION:

* MEDIAN WIDTH

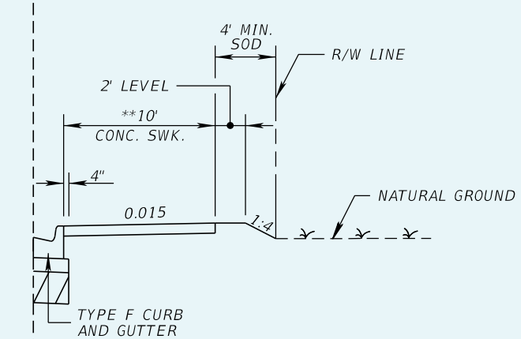
Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Typical Section
EXHIBIT 2E





Option 1



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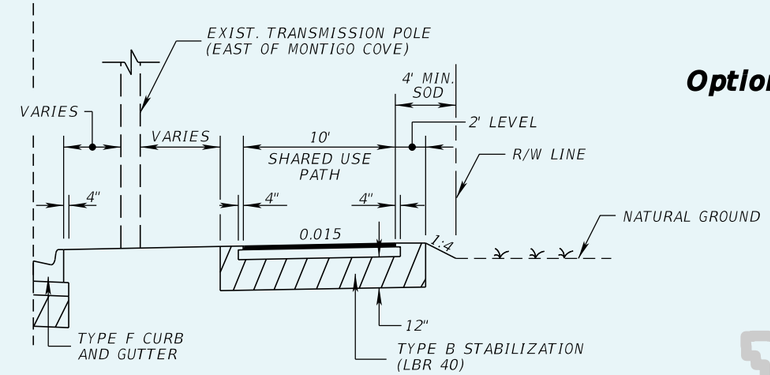


Option 3

SEGMENT 2
AVALON DRIVE TO US-1 (SR 5)

TYPICAL SECTION ALTERNATIVE 2D

DESIGN SPEED = 35 MPH

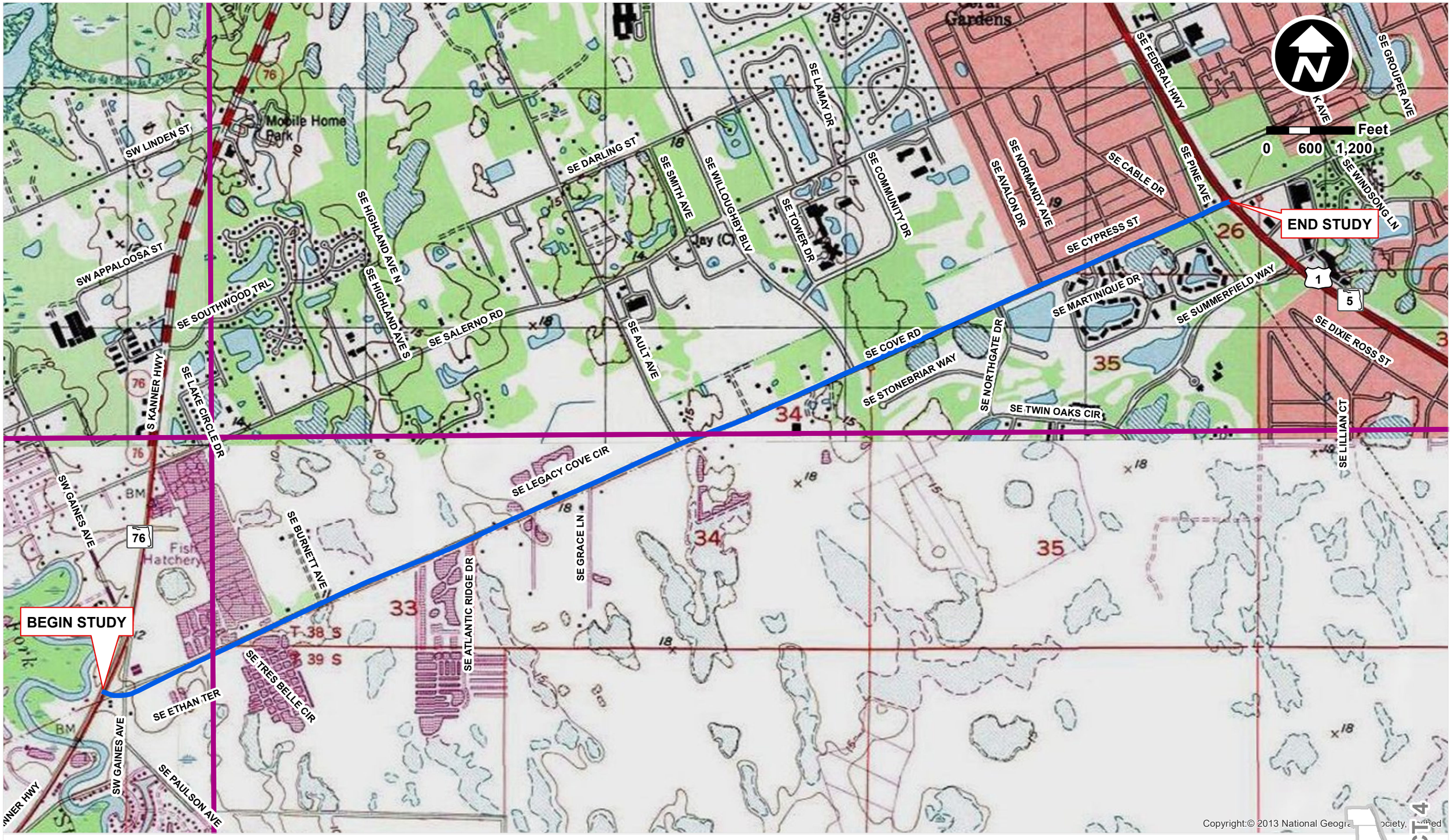
DESIGN VARIATION:

* MEDIAN WIDTH
** NO BIKE ACCOMMODATIONS

Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Typical Section
EXHIBIT 2F

MARTIN
DISTRICT 4



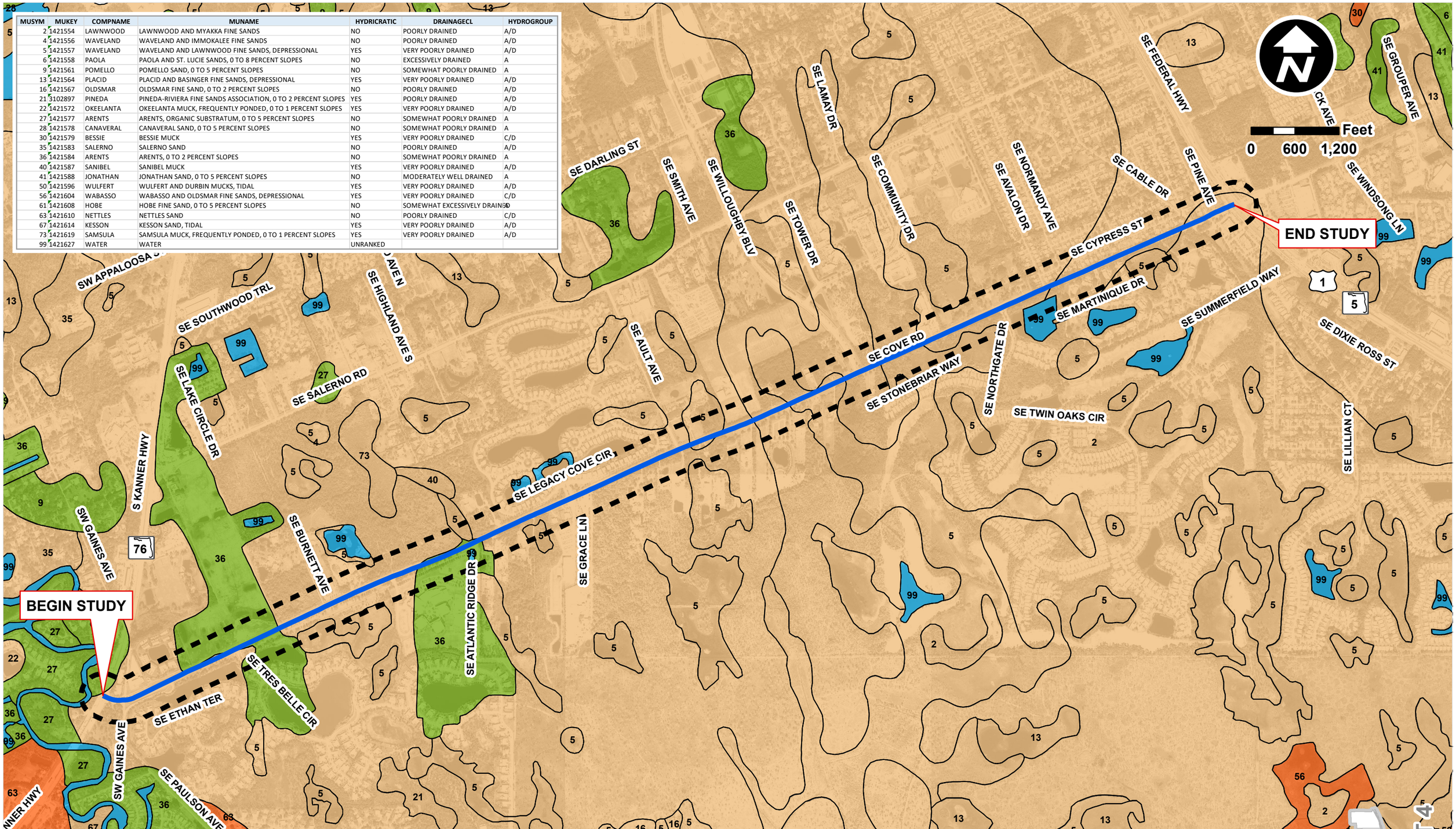
Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Legend
USGS Quadrangle Source: USGS 2018
Project Limits
USA Topo Maps

USGS Quadrangle Map
EXHIBIT 3

MARTIN
DISTRICT 4

MUSYM	MUKEY	COMPNAME	MUNAME	HYDRICRATIC	DRAINAGECL	HYDROGROUP
2	1421554	LAWNWOOD	LAWNWOOD AND MYAKKA FINE SANDS	NO	POORLY DRAINED	A/D
4	1421556	WAVELAND	WAVELAND AND IMMOKALEE FINE SANDS	NO	POORLY DRAINED	A/D
5	1421557	WAVELAND	WAVELAND AND LAWNWOOD FINE SANDS, DEPRESSIONAL	YES	VERY POORLY DRAINED	A/D
6	1421558	PAOLA	PAOLA AND ST. LUCIE SANDS, 0 TO 8 PERCENT SLOPES	NO	EXCESSIVELY DRAINED	A
9	1421561	POMELLO	POMELLO SAND, 0 TO 5 PERCENT SLOPES	NO	SOMEWHAT POORLY DRAINED	A
13	1421564	PLACID	PLACID AND BASINGER FINE SANDS, DEPRESSIONAL	YES	VERY POORLY DRAINED	A/D
16	1421567	OLDSMAR	OLDSMAR FINE SAND, 0 TO 2 PERCENT SLOPES	NO	POORLY DRAINED	A/D
21	3102897	PINEDA	PINEDA-RIVIERA FINE SANDS ASSOCIATION, 0 TO 2 PERCENT SLOPES	YES	POORLY DRAINED	A/D
22	1421572	OKEELANTA	OKEELANTA MUCK, FREQUENTLY PONDED, 0 TO 1 PERCENT SLOPES	YES	VERY POORLY DRAINED	A/D
27	1421577	ARENTS	ARENTS, ORGANIC SUBSTRATUM, 0 TO 5 PERCENT SLOPES	NO	SOMEWHAT POORLY DRAINED	A
28	1421578	CANAVERAL	CANAVERAL SAND, 0 TO 5 PERCENT SLOPES	NO	SOMEWHAT POORLY DRAINED	A
30	1421579	BESSIE	BESSIE MUCK	YES	VERY POORLY DRAINED	C/D
35	1421583	SALERNO	SALERNO SAND	NO	POORLY DRAINED	A/D
36	1421584	ARENTS	ARENTS, 0 TO 2 PERCENT SLOPES	NO	SOMEWHAT POORLY DRAINED	A
40	1421587	SANIBEL	SANIBEL MUCK	YES	VERY POORLY DRAINED	A/D
41	1421588	JONATHAN	JONATHAN SAND, 0 TO 5 PERCENT SLOPES	NO	MODERATELY WELL DRAINED	A
50	1421596	WULFERT	WULFERT AND DURBIN MUCKS, TIDAL	YES	VERY POORLY DRAINED	A/D
56	1421604	WABASSO	WABASSO AND OLDSMAR FINE SANDS, DEPRESSIONAL	YES	VERY POORLY DRAINED	C/D
61	1421608	HOBE	HOBE FINE SAND, 0 TO 5 PERCENT SLOPES	NO	SOMEWHAT EXCESSIVELY DRAINED	A
63	1421610	NETTLES	NETTLES SAND	NO	POORLY DRAINED	C/D
67	1421614	KESSON	KESSON SAND, TIDAL	YES	VERY POORLY DRAINED	A/D
73	1421619	SAMSULA	SAMSULA MUCK, FREQUENTLY PONDED, 0 TO 1 PERCENT SLOPES	YES	VERY POORLY DRAINED	A/D
99	1421627	WATER	WATER	UNRANKED		

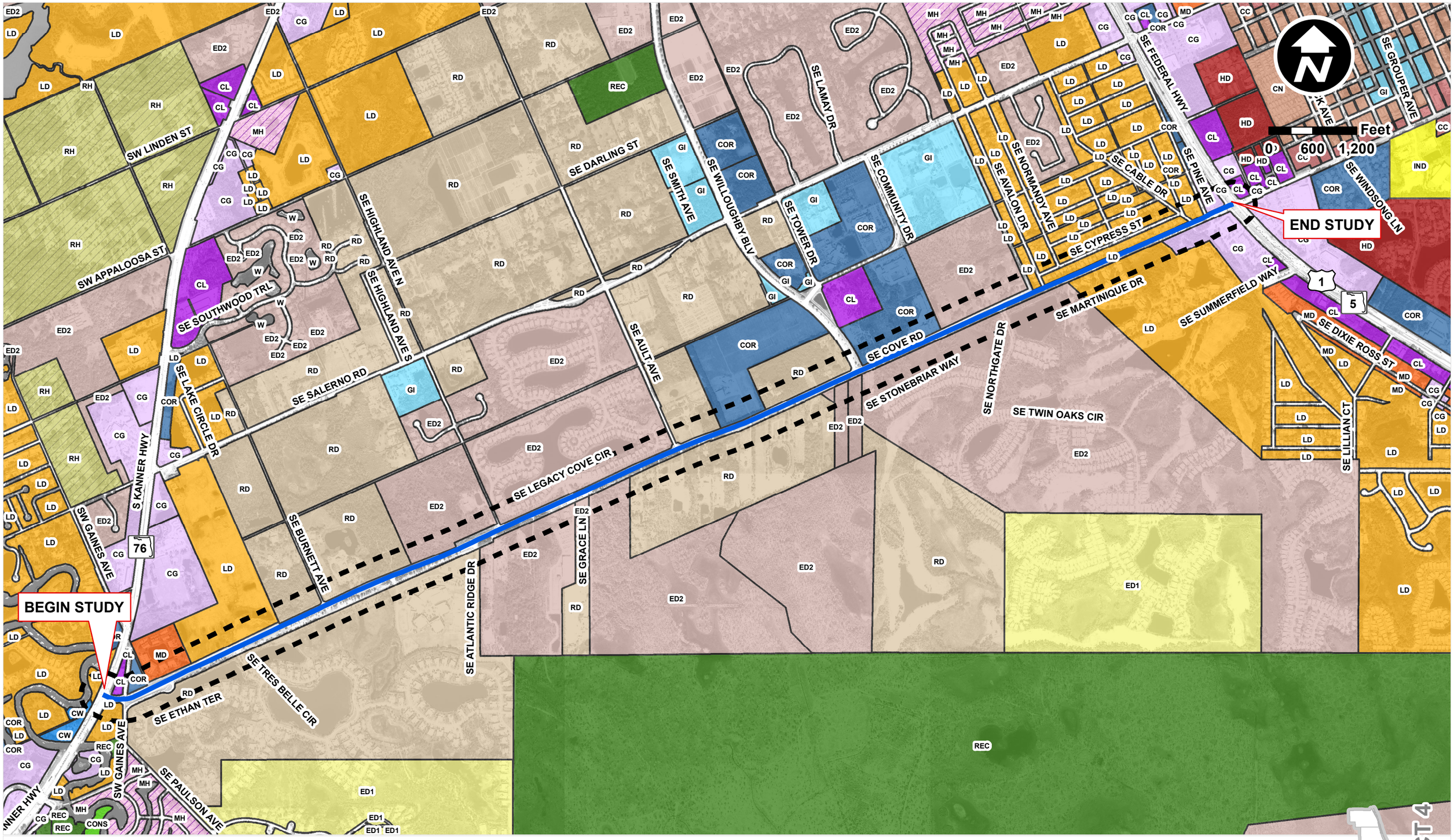


Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Legend
300 ft. Buffer
Project Limits

Hydro Group
A
A/D
C/D
Water

NRCS Soils (SSURGO) Map
EXHIBIT 4



Cove Road PD&E Study

from SR 76/Kanner Hwy. to SR 5/US 1

Martin County, Florida

FPID: 441700-1

Federal ID: D421-137-B

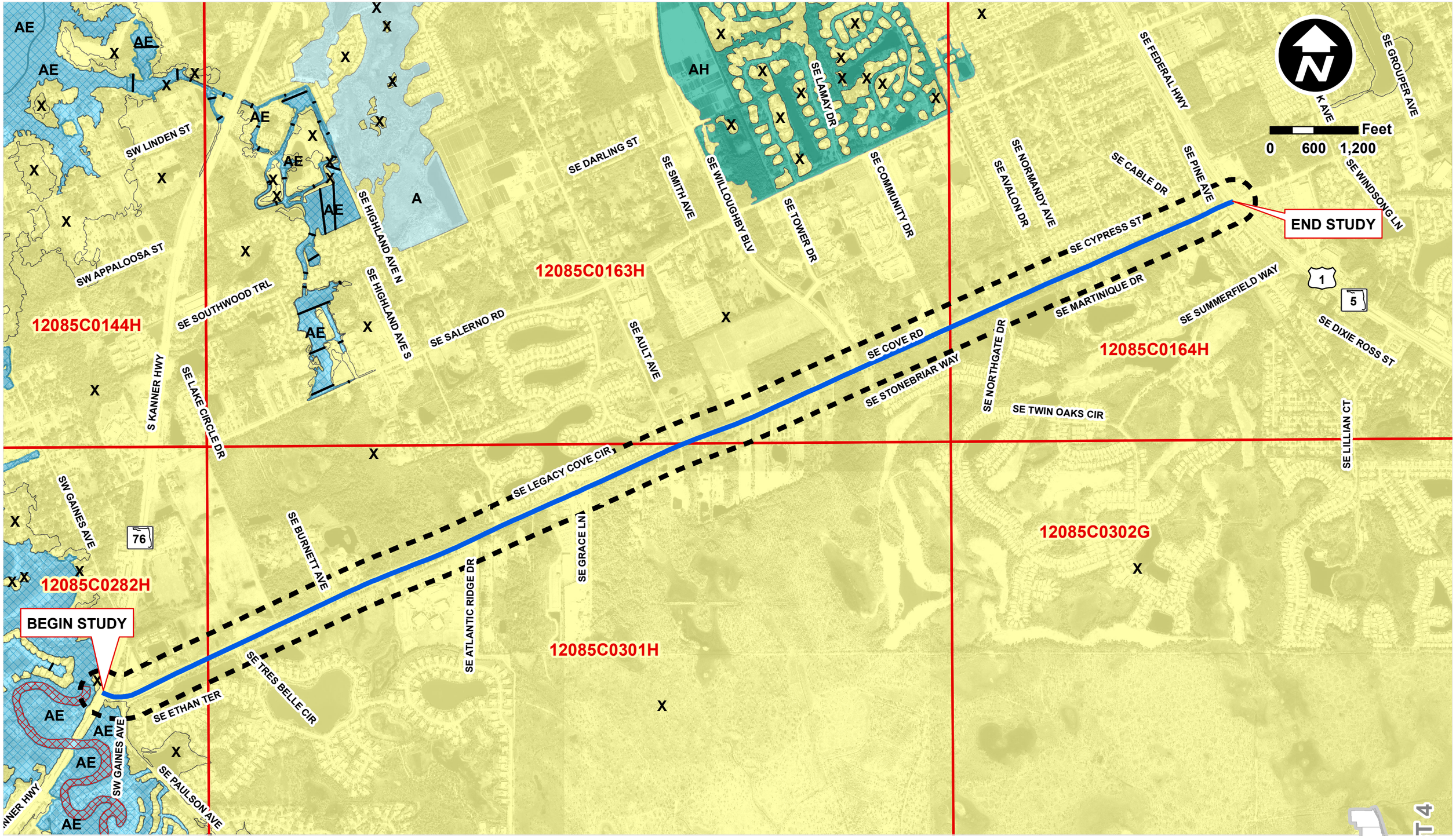
Legend

- CRA Center-CC
- CRA Neighborhood-CN
- Commercial General-CG
- Commercial Limited-CL
- Commercial Waterfront-CW
- Commercial/ Office/ Residential-COR
- Public Conservation-CONS
- Estate Density up to 1 UPA-ED1
- Estate Density up to 2 UPA-ED2
- General Institutional-GI
- Industrial-IND
- High Density-HD
- Low Density-LD
- Medium Density-MD
- Mobile Home-MH
- Recreational-REC
- Rural Density-RD
- Rural Heritage-RH
- 300 ft. Buffer
- Project Limits

Future Land Use Map
EXHIBIT 5

MARTIN

DISTRICT 4



Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Legend

A	AH	Floodway	Project Limits
AE	X	DFIRM Panel Boundary	300 ft. Buffer

FEMA Floodplain Map
EXHIBIT 6

MARTIN
DISTRICT 4

ST LUCIE RIVER (SOUTH FORK)
3210

ST LUCIE CANAL
3210A

MANATEE POCKET
3208C

SOUTH FORK ST LUCIE RIVER (TIDAL SEGMENT)
3210C

SOUTH FORK ST LUCIE RIVER (FRESHWATER SEGMENT)
3210D

BASIN 2
3220

BEGIN STUDY

END STUDY

SW LINDEN ST
SW APPALOOSA ST
SE SOUTHWOOD TRL
SE LAKE CIRCLE DR
SE SALERNO RD
S KANNER HWY
SW GAINES AVE
76
SE HIGHLAND AVE N
SE HIGHLAND AVE S
SE DARLING ST
SE SMITH AVE
SE WILLOUGHBY BLV
SE TOWER DR
SE LAMAY DR
SE COMMUNITY DR
SE AULT AVE
SE BURNETT AVE
SE ATLANTIC RIDGE DR
SE GRACE LN
SE LEGACY COVE CIR
SE COVE RD
SE STONEBRIAR WAY
SE NORTHGATE DR
SE TWIN OAKS CIR
SE AVALON DR
SE NORMANDY AVE
SE CABLE DR
SE PINE AVE
SE FEDERAL HWY
SE CYPRESS ST
SE MARTINIQUE DR
SE SUMMERFIELD WAY
SE DIXIE ROSS ST
SE LILLIAN CT
SE WINDSONG LN
SE GROUPER AVE
1
5
SE ETHAN TER
SE TRES BELLE CIR
SW GAINES AVE
SE PAULSON AVE

0 600 1,200 Feet

Cove Road PD&E Study
from SR 76/Kanner Hwy. to SR 5/US 1
Martin County, Florida
FPID: 441700-1
Federal ID: D421-137-B

Legend

- 300 ft. Buffer
- Project Limits
- 3208C-MANATEE POCKET
- 3210-ST LUCIE RIVER (SOUTH FORK)
- 3210A-ST LUCIE CANAL
- 3210C-SOUTH FORK ST LUCIE RIVER (TIDAL SEGMENT)
- 3210D-SOUTH FORK ST LUCIE RIVER (FRESHWATER SEGMENT)
- 3220-BASIN 2

Water Body Identification Map (WBID)
EXHIBIT 7

MARTIN
DISTRICT 4

APPENDIX 2

Basin Maps

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
LICENSE NUMBER: 80498
ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

EXISTING BASIN MAP

SHEET NO.

FAC NOTE

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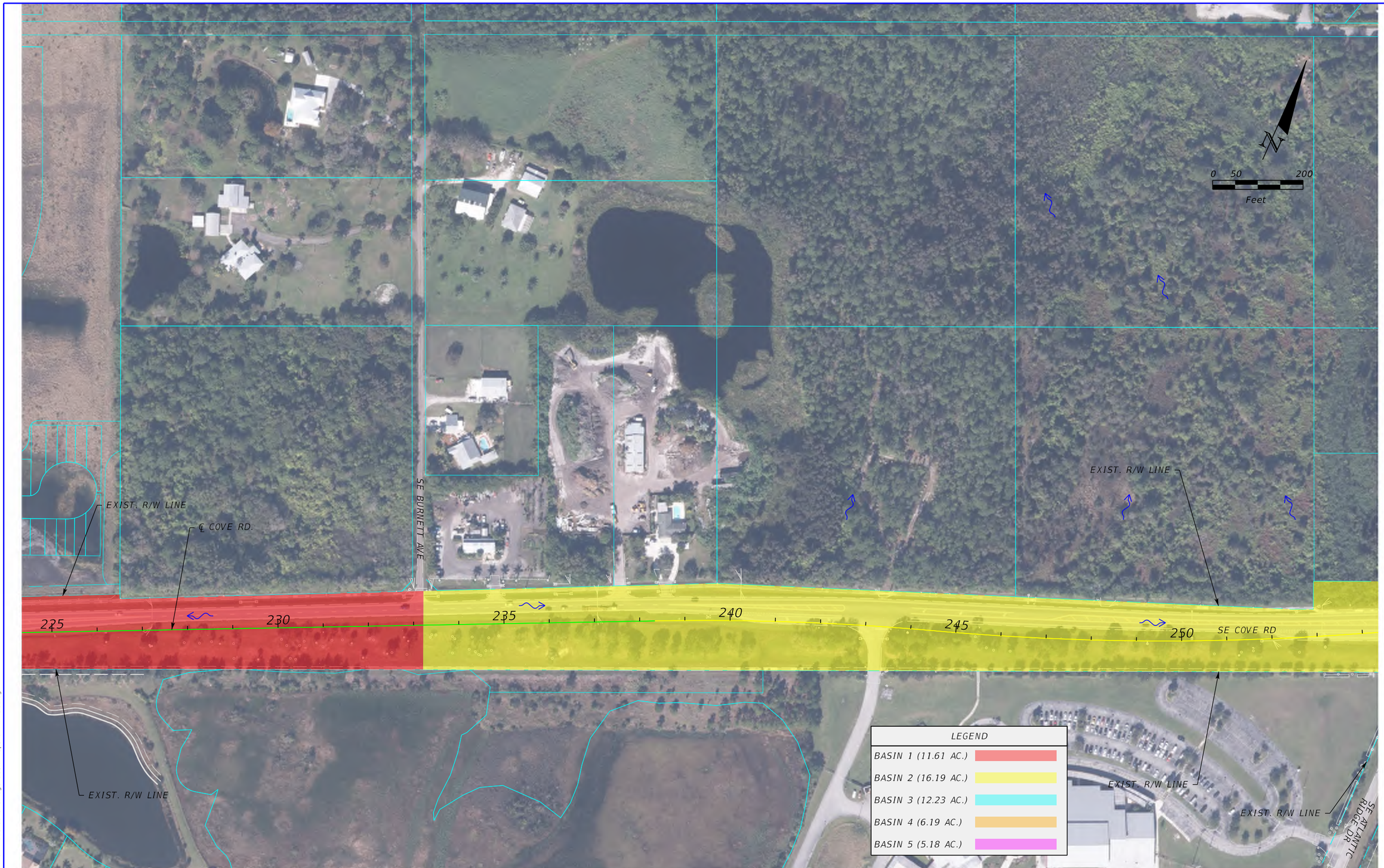

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STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

EXISTING BASIN MAP

SHEET NO.

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
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ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

EXISTING BASIN MAP

SHEET NO.

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FAC NOTE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
LICENSE NUMBER: 80498
ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

EXISTING BASIN MAP

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REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
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OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

EXISTING BASIN MAP

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FAC NOTE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

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LICENSE NUMBER: 80498
ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

EXISTING BASIN MAP

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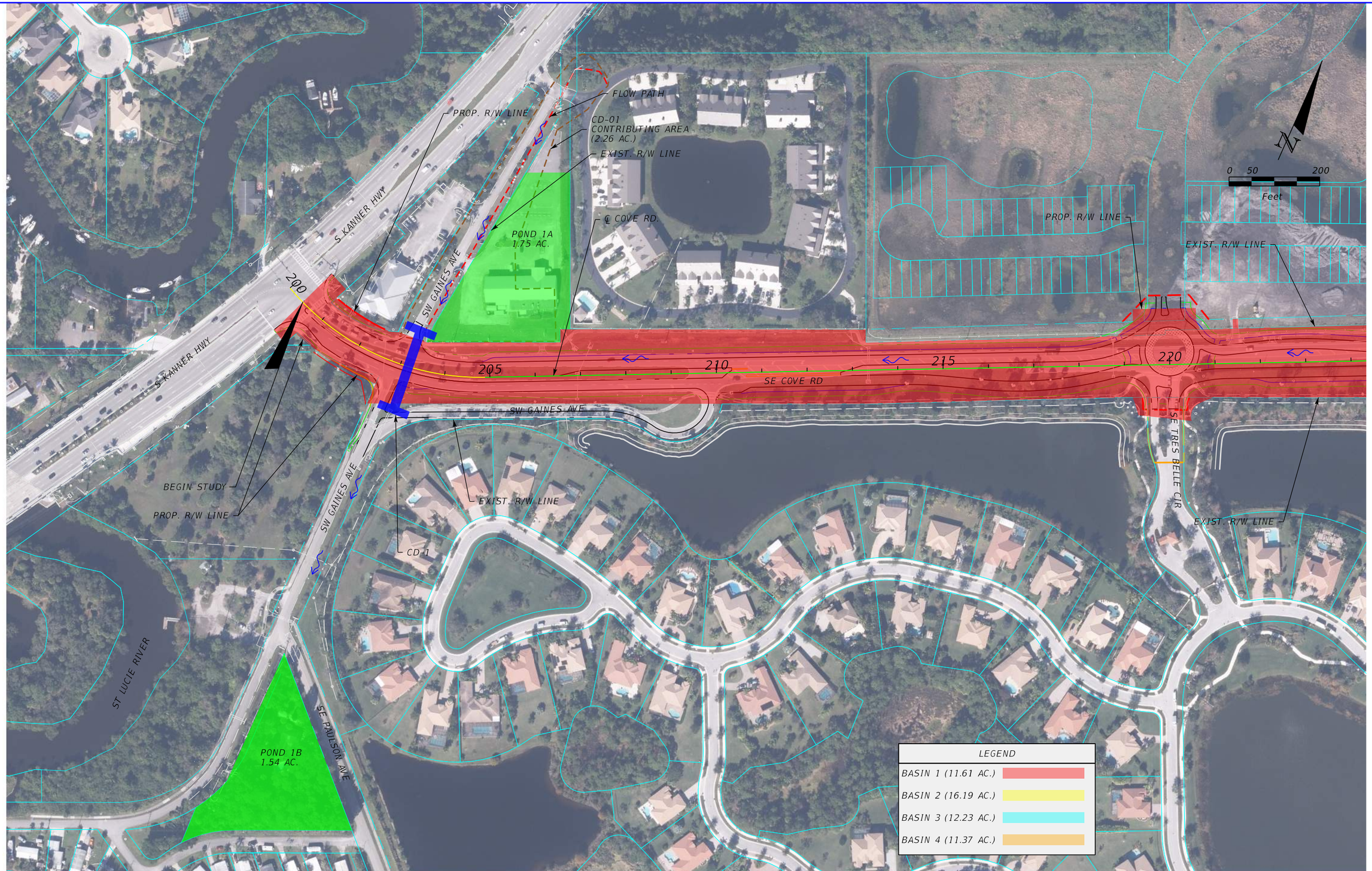

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

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OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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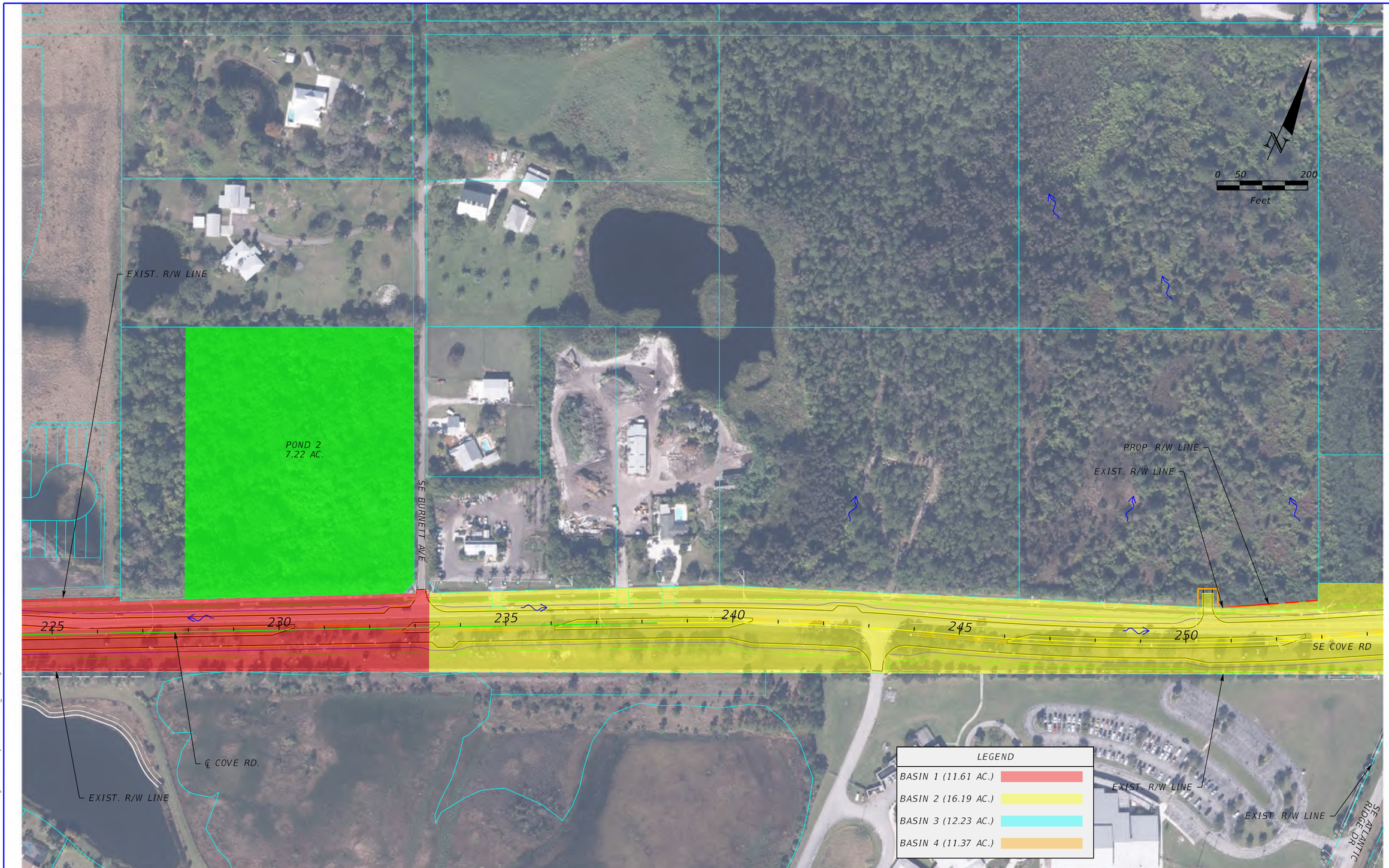

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
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ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

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FAC NOTE

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
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ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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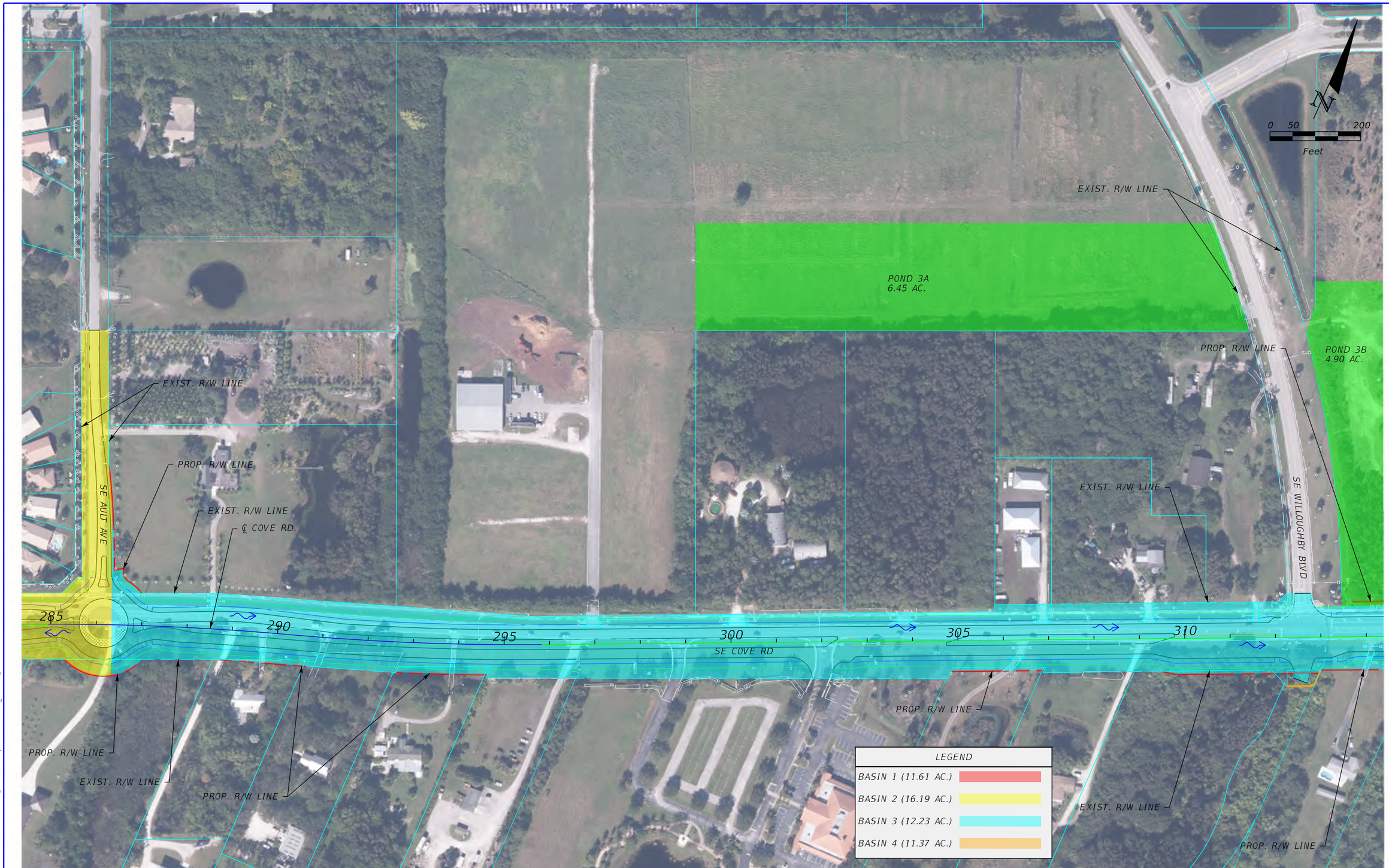

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
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ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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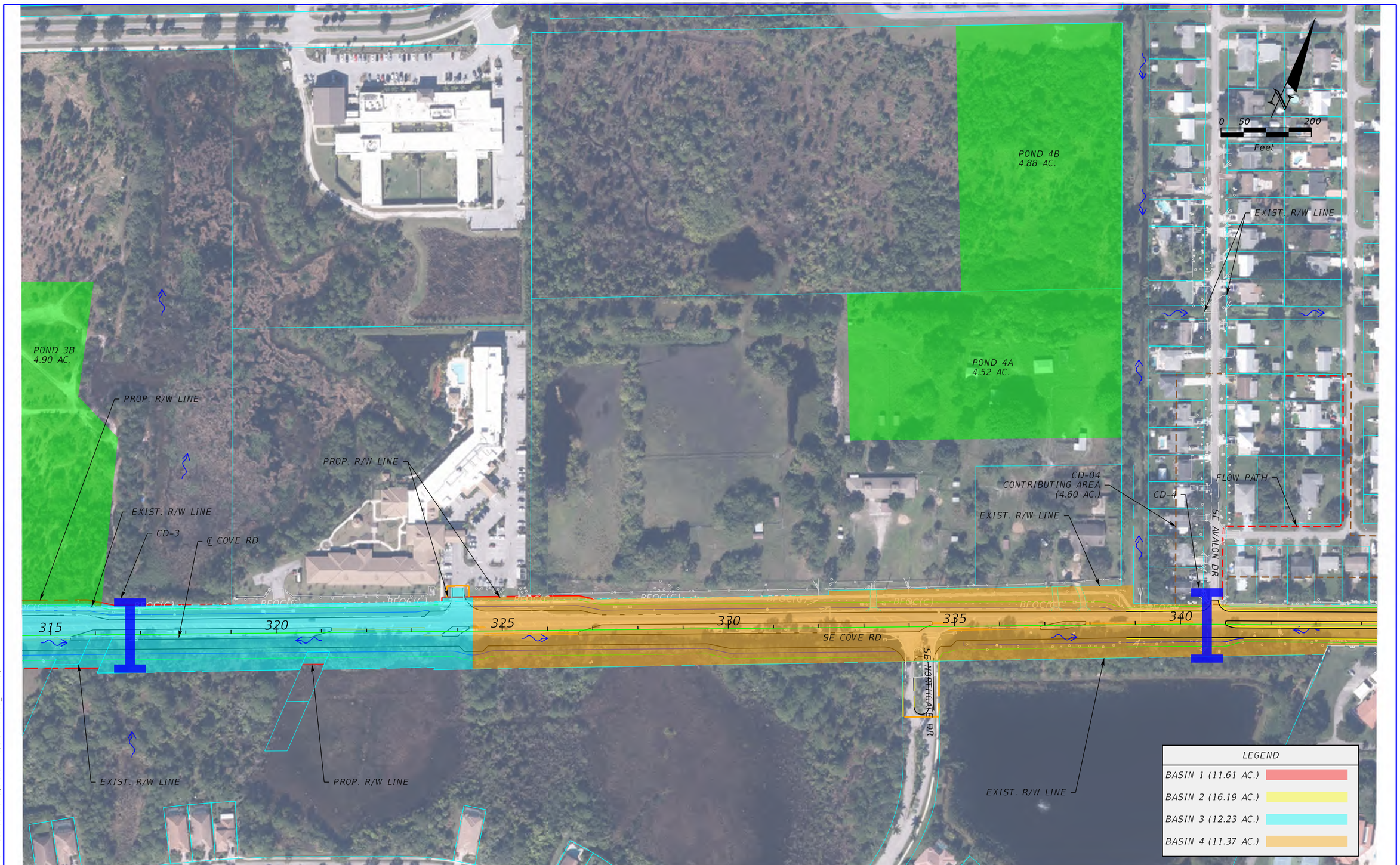

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

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3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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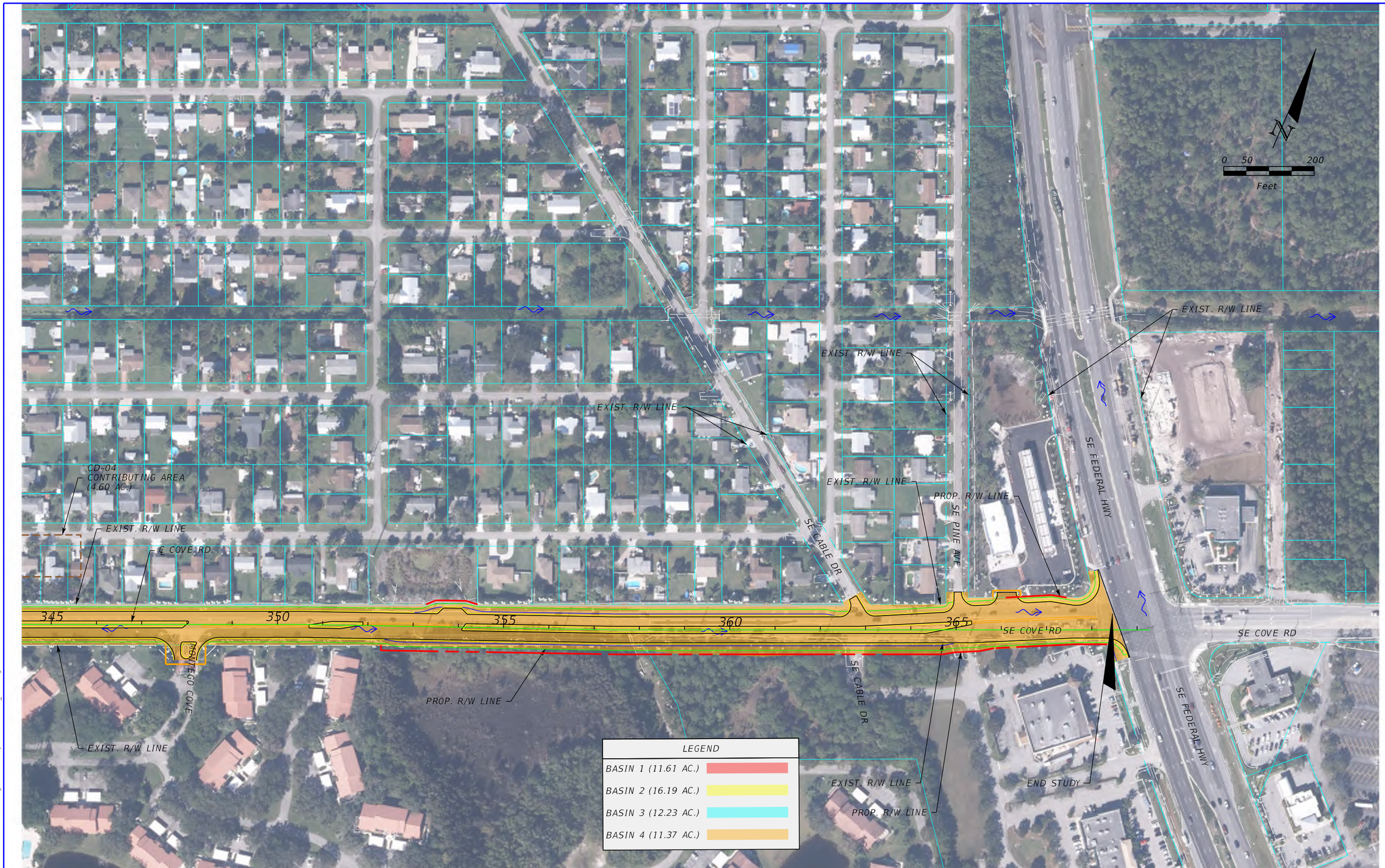
FAC NOTE



REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

PROFESSIONAL TYPE

ZACHARY EVANS, P. E.
LICENSE NUMBER: 80498
ARDIRRA GROUP, INC.
3000 DOVERA DRIVE
OVIEDO, FL 32765

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE	MARTIN	441700-1-22-02

PROPOSED BASIN MAP

SHEET NO.

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FAC NOTE

APPENDIX 3

Pond Design Calculations

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1A**

Station Limits: From: 200+00 To: 233+27

Roadway Length = 3327 ft
R/W Width = 152 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 0.92 ac
Pervious Roadway Area: 10.69 ac
Total Roadway Area: 11.61 ac

Pond Area: Pond Area = 1.69 ac

Total Area:
Impervious Area: **0.92 ac**
Pervious Area: **12.39 ac**
Total Area: **13.30 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	0.92 ac	89.8
Impervious areas; Streets & roads	D	98		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84	10.69 ac	898.2
Commercial & business (85% impervious)	D	95	1.69 ac	160.8
		Total:	13.30 ac	1148.8

CN = Total CN*Area / Total Area = **86.4**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **1.58 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.00 in**	**6.46 in**

Ardurra Group, Inc.
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Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1A**

Station Limits: From: 200+00 To: 233+27

Roadway Length = 3327 ft
R/W Width = 152 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	97 ft

Impervious Roadway Area: 7.38 ac
Pervious Roadway Area: 4.23 ac
Total Roadway Area: 11.61 ac

Pond Area:

Pervious Pond Area : 0.95 ac
Water Surface Area: 0.74 ac Wet Pond
Total Pond Area: 1.69 ac

Total Area:

Impervious Area: **7.38 ac**
Pervious Area: **5.19 ac**
Water Surface Area: **0.74 ac**
Total Area: **13.30 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	7.38 ac	723.0
Impervious areas; Streets & roads	A	98		0.0
Proposed Ponds (Water Surface)	D	100	0.74 ac	73.9
Open Space (lawns, parks, golf courses, cemeteries,	A	49		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84	4.23 ac	355.4
Open Space (lawns, parks, golf courses, cemeteries,	D	84	0.95 ac	80.1
		Total:	13.30 ac	1232.5

CN = Total CN*Area / Total Area = **92.7**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.80 in**	**7.21 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.79 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1A**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 1: **6.10 ac**
Impacted Permitted Treatment Volume for Basin 1: **1.27 ac-ft**

SFWMD			
Wet Detention	**1.00 in**	x Total Basin Area =	**1.11 ac-ft**
	2.50 in	x New Impervious Areas	0.27 ac-ft
		Provide 50% More TV =	0.40 ac-ft
		New + Permitted Vol =	**1.67 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	**2.77 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. = **2.77 ac-ft**

Required Wet Detention TV = **2.77 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	11.08 ac-ft	7.16 ac-ft
Q_{post} =	11.97 ac-ft	7.99 ac-ft
ΔQ =	**0.89 ac-ft**	**0.83 ac-ft**

Attenuation V_{req} = **0.89 ac-ft** (use largest value)

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Made by: ZKE
Checked by: REC

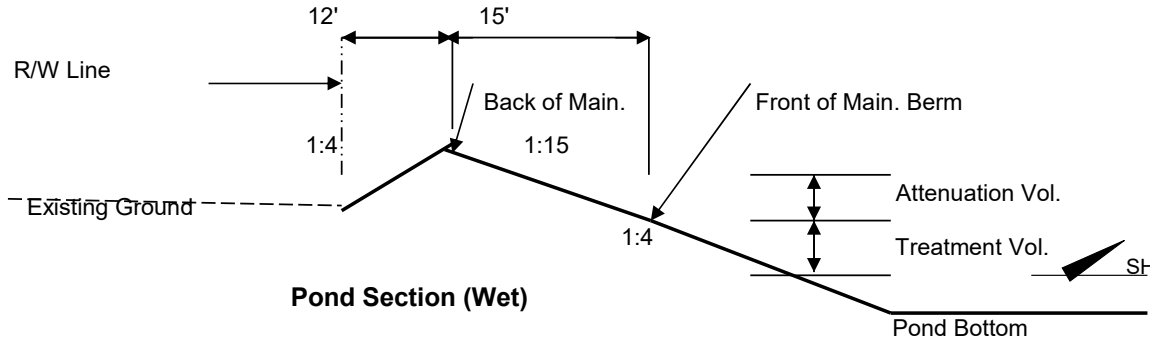
DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1A**

Maintenance Area Width =	15.0 ft	@ 1:15	Existing Ground Elevation =	8.50
Pond Tie-In Width =	12.0 ft	@ 1:4	Normal Water Elevation =	4.00
Maximum Storage Depth (**SD**) =	5.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	12.00

Hydraulic Grade Line (HGL) check

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	200 ft	
Estimated Energy Losses =	0.2 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	10.8 ft	



Pond Section (Wet)

Ardurra Group, Inc.
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(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1A**

Pond Stage / Storage Calculations

Note: Pond area divided by 2 to account for triangular pond shape

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
8.50	Pond R/W	1.46 ac	470.0 ft	271.0 ft	
11.50	Back of Main. Berm	1.26 ac	446.0 ft	247.0 ft	6.01 ac-ft
11.00		1.15 ac	431.0 ft	232.0 ft	5.41 ac-ft
10.50	Front of Main. Berm	1.04 ac	416.0 ft	217.0 ft	4.87 ac-ft
9.50	Provided Treat.Vol.+Att.Vol	0.98 ac	408.0 ft	209.0 ft	3.86 ac-ft
9.30	Req'd Treat.Vol+Att. Vol	0.97 ac	406.4 ft	207.4 ft	3.66 ac-ft
9.23	Estimated Storm Sewer TW	0.96 ac	405.8 ft	206.8 ft	3.60 ac-ft
8.35	Top of Treatment Vol.	0.91 ac	398.8 ft	199.8 ft	2.77 ac-ft
5.00	Normal Water Level	0.74 ac	372.0 ft	173.0 ft	0.00 ac-ft
2.00		0.60 ac	348.0 ft	149.0 ft	
-4.00	Pond Bottom	0.39 ac	336.0 ft	101.0 ft	

Required Treatment+Attenuation Vol.= 3.66 ac-ft
Required Treatment+Attenuation Stage= 9.30 ft

Provided Treatment+Attenuation Vol.= 3.86 ac-ft
Provided Treatment+Attenuation Stage= 9.50 ft

Estimated Treat. Vol.+Storm Sewer Att.= 3.60 ac-ft
Estimated Storm Sewer TW EL.= 9.23 ft

HGL requirements met

Additional 20% = 1.75 ac

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: December 5, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1B**

Station Limits: From: 200+00 To: 233+27

Roadway Length = 3327 ft
R/W Width = 152 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 0.92 ac
Pervious Roadway Area: 10.69 ac
Total Roadway Area: 11.61 ac

Pond Area: Pond Area = 1.29 ac

Total Area:
Impervious Area: **0.92 ac**
Pervious Area: **11.98 ac**
Total Area: **12.90 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	0.92 ac	89.8
Impervious areas; Streets & roads	D	98		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84	10.69 ac	897.8
Residential Areas (1.0 acre, 20% Impervious)	D	84	1.29 ac	108.4
		Total:	12.90 ac	1096.0

CN = Total CN*Area / Total Area = **84.9**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.81 in**	**6.29 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **1.77 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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Made by: ZKE
Checked by: REC

DATE: December 5, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1B**

Station Limits: From: 200+00 To: 233+27

Roadway Length = 3327 ft
R/W Width = 152 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	97 ft

Impervious Roadway Area:	7.38 ac
Pervious Roadway Area:	4.23 ac
Total Roadway Area:	11.61 ac

Pond Area:

Pervious Pond Area :	0.84 ac	
Water Surface Area:	0.45 ac	Wet Pond
Total Pond Area:	1.29 ac	

Total Area:

Impervious Area:	**7.38 ac**
Pervious Area:	**5.07 ac**
Water Surface Area:	**0.45 ac**
Total Area:	**12.90 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	7.38 ac	723.0
Impervious areas; Streets & roads	A	98		0.0
Proposed Ponds (Water Surface)	D	100	0.45 ac	45.3
Open Space (lawns, parks, golf courses, cemeteries,	A	49		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84	4.23 ac	355.4
Open Space (lawns, parks, golf courses, cemeteries,	D	84	0.84 ac	70.3
		Total:	12.90 ac	1194.1

CN = Total CN*Area / Total Area = **92.6**

Runoff:

		SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Soil Capacity (S) = $\frac{1000}{CN} - 10 =$	0.80 in	Precipitation (P) =	11.70 in / 8.09 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**10.79 in** / **7.20 in**

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Made by: ZKE
Checked by: REC

DATE: December 5, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1B**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 1: **6.10 ac**
Impacted Permitted Treatment Volume for Basin 1: **1.27 ac-ft**

SFWMD			
Wet Detention	**1.00 in**	x Total Basin Area =	**1.07 ac-ft**
	2.50 in	x New Impervious Areas	0.27 ac-ft
		Provide 50% More TV =	0.40 ac-ft
		New + Permitted Vol =	**1.67 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	**2.77 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. =	**2.77 ac-ft**
Required Wet Detention TV =	**2.77 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	10.55 ac-ft	6.77 ac-ft
Q_{post} =	11.59 ac-ft	7.74 ac-ft
ΔQ =	**1.04 ac-ft**	**0.97 ac-ft**

Attenuation V_{req} = **1.04 ac-ft** (use largest value)

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Made by: ZKE
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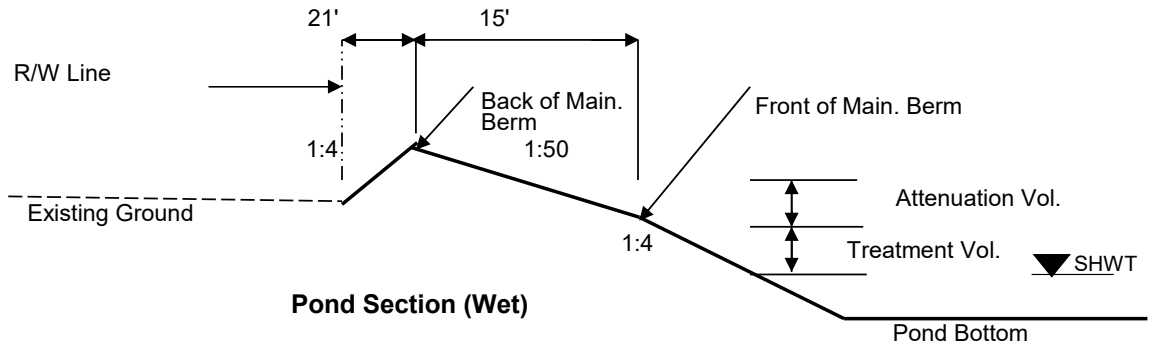
DATE: December 5, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1B**

Maintenance Area Width =	15.0 ft	@ 1:50	Existing Ground Elevation =	6.00
Pond Tie-In Width =	21.2 ft	@ 1:4	Normal Water Elevation =	3.50
Maximum Storage Depth (**SD**) =	6.50 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	12.00

Hydraulic Grade Line (HGL) check

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	700 ft	
Estimated Energy Losses =	0.7 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	10.3 ft	



Pond Section (Wet)

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Made by: ZKE
Checked by: REC

DATE: December 5, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1B**

Pond Stage / Storage Calculations

Note: Pond area divided by 2 to account for triangular pond shape

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
6.00	Pond R/W	1.29 ac	400.0 ft	280.0 ft	
11.30	Back of Main. Berm	0.98 ac	357.6 ft	237.6 ft	4.85 ac-ft
11.15		0.88 ac	342.6 ft	222.6 ft	4.72 ac-ft
11.00	Front of Main. Berm	0.78 ac	327.6 ft	207.6 ft	4.59 ac-ft
10.00	Provided Treat.Vol.+Att.Vol	0.73 ac	319.6 ft	199.6 ft	3.83 ac-ft
9.96	Req'd Treat.Vol+Att. Vol	0.73 ac	319.3 ft	199.3 ft	3.81 ac-ft
9.87	Estimated Storm Sewer TW	0.73 ac	318.6 ft	198.6 ft	3.74 ac-ft
8.47	Top of Treatment Vol.	0.66 ac	307.4 ft	187.4 ft	2.77 ac-ft
3.50	Normal Water Level	0.45 ac	267.6 ft	147.6 ft	0.00 ac-ft
0.50		0.35 ac	243.6 ft	123.6 ft	
-5.50	Pond Bottom	0.20 ac	231.6 ft	75.6 ft	

Required Treatment+Attenuation Vol.= 3.81 ac-ft
Required Treatment+Attenuation Stage= 9.96 ft

Provided Treatment+Attenuation Vol.= 3.83 ac-ft
Provided Treatment+Attenuation Stage= 10.00 ft

Estimated Treat. Vol.+Storm Sewer Att.= 3.74 ac-ft
Estimated Storm Sewer TW EL.= 9.87 ft

HGL requirements met

Additional 20% = 1.54 ac

Ardurra Group, Inc.
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Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 200+00 To: 233+27

Roadway Length = 3327 ft
R/W Width = 152 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 0.92 ac
Pervious Roadway Area: 10.69 ac
Total Roadway Area: 11.61 ac

Total Area:

Impervious Area: **0.92 ac**
Pervious Area: **10.69 ac**
Total Area: **11.61 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	0.92 ac	89.8
Impervious areas; Streets & roads	D	98		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84	10.69 ac	898.2
Commercial & business (85% impervious)	D	95	0.00 ac	0.0
		Total:	11.61 ac	988.0

CN = Total CN*Area / Total Area = **85.1**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **1.75 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.83 in**	**6.31 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 200+00 To: 233+27

Roadway Length = 3327 ft
R/W Width = 152 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	97 ft

Impervious Roadway Area:	7.38 ac
Pervious Roadway Area:	4.23 ac
Total Roadway Area:	11.61 ac

Total Area:

Impervious Area:	**7.38 ac**
Pervious Area:	**4.23 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**11.61 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	7.38 ac	723.0
Impervious areas; Streets & roads	A	98		0.0
Proposed Ponds (Water Surface)	D	100	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries,	A	49		0.0
Open Space (lawns, parks, golf courses, cemeteries,	D	84	4.23 ac	355.4
Open Space (lawns, parks, golf courses, cemeteries,	D	84	0.00 ac	0.0
		Total:	11.61 ac	1078.5

CN = Total CN*Area / Total Area = **92.9**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.83 in**	**7.24 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.76 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
TREATMENT NAME : **Exfiltration**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Dry Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 1: **6.10 ac**
Impacted Permitted Treatment Volume for Basin 1: **1.27 ac-ft**

SFWMD			
Dry Detention	**1.00 in**	x Total Basin Area =	**0.97 ac-ft**
	1.88 in	x New Impervious Areas	0.20 ac-ft
		Provide 50% More TV =	0.30 ac-ft
		New + Permitted Vol =	**1.57 ac-ft**

Martin County			
Dry Detention	**3.75 in**	x Impervious Areas =	**2.31 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. =	**2.31 ac-ft**
Required Dry Detention TV =	**2.31 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	9.51 ac-ft	6.11 ac-ft
Q_{post} =	10.48 ac-ft	7.00 ac-ft
ΔQ =	**0.96 ac-ft**	**0.90 ac-ft**

Attenuation V_{req} = 0.96 ac-ft (use largest value)

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

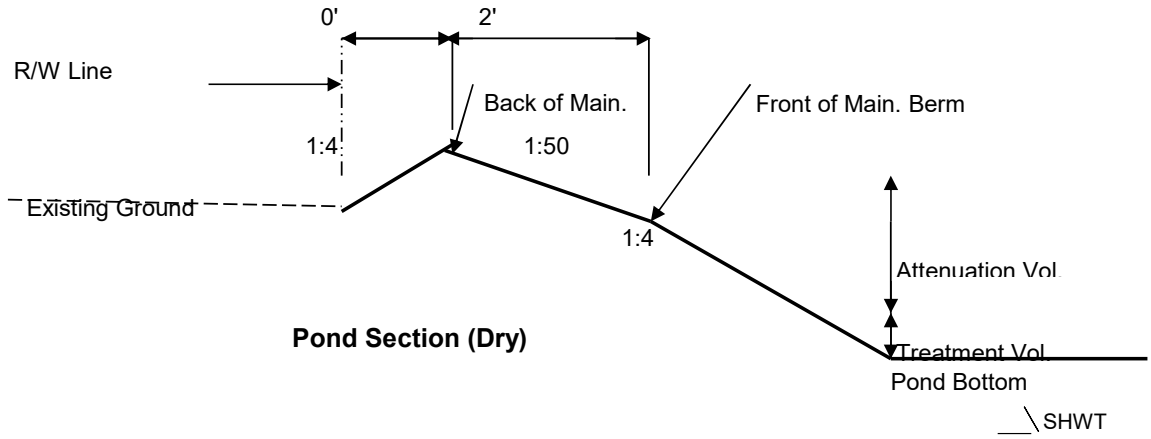
DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
TREATMENT NAME : **Exfiltration**

Maintenance Area Width =	2.0 ft	@ 1:50	Existing Ground Elevation =	9.50
Pond Tie-In Width =	0.4 ft	@ 1:4	Normal Water Elevation =	5.00
Maximum Storage Depth (**SD**) =	3.60 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	11.00

Hydraulic Grade Line (HGL) check

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	200 ft	
Estimated Energy Losses =	0.2 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	9.8 ft	



Pond Section (Dry)

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3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
TREATMENT NAME : **Exfiltration**

Swale Stage / Storage Calculations

Swale along north of Cove Road

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
9.50	Pond R/W	0.62 ac	675.0 ft	40.0 ft	
9.60	Back of Main. Berm	0.61 ac	674.2 ft	39.2 ft	1.17 ac-ft
9.55		0.26 ac	669.2 ft	34.2 ft	1.15 ac-ft
9.50	Front of Main. Berm	0.54 ac	670.2 ft	35.2 ft	1.13 ac-ft
9.00	Provided Treat.Vol.+Att.Vol	0.48 ac	666.2 ft	31.2 ft	0.87 ac-ft
9.00	Req'd Treat.Vol+Att. Vol	0.48 ac	666.2 ft	31.2 ft	0.87 ac-ft
9.00	Estimated Storm Sewer TW	0.48 ac	666.2 ft	31.2 ft	0.87 ac-ft
9.00	Top of Treatment Vol.	0.48 ac	666.2 ft	31.2 ft	0.87 ac-ft
6.00	Swale Bottom	0.11 ac	642.2 ft	7.2 ft	0.00 ac-ft

Swale between Gaines Avenue and Cove Road

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
12.50	Pond R/W	0.14 ac	120.0 ft	50.0 ft	
12.60	Back of Main. Berm	0.13 ac	119.2 ft	49.2 ft	0.31 ac-ft
12.55		0.06 ac	114.2 ft	44.2 ft	0.30 ac-ft
12.50	Front of Main. Berm	0.12 ac	115.2 ft	45.2 ft	0.30 ac-ft
12.00	Provided Treat.Vol.+Att.Vol	0.11 ac	111.2 ft	41.2 ft	0.24 ac-ft
12.00	Req'd Treat.Vol+Att. Vol	0.11 ac	111.2 ft	41.2 ft	0.24 ac-ft
12.00	Estimated Storm Sewer TW	0.11 ac	111.2 ft	41.2 ft	0.24 ac-ft
12.00	Top of Treatment Vol.	0.11 ac	111.2 ft	41.2 ft	0.24 ac-ft
8.00	Swale Bottom	0.02 ac	79.2 ft	9.2 ft	0.00 ac-ft

Compensation along Gaines Avenue north of Cove Road

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
9.50	Pond R/W	0.32 ac	550.0 ft	25.0 ft	
9.10	Back of Main. Berm	0.31 ac	549.2 ft	24.2 ft	0.28 ac-ft
9.05		0.12 ac	544.2 ft	19.2 ft	0.27 ac-ft
9.00	Front of Main. Berm	0.25 ac	545.2 ft	20.2 ft	0.26 ac-ft
8.50	Provided Treat.Vol.+Att.Vol	0.20 ac	541.2 ft	16.2 ft	0.15 ac-ft
8.00	Req'd Treat.Vol+Att. Vol	0.15 ac	537.2 ft	12.2 ft	0.06 ac-ft
8.00	Estimated Storm Sewer TW	0.15 ac	537.2 ft	12.2 ft	0.06 ac-ft
8.00	Top of Treatment Vol.	0.15 ac	537.2 ft	12.2 ft	0.06 ac-ft
7.50	Swale Bottom	0.10 ac	533.2 ft	8.2 ft	0.00 ac-ft

Required Treatment+Attenuation Vol.= 3.27 ac-ft
Required Treatment+Attenuation Stage= 9.00 ft

Provided Treatment+Attenuation Vol.= 1.18 ac-ft
Provided Treatment+Attenuation Stage= 9.00 ft

Additional Required 2.09 ac-ft of Treatment and Attenuation Volume provided via Exfiltration

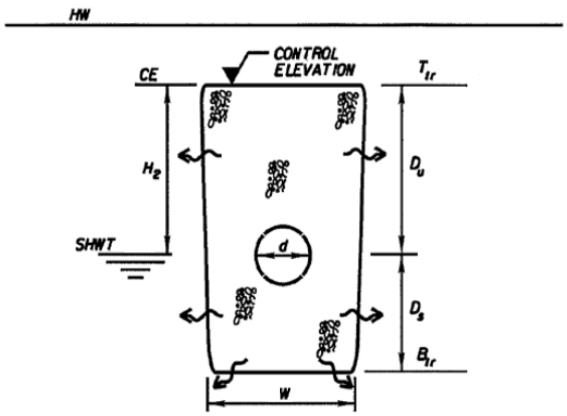
MADE BY:	ZKE	DATE:	08/12/24	JOB NO.	DT4-010-01
CHECKED BY:	REC	DATE:		SHEET NO.	
CALCULATIONS FOR:	Cove Road PD&E Study			BASIN:	Basin 1

Factor of Safety = 2
(per Drainage Design Guide 7.2.2.7)

Seasonal High Water Table (SHWT) = 6 ft
Tail Water Elevation (TW) = 6 ft
Head Water (HW) = 11 ft
Saturated Hydraulic Conductivity (K) = 0.0000317 ft^3/sec / ft^2-ft of head

Exfiltration Trench Characteristics

Outfall Control Elevation (CE) = 10 ft
Trench Bottom Width (W) = 8 ft
Trench Bottom Elevation (B_{el}) = 3 ft
Trench Top Elevation (T_{el}) = 10 ft
Perforated Pipe Diameter (D) = 30 in
Perforated Pipe Invert (P_{inv}) = 6 ft
Length of Trench (L) = 3725 ft



Calculations

Effective Head (H_2) = CE - SHWT = 4 ft
Trench Height (H) = T_{el} - B_{el} = 7 ft
Unsaturated Depth of Trench (D_u) = T_{el} - SHWT = 4 ft
Saturated Depth of Trench (D_s) = SHWT - B_{el} = 3 ft

If $D_u > D_s$ or $W < 2H$

Treatment Volume Provided (V) = $L(K(H_2W+2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = 2.09 Ac-Ft

If $D_u < D_s$ or $W > 2H$

Treatment Volume Provided (V) = $L(K(2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = Criteria Not Met

Note: If both criteria are met then use most conservative:

Provided Treatment Volume (V) = 2.09 Ac-Ft
Required Exfiltration Trench Length (L) * FoS = 7450 Ft

Recovery Time

Effective Head: Heff = (HW - SWHT) / 2 = 2.5 ft
Trench Height: Htr = T_{el} - B_{el} = 7 ft
A_{uwb} = Lnet ($2D_u$ + W_{tr}) = 29800 ft^2
Unsaturated exfiltration will occur only through walls and bottom if the trench bottom is above the SHWT: Therefore W_{tr} = 0 for this trench
Unsaturated Capacity: Q_u = K_u*A_{uwb}*H_{eff} = 2.36165 ft^3/sec

Recovery Time (T_{rec} ≤ 72hr): T_{rec} = V_{WQ} / Q_u = 10.70 hr **Meets Recovery Requirements**

filename: exfiltration worksheet.xls
worksheet: Empirical Equations (Basin 1)

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Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

Station Limits: From: 233+27 To: 286+28

Roadway Length = 5301 ft
R/W Width = 133 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Ault Avenue Area			5 ft
Barrier Wall			0 ft
		Total Impervious Width:	17 ft

Impervious Roadway Area: 2.07 ac
Pervious Roadway Area: 14.12 ac
Total Roadway Area: 16.19 ac

Pond Area: Pervious Pond Area = 5.63 ac

Total Area:
Impervious Area: **2.07 ac**
Pervious Area: **19.74 ac**
Total Area: **21.81 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.18 ac	115.6
Impervious areas; Streets & roads	A	98	0.89 ac	87.1
Open Space (lawns, parks, golf courses, cemeteries,	A	49	1.62 ac	79.4
Open Space (lawns, parks, golf courses, cemeteries,	D	84	12.50 ac	1049.7
Woods; Good condition (Woods are protected from	D	77	5.63 ac	433.4
		Total:	21.81 ac	1765.2

CN = Total CN*Area / Total Area = **80.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.36 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.28 in**	**5.82 in**

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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

Station Limits: From: 233+27 To: 286+28

Roadway Length = 5301 ft
R/W Width = 133 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Ault Avenue Area			5 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	102 ft

Impervious Roadway Area: 12.46 ac
Pervious Roadway Area: 3.73 ac
Total Roadway Area: 16.19 ac

Pond Area:

Pervious Pond Area : 1.74 ac
Water Surface Area: 3.89 ac Wet Pond
Total Pond Area: 5.63 ac

Total Area:

Impervious Area: **12.46 ac**
Pervious Area: **5.47 ac**
Water Surface Area: **3.89 ac**
Total Area: **21.81 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	10.20 ac	999.6
Impervious areas; Streets & roads	A	98	2.26 ac	221.1
Proposed Ponds (Water Surface)	D	100	3.89 ac	389.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	A	49	0.68 ac	33.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	3.05 ac	256.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	1.74 ac	145.9
				0.0
		Total:	21.81 ac	2045.3

CN = Total CN*Area / Total Area = **93.8**

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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

Runoff:

				SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Soil Capacity (S) =	$\frac{1000}{CN} - 10 =$	0.67 in	Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	$\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**10.94 in**	**7.34 in**

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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 2: **7.89 ac**
Impacted Permitted Treatment Volume for Basin 2: **1.64 ac-ft**

SFWMD			
SFWMD	**1.00 in**	x Total Basin Area =	**1.82 ac-ft**
		x New Impervious Areas	0.95 ac-ft
	2.50 in	Provide 50% More TV =	1.43 ac-ft
		New + Permitted Vol =	**3.07 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	4.67 ac-ft

Treatment V_{req} = Largest of Trt. Vol. = **4.67 ac-ft**

Required Wet Detention TV = **4.67 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	16.87 ac-ft	10.58 ac-ft
Q_{post} =	19.88 ac-ft	13.35 ac-ft
ΔQ =	**3.01 ac-ft**	**2.77 ac-ft**

Attenuation V_{req} = **3.01 ac-ft** (use largest value)

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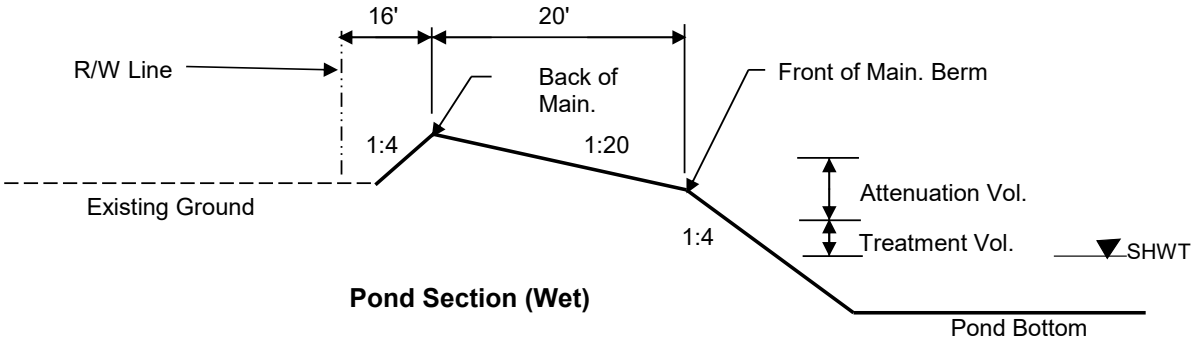
PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	11.00
Pond Tie-In Width =	16.4 ft	@ 1:4	Normal Water Elevation =	11.00
Maximum Storage Depth (**SD**) =	2.10 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	16.00

Hydraulic Grade Line (HGL) check

HGL Slope =	0.100%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	650 ft	
Estimated Energy Losses =	0.7 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	14.4 ft	



Pond Section (Wet)

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
11.00	Pond R/W	6.02 ac	416.0 ft	630.0 ft	
15.10	Back of Main. Berm	5.25 ac	383.2 ft	597.2 ft	17.65 ac-ft
14.60		4.81 ac	363.2 ft	577.2 ft	15.13 ac-ft
14.10	Front of Main. Berm	4.39 ac	343.2 ft	557.2 ft	12.83 ac-ft
13.10	Provided Treat.Vol.+Att.Vol	4.23 ac	335.2 ft	549.2 ft	8.52 ac-ft
12.90	Req'd Treat.Vol+Att. Vol	4.19 ac	333.6 ft	547.6 ft	7.68 ac-ft
12.85	Estimated Storm Sewer TW	4.19 ac	333.2 ft	547.2 ft	7.47 ac-ft
12.17	Top of Treatment Vol.	4.08 ac	327.8 ft	541.8 ft	4.67 ac-ft
11.00	Normal Water Level	3.89 ac	318.4 ft	532.4 ft	0.00 ac-ft
8.00		3.44 ac	294.4 ft	508.4 ft	
2.00	Pond Bottom	2.98 ac	282.4 ft	460.4 ft	

Required Treatment+Attenuation Vol.= 7.68 ac-ft
Required Treatment+Attenuation Stage= 12.90 ft

Provided Treatment+Attenuation Vol.= 8.52 ac-ft
Provided Treatment+Attenuation Stage= 13.10 ft

Estimated Treat. Vol.+Storm Sewer Att.= 7.44 ac-ft
Estimated Storm Sewer TW EL.= 12.85 ft

HGL requirements met

Additional 20% = 7.22 ac

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 233+27 To: 286+28

Roadway Length = 5301 ft
R/W Width = 133 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Ault Avenue Area			5 ft
Barrier Wall			0 ft
		Total Impervious Width:	17 ft

Impervious Roadway Area: 2.07 ac
Pervious Roadway Area: 14.12 ac
Total Roadway Area: 16.19 ac

Total Area:

Impervious Area: **2.07 ac**
Pervious Area: **14.12 ac**
Total Area: **16.19 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	A	98	1.18 ac	115.6
Impervious areas; Streets & roads	D	98	0.89 ac	87.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	A	49	1.62 ac	79.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	12.50 ac	1049.7
Depressional areas & existing storage	D	90	0.00 ac	0.0
		Total:	16.19 ac	1331.8

CN = Total CN*Area / Total Area = **82.3**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.46 in**	**5.98 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.15 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 233+27 To: 286+28

Roadway Length = 5301 ft
R/W Width = 133 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Ault Avenue Area			5 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	102 ft

Impervious Roadway Area:	12.46 ac
Pervious Roadway Area:	3.73 ac
Total Roadway Area:	16.19 ac

Total Area:

Impervious Area:	**12.46 ac**
Pervious Area:	**3.73 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**16.19 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	10.20 ac	999.6
Impervious areas; Streets & roads	A	98	2.26 ac	221.1
Proposed Ponds (Water Surface)	D	100	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	A	49	0.68 ac	33.1
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	3.05 ac	256.6
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84	0.00 ac	0.0
				0.0
		Total:	16.19 ac	1510.3

CN = Total CN*Area / Total Area = **93.3**

Runoff:

SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)

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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
TREATMENT NAME : **Exfiltration**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.72 in

Precipitation (P) = 11.70 in | 8.09 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

Runoff (Q) = **10.88 in** | **7.29 in**

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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
TREATMENT NAME : **Exfiltration**

EXFILTRATION

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:

Existing Permitted Impervious Area for Basin 2:	**7.89 ac**
Impacted Permitted Treatment Volume for Basin 2:	**1.64 ac-ft**

SFWMD			
SFWMD	**1.00 in**	x Total Basin Area =	**1.35 ac-ft**
	1.25 in	x New Impervious Areas	0.48 ac-ft
		Provide 50% More TV =	0.71 ac-ft
		New + Permitted Vol =	**2.35 ac-ft**

Martin County			
Wet Detention	**3.00 in**	x Impervious Areas =	3.11 ac-ft

Treatment V_{req} = Largest of Trt. Vol. =	**3.11 ac-ft**
Required Wet Detention TV =	**3.11 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	12.76 ac-ft	8.06 ac-ft
Q_{post} =	14.68 ac-ft	9.83 ac-ft
ΔQ =	**1.92 ac-ft**	**1.77 ac-ft**

Attenuation V_{req} = 1.92 ac-ft (use largest value)

Required Treatment+Attenuation Vol.= 5.03 ac-ft

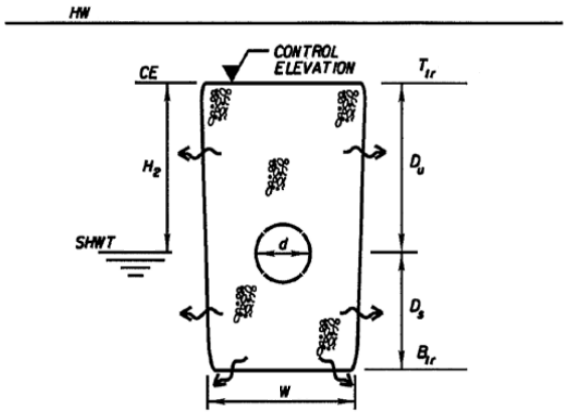
MADE BY:	ZKE	DATE:	08/12/24	JOB NO.	DT4-010-01
CHECKED BY:	REC	DATE:		SHEET NO.	
CALCULATIONS FOR:	Cove Road PD&E Study			BASIN:	Basin 2

Factor of Safety = 2
(per Drainage Design Guide 7.2.2.7)

Seasonal High Water Table (SHWT) = 11 ft
Tail Water Elevation (TW) = 11 ft
Head Water (HW) = 16 ft
Saturated Hydraulic Conductivity (K) = 0.0000317 ft^3/sec / ft^2-ft of head

Exfiltration Trench Characteristics

Outfall Control Elevation (CE) = 15 ft
Trench Bottom Width (W) = 8 ft
Trench Bottom Elevation (B_{el}) = 8 ft
Trench Top Elevation (T_{el}) = 15 ft
Perforated Pipe Diameter (D) = 30 in
Perforated Pipe Invert (P_{inv}) = 11 ft
Length of Trench (L) = 8960 ft



Calculations

Effective Head (H_2) = CE - SHWT = 4 ft
Trench Height (H) = T_{el} - B_{el} = 7 ft
Unsaturated Depth of Trench (D_u) = T_{el} - SHWT = 4 ft
Saturated Depth of Trench (D_s) = SHWT - B_{el} = 3 ft

If $D_u > D_s$ or $W < 2H$

Treatment Volume Provided (V) = $L(K(H_2W+2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = 5.03 Ac-Ft

If $D_u < D_s$ or $W > 2H$

Treatment Volume Provided (V) = $L(K(2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = Criteria Not Met

Note: If both criteria are met then use most conservative:

Provided Treatment Volume (V) = 5.03 Ac-Ft
Required Exfiltration Trench Length (L) * FoS = 17920 Ft

Recovery Time

Effective Head: Heff = (HW - SWHT) / 2 = 2.5 ft
Trench Height: Htr = T_{el} - B_{el} = 7 ft
A_{uwb} = Lnet ($2D_u$ + W_{tr}) = 71680 ft^2
Unsaturated exfiltration will occur only through walls and bottom if the trench bottom is above the SHWT: Therefore W_{tr} = 0 for this trench
Unsaturated Capacity: Q_u = K_u*A_{uwb}*H_{eff} = 5.68064 ft^3/sec

Recovery Time (T_{rec} ≤ 72hr): T_{rec} = V_{WQ} / Q_u = 10.70 hr **Meets Recovery Requirements**

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(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3A**

Station Limits: From: 286+28 To: 324+20

Roadway Length = 3792 ft
R/W Width = 141 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 1.04 ac
Pervious Roadway Area: 11.19 ac
Total Roadway Area: 12.23 ac

Pond Area: Pervious Pond Area = 5.81 ac

Total Area:
Impervious Area: **1.04 ac**
Pervious Area: **17.00 ac**
Total Area: **18.04 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.04 ac	102.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	11.19 ac	894.9
Brush-weed-grass mixture; Fair condition (50% to 75% ground cover)	D	77	5.81 ac	447.5
		Total:	18.04 ac	1444.8

CN = Total CN*Area / Total Area = **80.1**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.49 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.17 in**	**5.72 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3A**

Station Limits: From: 286+28 To: 324+20

Roadway Length = 3792 ft
R/W Width = 141 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	97 ft

Impervious Roadway Area: 8.41 ac
Pervious Roadway Area: 3.82 ac
Total Roadway Area: 12.23 ac

Pond Area:

Pervious Pond Area : 2.43 ac
Water Surface Area: 3.38 ac Wet Pond
Total Pond Area: 5.81 ac

Total Area:

Impervious Area: **8.41 ac**
Pervious Area: **6.25 ac**
Water Surface Area: **3.38 ac**
Total Area: **18.04 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	8.41 ac	824.1
Proposed Ponds (Water Surface)	D	100	3.38 ac	337.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	6.25 ac	500.4
		Total:	18.04 ac	1662.3

CN = Total CN*Area / Total Area = **92.1**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.73 in**	**7.15 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.85 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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DATE: November 21, 2024
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PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3A**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 3: **6.25 ac**
Impacted Permitted Treatment Volume for Basin 3: **1.30 ac-ft**

SFWMD			
Wet Detention	**1.00 in**	x Total Basin Area =	**1.50 ac-ft**
		x New Impervious Areas	0.45 ac-ft
	2.50 in	Provide 50% More TV =	0.67 ac-ft
		New + Permitted Vol =	**1.97 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	**3.15 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. =	**3.15 ac-ft**
Required Wet Detention TV =	**3.15 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	13.78 ac-ft	8.60 ac-ft
Q_{post} =	16.14 ac-ft	10.75 ac-ft
ΔQ =	**2.36 ac-ft**	**2.15 ac-ft**

Attenuation V_{req} = **2.36 ac-ft** (use largest value)

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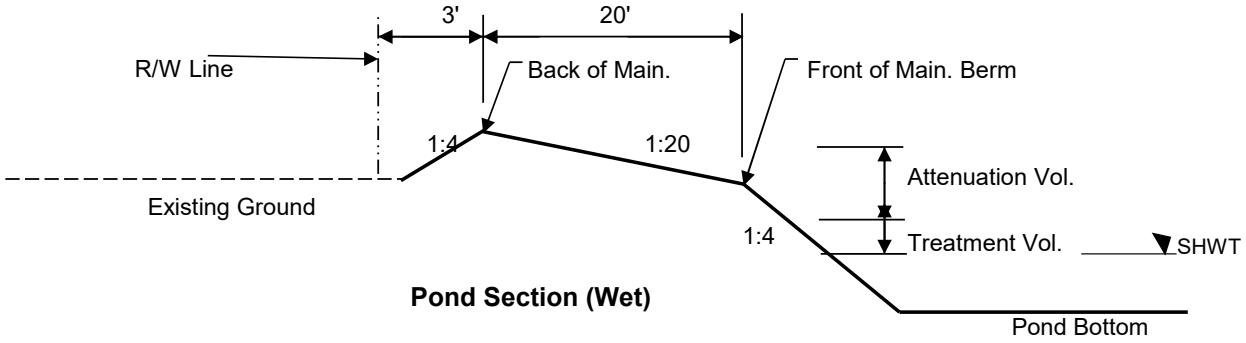
PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3A**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	17.00
Pond Tie-In Width =	3.0 ft	@ 1:4	Normal Water Elevation =	14.00
Maximum Storage Depth (**SD**) =	1.75 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	18.00

Hydraulic Grade Line (HGL) check

HGL Slope =	0.050%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	2800 ft	
Estimated Energy Losses =	1.4 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	15.6 ft	



Pond Section (Wet)

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3A**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
17.00	Pond R/W	5.45 ac	1200.0 ft	198.0 ft	
17.75	Back of Main. Berm	5.26 ac	1194.0 ft	192.0 ft	14.82 ac-ft
17.25		4.64 ac	1174.0 ft	172.0 ft	12.34 ac-ft
16.75	Front of Main. Berm	4.03 ac	1154.0 ft	152.0 ft	10.18 ac-ft
15.75	Provided Treat.Vol.+Att.Vol	3.79 ac	1146.0 ft	144.0 ft	6.27 ac-ft
15.55	Req'd Treat.Vol+Att. Vol	3.74 ac	1144.4 ft	142.4 ft	5.52 ac-ft
15.50	Estimated Storm Sewer TW	3.73 ac	1144.0 ft	142.0 ft	5.33 ac-ft
14.91	Top of Treatment Vol.	3.59 ac	1139.2 ft	137.2 ft	3.15 ac-ft
14.00	Normal Water Level	3.38 ac	1132.0 ft	130.0 ft	0.00 ac-ft
11.00		2.70 ac	1108.0 ft	106.0 ft	
5.00	Pond Bottom	1.46 ac	1096.0 ft	58.0 ft	

Required Treatment+Attenuation Vol.= 5.51 ac-ft
Required Treatment+Attenuation Stage= 15.55 ft

Provided Treatment+Attenuation Vol.= 6.27 ac-ft
Provided Treatment+Attenuation Stage= 15.75 ft

Estimated Treat. Vol.+Storm Sewer Att.= 5.30 ac-ft
Estimated Storm Sewer TW EL.= 15.50 ft

HGL requirements met

Additional 20% = 6.55 ac

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Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3B**

Station Limits: From: 286+28 To: 324+20

Roadway Length = 3792 ft
R/W Width = 141 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 1.04 ac
Pervious Roadway Area: 11.19 ac
Total Roadway Area: 12.23 ac

Pond Area: Pervious Pond Area = 4.34 ac

Total Area:
Impervious Area: **1.04 ac**
Pervious Area: **15.53 ac**
Total Area: **16.57 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.04 ac	102.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	11.19 ac	894.9
Brush-weed-grass mixture; Fair condition (50% to 75% ground cover)	D	77	4.34 ac	334.4
		Total:	16.57 ac	1331.7

CN = Total CN*Area / Total Area = **80.3**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.45 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.20 in**	**5.75 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3B**

Station Limits: From: 286+28 To: 324+20

Roadway Length = 3792 ft
R/W Width = 141 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	97 ft

Impervious Roadway Area: 8.41 ac
Pervious Roadway Area: 3.82 ac
Total Roadway Area: 12.23 ac

Pond Area:

Pervious Pond Area : 2.03 ac
Water Surface Area: 2.31 ac Wet Pond
Total Pond Area: 4.34 ac

Total Area:

Impervious Area: **8.41 ac**
Pervious Area: **5.86 ac**
Water Surface Area: **2.31 ac**
Total Area: **16.57 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	8.41 ac	824.1
Proposed Ponds (Water Surface)	D	100	2.31 ac	230.9
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	5.86 ac	468.5
		Total:	16.57 ac	1523.4

CN = Total CN*Area / Total Area = **91.9**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.71 in**	**7.12 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.88 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3B**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 3: **6.25 ac**
Impacted Permitted Treatment Volume for Basin 3: **1.30 ac-ft**

SFWMD			
Wet Detention	**1.00 in**	x Total Basin Area =	**1.38 ac-ft**
	2.50 in	x New Impervious Areas	0.45 ac-ft
		Provide 50% More TV =	0.67 ac-ft
		New + Permitted Vol =	**1.97 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	**3.15 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. = **3.15 ac-ft**

Required Wet Detention TV = **3.15 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	12.71 ac-ft	7.94 ac-ft
Q_{post} =	14.79 ac-ft	9.84 ac-ft
ΔQ =	**2.08 ac-ft**	**1.90 ac-ft**

Attenuation V_{req} = **2.08 ac-ft** (use largest value)

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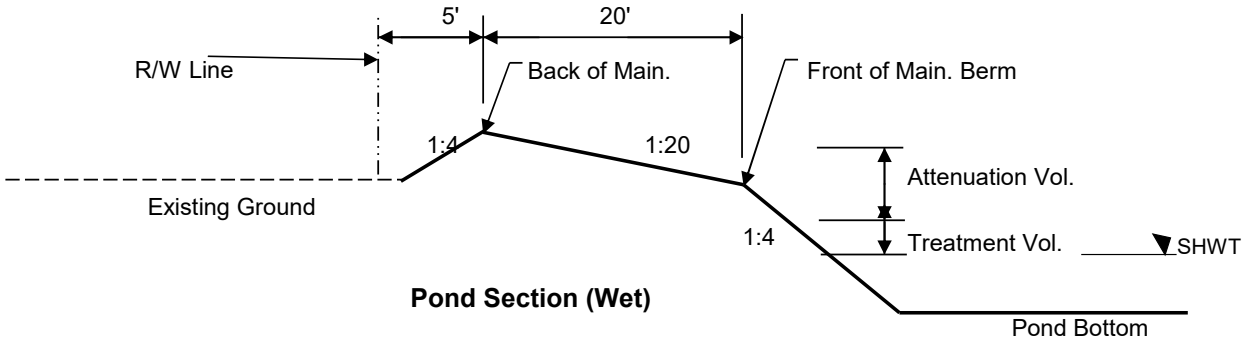
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3B**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	17.00
Pond Tie-In Width =	5.2 ft	@ 1:4	Normal Water Elevation =	14.00
Maximum Storage Depth (**SD**) =	2.30 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	18.00

Hydraulic Grade Line (HGL) check

HGL Slope =	0.050%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	1800 ft	
Estimated Energy Losses =	0.9 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	16.1 ft	



Pond Section (Wet)

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3B**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
17.00	Pond R/W	4.08 ac	880.0 ft	202.0 ft	
18.30	Back of Main. Berm	3.82 ac	869.6 ft	191.6 ft	11.92 ac-ft
17.80		3.35 ac	849.6 ft	171.6 ft	10.12 ac-ft
17.30	Front of Main. Berm	2.89 ac	829.6 ft	151.6 ft	8.57 ac-ft
16.30	Provided Treat.Vol.+Att.Vol	2.71 ac	821.6 ft	143.6 ft	5.77 ac-ft
16.10	Req'd Treat.Vol+Att. Vol	2.67 ac	820.0 ft	142.0 ft	5.23 ac-ft
16.05	Estimated Storm Sewer TW	2.66 ac	819.6 ft	141.6 ft	5.10 ac-ft
15.30	Top of Treatment Vol.	2.53 ac	813.6 ft	135.6 ft	3.15 ac-ft
14.00	Normal Water Level	2.31 ac	803.2 ft	125.2 ft	0.00 ac-ft
11.00		1.81 ac	779.2 ft	101.2 ft	
5.00	Pond Bottom	0.94 ac	767.2 ft	53.2 ft	

Required Treatment+Attenuation Vol.= 5.23 ac-ft
Required Treatment+Attenuation Stage= 16.10 ft

Provided Treatment+Attenuation Vol.= 5.77 ac-ft
Provided Treatment+Attenuation Stage= 16.30 ft

Estimated Treat. Vol.+Storm Sewer Att.= 5.05 ac-ft
Estimated Storm Sewer TW EL.= 16.05 ft

HGL requirements met

Additional 20% = 4.90 ac

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 286+28 To: 324+20

Roadway Length = 3792 ft
R/W Width = 141 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 1.04 ac
Pervious Roadway Area: 11.19 ac
Total Roadway Area: 12.23 ac

Total Area:

Impervious Area: **1.04 ac**
Pervious Area: **11.19 ac**
Total Area: **12.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.04 ac	102.4
Open Space (lawns, parks, golf courses, cemeteries,	D	80	11.19 ac	894.9
Brush-weed-grass mixture; Fair condition (50% to 75% ground cover)	D	77	0.00 ac	0.0
		Total:	12.23 ac	997.3

CN = Total CN*Area / Total Area = **81.5**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.26 in**		
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$		
Runoff (Q) =	**9.36 in**	**5.89 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 286+28 To: 324+20

Roadway Length = 3792 ft
R/W Width = 141 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	18.0 ft	1	18 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
15% Cont. for TL			13 ft
		Total Impervious Width:	97 ft

Impervious Roadway Area: 8.41 ac
Pervious Roadway Area: 3.82 ac
Total Roadway Area: 12.23 ac

Total Area:

Impervious Area: **8.41 ac**
Pervious Area: **3.82 ac**
Water Surface Area: **0.00 ac**
Total Area: **12.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	8.41 ac	824.1
Proposed Ponds (Water Surface)	D	100	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	3.82 ac	305.7
		Total:	12.23 ac	1129.8

CN = Total CN*Area / Total Area = **92.4**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.83 in		
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$	**10.76 in**	**7.18 in**

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
TREATMENT NAME : **Exfiltration**

EXFILTRATION

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:
Existing Permitted Impervious Area for Basin 3: **6.25 ac**
Impacted Permitted Treatment Volume for Basin 3: **1.30 ac-ft**

SFWMD			
Dry Retention	**0.50 in**	x Total Basin Area =	**0.51 ac-ft**
	1.25 in	x New Impervious Areas	0.22 ac-ft
		Provide 50% More TV =	0.34 ac-ft
		New + Permitted Vol =	**1.64 ac-ft**

Martin County			
Dry Retention	**3.00 in**	x Impervious Areas =	**2.10 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. = **2.10 ac-ft**

Required Wet Detention TV = **2.10 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	9.54 ac-ft	6.00 ac-ft
Q_{post} =	10.97 ac-ft	7.32 ac-ft
ΔQ =	**1.43 ac-ft**	**1.31 ac-ft**

Attenuation V_{req} = **1.43 ac-ft** (use largest value)

Required Treatment+Attenuation Vol.= 3.53 ac-ft

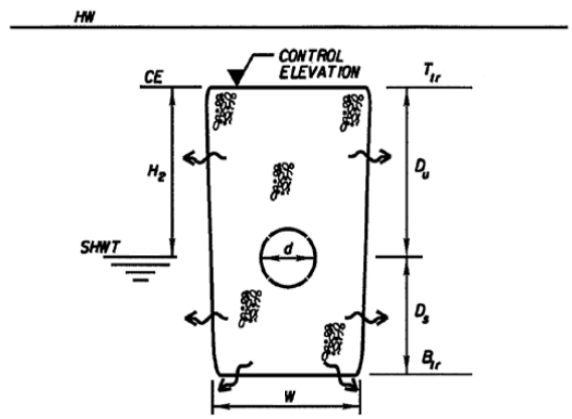
MADE BY:	ZKE	DATE:	08/12/24	JOB NO.	DT4-010-01
CHECKED BY:	REC	DATE:		SHEET NO.	
CALCULATIONS FOR:	Cove Road PD&E Study			BASIN:	Basin 3

Factor of Safety = 2
(per Drainage Design Guide 7.2.2.7)

Seasonal High Water Table (SHWT) =	14	ft
Tail Water Elevation (TW) =	14	ft
Head Water (HW) =	18	ft
Saturated Hydraulic Conductivity (K) =	0.0000317	ft^3/sec / ft^2-ft of head

Exfiltration Trench Characteristics

Outfall Control Elevation (CE) =	17	ft
Trench Bottom Width (W) =	8	ft
Trench Bottom Elevation (B_{el}) =	11	ft
Trench Top Elevation (T_{el}) =	17	ft
Perforated Pipe Diameter (D) =	30	in
Perforated Pipe Invert (P_{inv}) =	14	ft
Length of Trench (L) =	8550	ft



Calculations

Effective Head (H_2) = CE - SHWT =	3	ft
Trench Height (H) = T_{el} - B_{el} =	6	ft
Unsaturated Depth of Trench (D_u) = T_{el} - SHWT =	3	ft
Saturated Depth of Trench (D_s) = SHWT - B_{el} =	3	ft

If $D_u > D_s$ or $W < 2H$

Treatment Volume Provided (V) = $L(K(H_2W+2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = 3.53 Ac-Ft

If $D_u < D_s$ or $W > 2H$

Treatment Volume Provided (V) = $L(K(2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = Criteria Not Met

Note: If both criteria are met then use most conservative:

Provided Treatment Volume (V) =	**3.53**	**Ac-Ft**
Required Exfiltration Trench Length (L) * FoS =	**17100**	**Ft**

Recovery Time

Effective Head: Heff = (HW - SWHT) / 2 =	2	ft
Trench Height: Htr = T_{el} - B_{el} =	6	ft
A_{uwb} = Lnet ($2D_u$ + W_{tr}) =	51300	ft^2

Unsaturated exfiltration will occur only through walls and bottom if the trench bottom is above the SHWT: Therefore W_{tr} = 0 for this trench

Unsaturated Capacity: Q_u = K_u*A_{uwb}*H_{eff} = 3.25242 ft^3/sec

Recovery Time (T_{rec} ≤ 72hr): T_{rec} = V_{WQ} / Q_u = 13.13 hr **Meets Recovery Requirements**

filename: exfiltration worksheet.xls
worksheet: Empirical Equations (Basin 3)

Ardurra Group, Inc.
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(407) 971-8850 (phone)
(407) 971-8955 (fax)

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4A**

Station Limits: From: 324+20 To: 368+28

Roadway Length = 4408 ft
R/W Width = 112 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 1.21 ac
Pervious Roadway Area: 10.15 ac
Total Roadway Area: 11.37 ac

Pond Area: Pervious Pond Area = 3.86 ac

Total Area:
Impervious Area: **1.21 ac**
Pervious Area: **14.02 ac**
Total Area: **15.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.21 ac	119.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	14.02 ac	1121.4
		Total:	15.23 ac	1240.4

CN = Total CN*Area / Total Area = **81.4**

Runoff:

			SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Soil Capacity (S) =	$\frac{1000}{CN} - 10 =$	**2.28 in**	Precipitation (P) =	11.70 in / 8.09 in
Runoff (Q) =	$\frac{(P - 0.2S)^2}{(P + 0.8S)}$		Runoff (Q) =	**9.35 in** / **5.88 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4A**

Station Limits: From: 324+20 To: 368+28

Roadway Length = 4408 ft
R/W Width = 112 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	6.0 ft	1	6 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
Miscellaneous	12.0 ft	1	12 ft
		Total Impervious Width:	84 ft

Impervious Roadway Area:	8.50 ac
Pervious Roadway Area:	2.87 ac
Total Roadway Area:	11.37 ac

Pond Area:

Pervious Pond Area :	1.64 ac	
Water Surface Area:	2.22 ac	Wet Pond
Total Pond Area:	3.86 ac	

Total Area:

Impervious Area:	**8.50 ac**
Pervious Area:	**4.51 ac**
Water Surface Area:	**2.22 ac**
Total Area:	**15.23 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	8.50 ac	833.0
Proposed Ponds (Water Surface)	D	100	2.22 ac	222.4
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	4.51 ac	360.6
		Total:	15.23 ac	1416.0

CN = Total CN*Area / Total Area = **93.0**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.84 in**	**7.25 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.76 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4A**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:

Existing Permitted Impervious Area Basin 4:	**3.24 ac**
Impacted Permitted Treatment Volume Basin 4:	**0.68 ac-ft**
Existing Permitted Impervious AreaBasin 5:	**2.18 ac**
Impacted Permitted Treatment Volume Basin 5:	**0.45 ac-ft**

SFWMD			
Wet Detention	**1.00 in**	x Total Basin Area =	**1.27 ac-ft**
		x New Impervious Areas	0.64 ac-ft
	2.50 in	Provide 50% More TV =	0.96 ac-ft
		New + Permitted Vol =	**2.09 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	**3.19 ac-ft**

Treatment V_{req} = Largest of Trt. Vol. =	**3.19 ac-ft**
Required Wet Detention TV =	**3.19 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	11.87 ac-ft	7.46 ac-ft
Q_{post} =	13.76 ac-ft	9.20 ac-ft
ΔQ =	**1.89 ac-ft**	**1.74 ac-ft**

Attenuation V_{req} = 1.89 ac-ft (use largest value)

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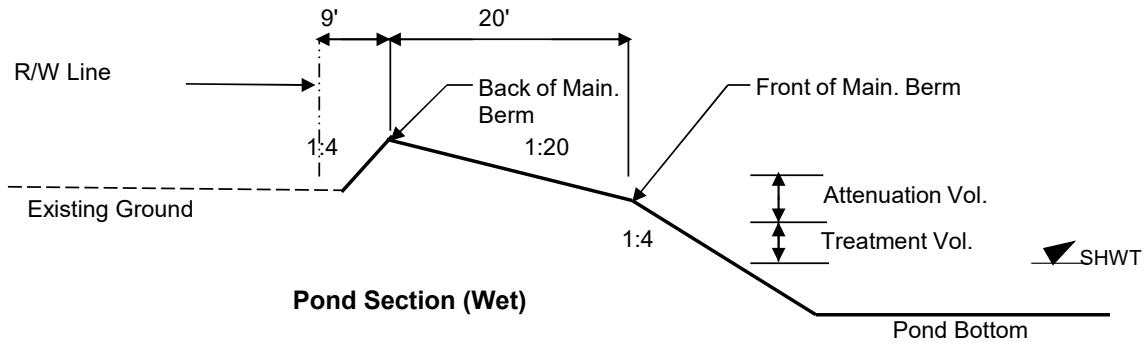
PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4A**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	16.00
Pond Tie-In Width =	9.4 ft	@ 1:4	Normal Water Elevation =	14.00
Maximum Storage Depth (**SD**) =	2.35 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	17.50

Hydraulic Grade Line (HGL) check

HGL Slope =	0.050%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	800 ft	
Estimated Energy Losses =	0.4 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	16.1 ft	



Pond Section (Wet)

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3000 Dovera Drive, Suite 200, Oviedo, FL 32765
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Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4A**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
16.00	Pond R/W	3.77 ac	597.0 ft	275.0 ft	
18.35	Back of Main. Berm	3.40 ac	578.2 ft	256.2 ft	11.22 ac-ft
17.85		3.03 ac	558.2 ft	236.2 ft	9.62 ac-ft
17.35	Front of Main. Berm	2.67 ac	538.2 ft	216.2 ft	8.19 ac-ft
16.35	Provided Treat.Vol.+Att.Vol	2.53 ac	530.2 ft	208.2 ft	5.59 ac-ft
16.15	Req'd Treat.Vol+Att. Vol	2.51 ac	528.6 ft	206.6 ft	5.08 ac-ft
16.10	Estimated Storm Sewer TW	2.50 ac	528.2 ft	206.2 ft	4.96 ac-ft
15.38	Top of Treatment Vol.	2.40 ac	522.4 ft	200.4 ft	3.19 ac-ft
14.00	Normal Water Level	2.22 ac	511.4 ft	189.4 ft	0.00 ac-ft
11.00		1.85 ac	487.4 ft	165.4 ft	
5.00	Pond Bottom	1.28 ac	475.4 ft	117.4 ft	

Required Treatment+Attenuation Vol.= 5.08 ac-ft
Required Treatment+Attenuation Stage= 16.15 ft

Provided Treatment+Attenuation Vol.= 5.59 ac-ft
Provided Treatment+Attenuation Stage= 16.35 ft

Estimated Treat. Vol.+Storm Sewer Att.= 4.93 ac-ft
Estimated Storm Sewer TW EL.= 16.10 ft

HGL requirements met

Additional 20% = 4.52 ac

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(407) 971-8955 (fax)

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4B**

Station Limits: From: 324+20 To: 368+28

Roadway Length = 4408 ft
R/W Width = 112 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 1.21 ac
Pervious Roadway Area: 10.16 ac
Total Roadway Area: 11.37 ac

Pond Area: Pervious Pond Area = 4.19 ac

Total Area:
Impervious Area: **1.21 ac**
Pervious Area: **14.35 ac**
Total Area: **15.56 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.21 ac	119.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	10.16 ac	812.5
Woods; Good condition (Woods are protected from grazing and covered with forest litter and brush)	D	77	4.19 ac	322.8
		Total:	15.56 ac	1254.3

CN = Total CN*Area / Total Area = **80.6**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.41 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.24 in**	**5.78 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4B**

Station Limits: From: 324+20 To: 368+28

Roadway Length = 4408 ft
R/W Width = 112 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	6.0 ft	1	6 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
Miscellaneous	12.0 ft	1	12 ft
		Total Impervious Width:	84 ft

Impervious Roadway Area: 8.50 ac
Pervious Roadway Area: 2.87 ac
Total Roadway Area: 11.37 ac

Pond Area:

Pervious Pond Area : 1.60 ac
Water Surface Area: 2.60 ac Wet Pond
Total Pond Area: 4.19 ac

Total Area:

Impervious Area: **8.50 ac**
Pervious Area: **4.46 ac**
Water Surface Area: **2.60 ac**
Total Area: **15.56 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	8.50 ac	833.0
Proposed Ponds (Water Surface)	D	100	2.60 ac	259.8
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	4.46 ac	357.2
		Total:	15.56 ac	1450.0

CN = Total CN*Area / Total Area = **93.2**

Runoff:

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.86 in**	**7.27 in**

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.73 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4B**

POND SIZING

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Wet Detention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:

Existing Permitted Impervious Area Basin 4:	**3.24 ac**
Impacted Permitted Treatment Volume Basin 4:	**0.68 ac-ft**
Existing Permitted Impervious AreaBasin 5:	**2.18 ac**
Impacted Permitted Treatment Volume Basin 5:	**0.45 ac-ft**

SFWMD			
Wet Detention	**1.00 in**	x Total Basin Area =	**1.30 ac-ft**
		x New Impervious Areas	0.64 ac-ft
	2.50 in	Provide 50% More TV =	0.96 ac-ft
		New + Permitted Vol =	**2.09 ac-ft**

Martin County			
Wet Detention	**4.50 in**	x Impervious Areas =	3.19 ac-ft

Treatment V_{req} = Largest of Trt. Vol. =	**3.19 ac-ft**
Required Wet Detention TV =	**3.19 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	11.98 ac-ft	7.50 ac-ft
Q_{post} =	14.09 ac-ft	9.43 ac-ft
ΔQ =	**2.11 ac-ft**	**1.94 ac-ft**

Attenuation V_{req} = 2.11 ac-ft (use largest value)

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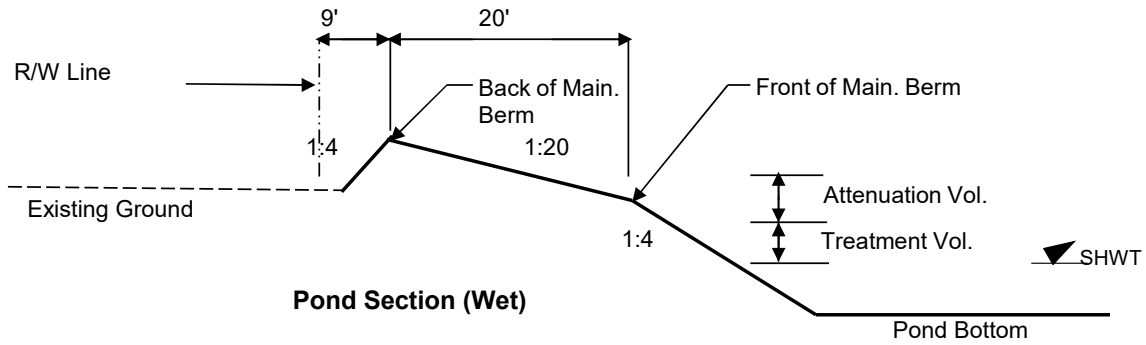
DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4B**

Maintenance Area Width =	20.0 ft	@ 1:20	Existing Ground Elevation =	16.00
Pond Tie-In Width =	8.6 ft	@ 1:4	Normal Water Elevation =	14.00
Maximum Storage Depth (**SD**) =	2.15 ft	with 1.0 ft freeboard	Lowest EOP Elevation =	17.50

Hydraulic Grade Line (HGL) check

HGL Slope =	0.050%	Use 0.05% for very flat terrain to 0.1% for flat terrain
Distance from Pond to Lowest EOP =	1200 ft	
Estimated Energy Losses =	0.6 ft	
HGL Clearance =	1.0 ft	Use 1.0 foot as a standard HGL clearance (no junction losses)
Estimated Storm Sewer Tailwater EL =	15.9 ft	



Pond Section (Wet)

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4B**

Pond Stage / Storage Calculations

ELEVATION	DESCRIPTION	AREA	DIMENSIONS		STORAGE
			LENGTH	WIDTH	
16.00	Pond R/W	4.05 ac	490.0 ft	360.0 ft	
18.15	Back of Main. Berm	3.72 ac	472.8 ft	342.8 ft	12.18 ac-ft
17.65		3.36 ac	452.8 ft	322.8 ft	10.41 ac-ft
17.15	Front of Main. Berm	3.01 ac	432.8 ft	302.8 ft	8.82 ac-ft
16.15	Provided Treat.Vol.+Att.Vol	2.87 ac	424.8 ft	294.8 ft	5.88 ac-ft
15.95	Req'd Treat.Vol+Att. Vol	2.85 ac	423.2 ft	293.2 ft	5.31 ac-ft
15.89	Estimated Storm Sewer TW	2.84 ac	422.7 ft	292.7 ft	5.12 ac-ft
15.19	Top of Treatment Vol.	2.75 ac	417.1 ft	287.1 ft	3.19 ac-ft
14.00	Normal Water Level	2.60 ac	407.6 ft	277.6 ft	0.00 ac-ft
11.00		2.23 ac	383.6 ft	253.6 ft	
5.00	Pond Bottom	1.75 ac	371.6 ft	205.6 ft	

Required Treatment+Attenuation Vol.= 5.30 ac-ft
Required Treatment+Attenuation Stage= 15.95 ft

Provided Treatment+Attenuation Vol.= 5.88 ac-ft
Provided Treatment+Attenuation Stage= 16.15 ft

Estimated Treat. Vol.+Storm Sewer Att.= 5.12 ac-ft
Estimated Storm Sewer TW EL.= 15.89 ft

HGL requirements met

Additional 20% = 4.86 ac

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 324+20 To: 368+28

Roadway Length = 4408 ft
R/W Width = 112 ft

EXISTING CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	12.0 ft	1	12 ft
Paved Shoulder			0 ft
			0 ft
Sidewalk or Trail			0 ft
Curb&Gutter			0 ft
Shldr Gutter			0 ft
Barrier Wall			0 ft
		Total Impervious Width:	12 ft

Impervious Roadway Area: 1.21 ac
Pervious Roadway Area: 10.15 ac
Total Roadway Area: 11.37 ac

Total Area:

Impervious Area: **1.21 ac**
Pervious Area: **10.15 ac**
Total Area: **11.37 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	1.21 ac	119.0
Open Space (lawns, parks, golf courses, cemeteries,	D	80	10.15 ac	812.4
		Total:	11.37 ac	931.4

CN = Total CN*Area / Total Area = **81.9**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ **2.21 in**

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**9.41 in**	**5.94 in**

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
TREATMENT NAME : **Exfiltration**

Station Limits: From: 324+20 To: 368+28

Roadway Length = 4408 ft
R/W Width = 112 ft

PROPOSED CONDITION

Roadway Area:

Description	Width	Quantity	Total Width
Travel Lane	11.0 ft	4	44 ft
Paved Shoulder	7.0 ft	2	14 ft
Imperv. Median			0 ft
Sidewalk or Trail	6.0 ft	1	6 ft
Curb&Gutter	2.0 ft	4	8 ft
Shldr Gutter			0 ft
Miscellaneous	12.0 ft	1	12 ft
		Total Impervious Width:	84 ft

Impervious Roadway Area:	8.50 ac
Pervious Roadway Area:	2.87 ac
Total Roadway Area:	11.37 ac

Total Area:

Impervious Area:	**8.50 ac**
Pervious Area:	**2.87 ac**
Water Surface Area:	**0.00 ac**
Total Area:	**11.37 ac**

Curve Number:

Land Use Description	Soil Group	CN	Area	CN*Area
Impervious areas; Streets & roads	D	98	8.50 ac	833.0
Proposed Ponds (Water Surface)	D	100	0.00 ac	0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80	2.87 ac	229.5
				0.0
		Total:	11.37 ac	1062.5

CN = Total CN*Area / Total Area = **93.5**

Runoff:

Soil Capacity (S) = $\frac{1000}{CN} - 10 =$ 0.70 in

Runoff (Q) = $\frac{(P - 0.2S)^2}{(P + 0.8S)}$

	SFWMD (25yr/72hr)	Storm Sewer Design (5yr/24hr)
Precipitation (P) =	11.70 in	8.09 in
Runoff (Q) =	**10.90 in**	**7.31 in**

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
TREATMENT NAME : **Exfiltration**

EXFILTRATION

Required Treatment Volume (TV)

Selection criteria

Permitting Agency	**SFWMD**
StormW.Mgmt.	**Dry Retention**
Online/Offline	**Online**
OFW	**Yes**
Open/Closed Basin	**Open**

From SFWMD Permit No. 43-00642-S:

Existing Permitted Impervious Area Basin 4:	**3.24 ac**
Impacted Permitted Treatment Volume Basin 4:	**0.68 ac-ft**
Existing Permitted Impervious AreaBasin 5:	**2.18 ac**
Impacted Permitted Treatment Volume Basin 5:	**0.45 ac-ft**

SFWMD			
Dry Retention	**0.50 in**	x Total Basin Area =	**0.47 ac-ft**
		x New Impervious Areas	0.32 ac-ft
	1.25 in	Provide 50% More TV =	0.48 ac-ft
		New + Permitted Vol =	**1.61 ac-ft**

Martin County			
Dry Retention	**3.00 in**	x Impervious Areas =	2.13 ac-ft

Treatment V_{req} = Largest of Trt. Vol. =	**2.13 ac-ft**
Required Wet Detention TV =	**2.13 ac-ft**

Required Attenuation Volume:

Total Runoff (ac-ft)

	SFWMD	**Storm Sewer Design**
Q_{pre} =	8.92 ac-ft	5.62 ac-ft
Q_{post} =	10.33 ac-ft	6.92 ac-ft
ΔQ =	**1.41 ac-ft**	**1.30 ac-ft**

Attenuation V_{req} = 1.41 ac-ft (use largest value)

Required Treatment+Attenuation Vol.= 3.53 ac-ft

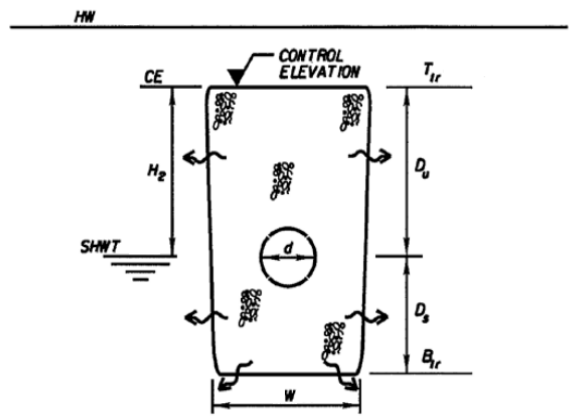
MADE BY:	ZKE	DATE:	08/12/24	JOB NO.	DT4-010-01
CHECKED BY:	REC	DATE:		SHEET NO.	
CALCULATIONS FOR:	Cove Road PD&E Study			BASIN:	Basin 4

Factor of Safety = 2
(per Drainage Design Guide 7.2.2.7)

Seasonal High Water Table (SHWT) =	14	ft
Tail Water Elevation (TW) =	14	ft
Head Water (HW) =	18	ft
Saturated Hydraulic Conductivity (K) =	0.0000317	ft^3/sec / ft^2-ft of head

Exfiltration Trench Characteristics

Outfall Control Elevation (CE) =	17	ft
Trench Bottom Width (W) =	8	ft
Trench Bottom Elevation (B_{el}) =	11	ft
Trench Top Elevation (T_{el}) =	17	ft
Perforated Pipe Diameter (D) =	30	in
Perforated Pipe Invert (P_{inv}) =	14	ft
Length of Trench (L) =	8550	ft



Calculations

Effective Head (H_2) = CE - SHWT =	3	ft
Trench Height (H) = T_{el} - B_{el} =	6	ft
Unsaturated Depth of Trench (D_u) = T_{el} - SHWT =	3	ft
Saturated Depth of Trench (D_s) = SHWT - B_{el} =	3	ft

If $D_u > D_s$ or $W < 2H$

Treatment Volume Provided (V) = $L(K(H_2W+2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = 3.53 Ac-Ft

If $D_u < D_s$ or $W > 2H$

Treatment Volume Provided (V) = $L(K(2H_2D_u-D_u^2+2H_2D_s)+0.000139WD_u)$ = Criteria Not Met

Note: If both criteria are met then use most conservative:

Provided Treatment Volume (V) =	**3.53**	**Ac-Ft**
Required Exfiltration Trench Length (L) * FoS =	**17100**	**Ft**

Recovery Time

Effective Head: Heff = (HW - SWHT) / 2 =	2	ft
Trench Height: Htr = T_{el} - B_{el} =	6	ft
A_{uwb} = Lnet ($2D_u$ + W_{tr}) =	51300	ft^2

Unsaturated exfiltration will occur only through walls and bottom if the trench bottom is above the SHWT: Therefore W_{tr} = 0 for this trench

Unsaturated Capacity: Q_u = K_u*A_{uwb}*H_{eff} = 3.25242 ft^3/sec

Recovery Time (T_{rec} ≤ 72hr): T_{rec} = V_{WQ} / Q_u = 13.13 hr **Meets Recovery Requirements**

filename: exfiltration worksheet.xls
worksheet: Empirical Equations (Basin 4)

APPENDIX 4

Engineering Analysis Matrix

ARDURRA
3000 Dovera Drive, Suite 200, Oviedo FL32765
(407) 971-8850 phone (407) 971-8955 fax

Cove Road PD&E

BASIN 1 ALTERNATIVE TREATMENT

ENGINEERING DATA & ANALYSIS

Alternatives	Location	Existing Ground Elevation (ft)	Treatment Type	Soil Names & Hydrologic Groups	Estimated SHWT Elevation (ft)	Lowest Edge of Existing Roadway (ft)	Distance From Lowest Edge of Proposed Roadway (ft)	Estimated Allowable $DHW_{25yr/72hr}$ (ft)	Estimated Allowable Treatment & Attenuation Depth (ft)	Outfall Location	Roadway Drainage Area Excluding Pond (ac)	Required Treatment & Attenuation Volume (ac-ft)	Required Pond Access Area (ac)	Required Pond Area (ac)	Required Pond Area Including Access (ac)
Pond 1A	Parcel No. 553841000042000821	8.50	Wet Detention	Waveland and Immokalee fine sands (HSG A/D)	5.00	12.00	200	9.50	4.50	Gaines Avenue Swale	11.61	3.66	0.00	1.75	1.75
Pond 1B	Parcel No. 043941000000000807	6.00	Wet Detention	Waveland and Immokalee fine sands (HSG A/D) and Arents, 0 to 2 percent slopes (HSG A)	3.50	12.00	700	10.00	6.50	St. Lucie River	11.61	3.81	0.00	1.54	1.54
Exfiltration	Within Roadway R/W	10.00	Exfiltration	Waveland and Immokalee fine sands (HSG A/D)	6.00	12.00	N/A	10.00	4.00	Gaines Avenue Swale	11.61	3.27	0.00	0.00	0.00

IMPACT & COST ANALYSIS

Alternatives	Pond Floodplain Impacts (ac-ft)	FEMA Floodzone	Arch. / Historical Impact Potential	Wetland Impacts (ac)	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Major Utility Conflict Potential* (Y/N)	Existing Land Use	Future Land Use	Total Area of Parcels (Including Non-Impacted Area) (ac)	Total Pond Costs	Rankings
Pond 1A	0.00	X	Moderate	0.00	Low	Low	None	No	Urban and Built Up	Commercial / Office / Residential	2.09	$3,339,930	2
Pond 1B	0.00	AE	High	0.00	Low	Low	None	No	Residential	Residential	1.54	$1,513,184	1
Exfiltration	0.00	X	Low	0.00	Low	Low	None	Yes	Roadway	Roadway	N/A	$3,446,742	3

Note:

The cost evaluation for the stormwater management facility alternatives in this report include stormwater management facility construction costs, costs associated with wetland impacts, potential remediation of contaminated sites, and parcel acquisition costs. The stormwater management facility construction costs include cost of installed drainage structures, drainage pipes and outfalls, clearing and grubbing, earthwork excavation and grading, berm construction, erosion protection, fencing, access accommodations, sodding and any potential impermeable liners. The associated parcel acquisition cost for each alternative evaluated include the estimated cost of land and any impacted improvements, administrative costs and legal fees.

The potential occurrence of any listed species within each proposed pond site was valued as low, medium, or high based on FLUCFCS type, FNAI reports, and data gathered during field reviews. A determination of low was given for areas that are developed and exhibited minimal to no available habitat for listed species. A determination of medium was given for areas where suitable habitat was identified within one quarter mile of the pond site, or suboptimal habitat was observed within the pond site. A determination of high was given for direct observations of listed species, or areas with greater than one mile of contiguous suitable habitat.

ARDURRA
3000 Dovera Drive, Suite 200, Oviedo FL32765
(407) 971-8850 phone (407) 971-8955 fax

Cove Road PD&E

BASIN 2 ALTERNATIVE POND SITES

ENGINEERING DATA & ANALYSIS

Alternatives	Location	Existing Ground Elevation (ft)	Treatment Type	Soil Names & Hydrologic Groups	Estimated SHWT Elevation (ft)	Lowest Edge of Existing Roadway (ft)	Distance From Lowest Edge of Proposed Roadway (ft)	Estimated Allowable $DHW_{25yr/72hr}$ (ft)	Estimated Allowable Treatment & Attenuation Depth (ft)	Outfall Location	Roadway Drainage Area (ac)	Required Treatment & Attenuation Volume (ac-ft)	Required Pond Access Area (ac)	Required Pond Area (ac)	Required Pond Area Including Access (ac)
Pond 2	Parcel No. 553841000043000801	11.00	Wet Detention	Waveland and Immokalee fine sands (HSG A/D)	11.00	16.00	650	13.10	2.10	Fern Creek Wetland System	16.19	7.68	0.00	7.22	7.22
Exfiltration	Within Roadway R/W	16.00	Exfiltration	Waveland and Immokalee fine sands (HSG A/D)	11.00	16.00	N/A	15.00	4.00	Fern Creek Wetland System	16.19	5.03	0.00	0.00	0.00

IMPACT & COST ANALYSIS

Alternatives	Pond Floodplain Impacts (ac-ft)	FEMA Floodzone	Arch. / Historical Impact Potential	Wetland Impacts (ac)	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Major Utility Conflict Potential (Y/N)	Existing Land Use	Future Land Use	Total Area of Parcels (Including Non-Impacted Area) (ac)	Total Pond Costs	Rankings
Pond 2	0.00	X	Low	6.67	Medium	Medium	None	No	Wetland/Upland Forests	Rural Density	8.75	$4,194,293	1
Exfiltration	0.00	X	Low	0.00	Low	Low	None	Yes	Roadway	Roadway	N/A	$7,673,779	2

Note:

The cost evaluation for the stormwater management facility alternatives in this report include stormwater management facility construction costs, costs associated with wetland impacts, potential remediation of contaminated sites, and parcel acquisition costs. The stormwater management facility construction costs include cost of installed drainage structures, drainage pipes and outfalls, clearing and grubbing, earthwork excavation and grading, berm construction, erosion protection, fencing, access accommodations, sodding and any potential impermeable liners. The associated parcel acquisition cost for each alternative evaluated include the estimated cost of land and any impacted improvements, administrative costs and legal fees.

The potential occurrence of any listed species within each proposed pond site was valued as low, medium, or high based on FLUCFCS type, FNAI reports, and data gathered during field reviews and species-specific surveys. A determination of low was given for areas that exhibited minimal to no available habitat for listed species. A determination of medium was given for areas where suitable habitat was identified within one quarter mile of the pond site, or suboptimal habitat was observed within the pond site. A determination of high was given for direct observations of listed species, or areas with greater than one mile of contiguous suitable habitat.

ARDURRA
3000 Dovera Drive, Suite 200, Oviedo FL32765
(407) 971-8850 phone (407) 971-8955 fax

Cove Road PD&E

BASIN 3 ALTERNATIVE POND SITES

ENGINEERING DATA & ANALYSIS

Alternatives	Location	Existing Ground Elevation (ft)	Treatment Type	Soil Names & Hydrologic Groups	Estimated SHWT Elevation (ft)	Lowest Edge of Existing Roadway (ft)	Distance From Lowest Edge of Proposed Roadway (ft)	Estimated Allowable $DHW_{25yr/72hr}$ (ft)	Estimated Allowable Treatment & Attenuation Depth (ft)	Outfall Location	Roadway Drainage Area (ac)	Required Treatment & Attenuation Volume (ac-ft)	Required Pond Access Area (ac)	Required Pond Area (ac)	Required Pond Area Including Access (ac)
Pond 3A	Parcel No. 553841000066000107	17.00	Wet Detention	Waveland and Lawnwood fine sands (HSG A/D) and Lawnwood and Myakka find sands (HSG A/D)	14.00	18.00	2800	15.75	1.75	Wetland System	12.23	5.51	0.00	6.55	6.55
Pond 3B	Parcel No. 553841000067000400	17.00	Wet Detention	Lawnwood and Myakka find sands (HSG A/D)	14.00	18.00	1800	16.30	2.30	Wetland System	12.23	5.23	0.00	4.90	4.90
Exfiltration	Within Roadway R/W	17.00	Exfiltration	Lawnwood and Myakka find sands (HSG A/D)	14.00	18.00	N/A	17.00	3.00	Wetland System	12.23	3.53	0.00	0.00	0.00

IMPACT & COST ANALYSIS

Alternatives	Pond Floodplain Impacts (ac-ft)	FEMA Floodzone	Arch. / Historical Impact Potential	Wetland Impacts (ac)	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Major Utility Conflict Potential (Y/N)	Existing Land Use	Future Land Use	Total Area of Parcels (Including Non-Impacted Area) (ac)	Total Pond Costs	Rankings
Pond 3A	0.00	X	Low	1.44	Medium	Medium	Low	No	Agriculture	Commercial / Office / Residential	34.04	$5,454,303	2
Pond 3B	0.00	X	Low	1.23	Medium	Medium	None	No	Barren Land	Commercial / Office / Residential	16.26	$5,109,740	1
Exfiltration	0.00	X	Low	0.00	Low	Low	None	Yes	Roadway	Roadway	N/A	$7,326,296	3

Note:

The cost evaluation for the stormwater management facility alternatives in this report include stormwater management facility construction costs, costs associated with wetland impacts, potential remediation of contaminated sites, and parcel acquisition costs. The stormwater management facility construction costs include cost of installed drainage structures, drainage pipes and outfalls, clearing and grubbing, earthwork excavation and grading, berm construction, erosion protection, fencing, access accommodations, sodding and any potential impermeable liners. The associated parcel acquisition cost for each alternative evaluated include the estimated cost of land and any impacted improvements, administrative costs and legal fees.

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ARDURRA
3000 Dovera Drive, Suite 200, Oviedo FL32765
(407) 971-8850 phone (407) 971-8955 fax

Cove Road PD&E

BASIN 4 ALTERNATIVE POND SITES

ENGINEERING DATA & ANALYSIS

Alternatives	Location	Existing Ground Elevation (ft)	Treatment Type	Soil Names & Hydrologic Groups	Estimated SHWT Elevation (ft)	Lowest Edge of Existing Roadway (ft)	Distance From Lowest Edge of Proposed Roadway (ft)	Estimated Allowable $DHW_{25yr/72hr}$ (ft)	Estimated Allowable Treatment & Attenuation Depth (ft)	Outfall Location	Roadway Drainage Area Excluding Pond (ac)	Required Treatment & Attenuation Volume (ac-ft)	Required Pond Access Area (ac)	Required Pond Area (ac)	Required Pond Area Including Access (ac)
Pond 4A	Parcel No. 553841000067000105	16.00	Wet Detention	Lawnwood and Myakka find sands (HSG A/D)	14.00	17.50	800	16.40	2.35	Hibiscus Park Ditch	11.37	5.08	0.00	4.52	4.52
Pond 4B	Parcel No. 553841000067000110	16.00	Wet Detention	Lawnwood and Myakka find sands (HSG A/D)	14.00	17.50	1200	16.15	2.15	Hibiscus Park Ditch	11.37	5.30	0.00	4.86	4.86
Exfiltration	Within Roadway R/W	18.00	Exfiltration	Lawnwood and Myakka fine sands (HSG A/D) and Waveland and Immokalee fine sands (HSG A/D)	14.00	18.00	N/A	17.00	3.00	Hibiscus Park Ditch	11.37	3.53	0.00	0.00	0.00

IMPACT & COST ANALYSIS

Alternatives	Pond Floodplain Impacts (ac-ft)	FEMA Floodzone	Arch. / Historical Impact Potential	Wetland Impacts (ac)	Environmental Impact Risk	Threatened or Endangered Species Impacts	Hazardous Materials & Contamination Potential	Major Utility Conflict Potential* (Y/N)	Existing Land Use	Future Land Use	Total Area of Parcels (Including Non-Impacted Area) (ac)	Total Pond Costs	Rankings
Pond 4A	0.00	X	Low	0.25	Medium	Medium	None	No	Urban and Built Up	Estate Density up to 2 UPA	17.90	$2,888,988	1
Pond 4B	0.00	X	Low	1.16	Medium	Medium	None	No	Agriculture	Estate Density up to 2 UPA	17.60	$3,464,578	2
Exfiltration	0.00	X	Low	0.00	Low	Low	None	Yes	Roadway	Roadway	N/A	$7,326,296	3

Note:

The cost evaluation for the stormwater management facility alternatives in this report include stormwater management facility construction costs, costs associated with wetland impacts, potential remediation of contaminated sites, and parcel acquisition costs. The stormwater management facility construction costs include cost of installed drainage structures, drainage pipes and outfalls, clearing and grubbing, earthwork excavation and grading, berm construction, erosion protection, fencing, access accommodations, sodding and any potential impermeable liners. The associated parcel acquisition cost for each alternative evaluated include the estimated cost of land and any impacted improvements, administrative costs and legal fees.

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Ardurra Group, Inc.
3000 Dovera Drive, Suite 200
Oviedo, Florida 32765
p: 407.971.8850 f: 407.971.8955

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1A**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	8.50 ft	1.46 ac				
			3.00 ft	484 cy	3.00 ft	0 cy
BACK OF BERM	11.50 ft	1.26 ac				
			1.00 ft	177 cy	1.00 ft	0 cy
FRONT OF BERM	10.50 ft	1.04 ac				
			2.00 ft	903 cy	2.00 ft	0 cy
EXISTING GROUND (INSIDE POND)	8.50 ft	0.92 ac				
			6.50 ft	0 cy	6.50 ft	6397 cy
SLOPE BREAK	2.00 ft	0.30 ac				
			5.00 ft	0 cy	5.00 ft	2783 cy
POND BOTTOM	-3.00 ft	0.39 ac				
			TOTAL:	**1565 cy**	**TOTAL:**	**9180 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	1565 cy	$20.82
POND EXCAVATION:	9180 cy	$12.01
TOTAL COST:		**$142,832.1**

CLEARING AND GRUBBING

POND R/W AREA :	1.46 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$65,354.96**

POND SOD QUANTITIES

POND R/W AREA :	1.46 ac
POND WATER AREA :	0.74 ac
TOTAL POND SOD AREA :	0.72 ac
COST PER SY :	$4.42
TOTAL COST :	**$15,402.82**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
200 ft	200 ft	400 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$104,340.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $407,929.88

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200
Oviedo, Florida 32765
p: 407.971.8850 f: 407.971.8955

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Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Pond 1B**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	6.00 ft	1.29 ac				
			5.30 ft	1325 cy	5.30 ft	0 cy
BACK OF BERM	11.30 ft	0.98 ac				
			0.30 ft	48 cy	0.30 ft	0 cy
FRONT OF BERM	11.00 ft	0.78 ac				
			5.00 ft	1815 cy	5.00 ft	0 cy
EXISTING GROUND (INSIDE POND)	6.00 ft	0.73 ac				
			5.50 ft	0 cy	5.50 ft	4792 cy
SLOPE BREAK	0.50 ft	0.35 ac				
			6.00 ft	0 cy	6.00 ft	2662 cy
POND BOTTOM	-5.50 ft	0.20 ac				
			TOTAL:	**3189 cy**	**TOTAL:**	**7454 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	3189 cy	$20.82
POND EXCAVATION:	7454 cy	$12.01
TOTAL COST:		**$155,907.6**

CLEARING AND GRUBBING

POND R/W AREA :	1.29 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$57,745.13**

POND SOD QUANTITIES

POND R/W AREA :	1.29 ac
POND WATER AREA :	0.74 ac
TOTAL POND SOD AREA :	0.55 ac
COST PER SY :	$4.42
TOTAL COST :	**$11,766.04**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
700 ft	200 ft	900 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$234,765.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $540,183.75

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200
Oviedo, Florida 32765
p: 407.971.8850 f: 407.971.8955

Made by: ZKE
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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 1**
POND NAME : **Swales**

CONSTRUCTION COSTS

Dry Treatment Swales

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	9.50 ft	0.62 ac	0.10 ft	1 cy	0.10 ft	0 cy
BACK OF BERM	9.60 ft	0.61 ac	0.10 ft	6 cy	0.10 ft	0 cy
FRONT OF BERM	9.50 ft	0.54 ac	0.00 ft	0 cy	0.00 ft	0 cy
EXISTING GROUND (INSIDE POND)	9.50 ft	0.54 ac	3.50 ft	0 cy	3.50 ft	1835 cy
SLOPE BREAK	6.00 ft	0.11 ac	0.00 ft	0 cy	0.00 ft	0 cy
POND BOTTOM	6.00 ft	0.11 ac	**TOTAL:**	**6 cy**	**TOTAL:**	**1835 cy**

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	12.50 ft	0.14 ac	0.10 ft	1 cy	0.10 ft	0 cy
BACK OF BERM	12.60 ft	0.13 ac	0.10 ft	1 cy	0.10 ft	0 cy
FRONT OF BERM	12.50 ft	0.12 ac	0.00 ft	0 cy	0.00 ft	0 cy
EXISTING GROUND (INSIDE POND)	12.50 ft	0.12 ac	4.50 ft	0 cy	4.50 ft	508 cy
SLOPE BREAK	8.00 ft	0.02 ac	0.00 ft	0 cy	0.00 ft	0 cy
POND BOTTOM	8.00 ft	0.02 ac	**TOTAL:**	**2 cy**	**TOTAL:**	**508 cy**

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	9.50 ft	0.32 ac	0.40 ft	0 cy	0.40 ft	203 cy
BACK OF BERM	9.10 ft	0.31 ac	0.10 ft	0 cy	0.10 ft	45 cy
FRONT OF BERM	9.00 ft	0.25 ac	1.50 ft	0 cy	1.50 ft	424 cy
SLOPE BREAK	7.50 ft	0.10 ac	0.00 ft	0 cy	0.00 ft	0 cy
POND BOTTOM	7.50 ft	0.10 ac	**TOTAL:**	**0 cy**	**TOTAL:**	**469 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	8 cy	$20.82
POND EXCAVATION:	2812 cy	$12.01
TOTAL COST:		**$33,940.5**

CLEARING AND GRUBBING

POND R/W AREA :	1.08 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$48,344.76**

POND SOD QUANTITIES

POND R/W AREA :	1.08 ac
POND WATER AREA :	0.00 ac
TOTAL POND SOD AREA :	1.08 ac
COST PER SY :	$4.42
TOTAL COST :	**$23,104.22**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	Outfall	Total
200 ft	200 ft	400 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$104,340.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $289,729.54

Ardurra Group, Inc.
3000 Dovera Drive, Suite 200
Oviedo, Florida 32765
p: 407.971.8850 f: 407.971.8955

Made by: ZKE
Checked by: REC

DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 2**
POND NAME : **Pond 2**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	11.00 ft	6.02 ac				
			4.10 ft	2547 cy	4.10 ft	0 cy
BACK OF BERM	15.10 ft	5.25 ac				
			1.00 ft	694 cy	1.00 ft	0 cy
FRONT OF BERM	14.10 ft	4.39 ac				
			3.10 ft	5551 cy	3.10 ft	0 cy
EXISTING GROUND (INSIDE POND)	11.00 ft	3.89 ac				
			3.00 ft	0 cy	3.00 ft	17739 cy
SLOPE BREAK	8.00 ft	3.44 ac				
			6.00 ft	0 cy	6.00 ft	31073 cy
POND BOTTOM	2.00 ft	2.98 ac				
			TOTAL:	**8792 cy**	**TOTAL:**	**48811 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	8792 cy	$20.82
POND EXCAVATION:	48811 cy	$12.01
TOTAL COST:		**$769,271.4**

CLEARING AND GRUBBING

POND R/W AREA :	6.02 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$269,477.29**

POND SOD QUANTITIES

POND R/W AREA :	6.02 ac
POND WATER AREA :	3.89 ac
TOTAL POND SOD AREA :	2.13 ac
COST PER SY :	$4.42
TOTAL COST :	**$45,566.66**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
650 ft	500 ft	1150 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$299,977.5**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $1,464,292.90

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p: 407.971.8850 f: 407.971.8955

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3A**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	17.00 ft	5.45 ac				
			0.75 ft	115 cy	0.75 ft	0 cy
BACK OF BERM	17.75 ft	5.26 ac				
			0.75 ft	563 cy	0.75 ft	0 cy
EXISTING GROUND (INSIDE POND)	17.00 ft	4.33 ac				
			0.25 ft	0 cy	0.25 ft	1686 cy
FRONT OF BERM	16.75 ft	4.03 ac				
			5.75 ft	0 cy	5.75 ft	31216 cy
SLOPE BREAK	11.00 ft	2.70 ac				
			6.00 ft	0 cy	6.00 ft	20134 cy
POND BOTTOM	5.00 ft	1.46 ac				
			TOTAL:	**563 cy**	**TOTAL:**	**53036 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	563 cy	$12.91
POND EXCAVATION:	53036 cy	$7.40
TOTAL COST:		**$399,732.6**

CLEARING AND GRUBBING

POND R/W AREA :	5.45 ac
COST PER ACRE :	$32,312.34
TOTAL COST :	**$176,102.25**

POND SOD QUANTITIES

POND R/W AREA :	5.45 ac
POND WATER AREA :	3.38 ac
TOTAL POND SOD AREA :	2.07 ac
COST PER SY :	$2.97
TOTAL COST :	**$29,755.84**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$2,000.00
TOTAL COST :	**$40,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
2800 ft	2000 ft	4800 ft
UNIT COST - PIPE (30") (RCP):		$219.94
TOTAL COST:		**$1,055,712.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages

TOTAL CONSTRUCTION COST: $1,701,302.64

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Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 3**
POND NAME : **Pond 3B**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	17.00 ft	4.08 ac				
			1.30 ft	273 cy	1.30 ft	0 cy
BACK OF BERM	18.30 ft	3.82 ac				
			1.00 ft	750 cy	1.00 ft	0 cy
FRONT OF BERM	17.30 ft	2.89 ac				
			0.30 ft	465 cy	0.30 ft	0 cy
EXISTING GROUND (INSIDE POND)	17.00 ft	2.83 ac				
			6.00 ft	0 cy	6.00 ft	22458 cy
SLOPE BREAK	11.00 ft	1.81 ac				
			6.00 ft	0 cy	6.00 ft	13310 cy
POND BOTTOM	5.00 ft	0.94 ac				
			TOTAL:	**1487 cy**	**TOTAL:**	**35768 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	1487 cy	$20.82
POND EXCAVATION:	35768 cy	$12.01
TOTAL COST:		**$460,538.5**

CLEARING AND GRUBBING

POND R/W AREA :	4.08 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$182,635.77**

POND SOD QUANTITIES

POND R/W AREA :	4.08 ac
POND WATER AREA :	2.31 ac
TOTAL POND SOD AREA :	1.77 ac
COST PER SY :	$4.42
TOTAL COST :	**$37,865.26**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
1800 ft	200 ft	2000 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$521,700.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $1,282,739.52

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p: 407.971.8850 f: 407.971.8955

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4A**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	16.00 ft	3.77 ac				
			2.35 ft	701 cy	2.35 ft	0 cy
BACK OF BERM	18.35 ft	3.40 ac				
			1.00 ft	589 cy	1.00 ft	0 cy
FRONT OF BERM	17.35 ft	2.67 ac				
			1.35 ft	1786 cy	1.35 ft	0 cy
EXISTING GROUND (INSIDE POND)	16.00 ft	2.49 ac				
			5.00 ft	0 cy	5.00 ft	17505 cy
SLOPE BREAK	11.00 ft	1.85 ac				
			6.00 ft	0 cy	6.00 ft	15149 cy
POND BOTTOM	5.00 ft	1.28 ac				
			TOTAL:	**3076 cy**	**TOTAL:**	**32654 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	3076 cy	$20.82
POND EXCAVATION:	32654 cy	$12.01
TOTAL COST:		**$456,219.9**

CLEARING AND GRUBBING

POND R/W AREA :	3.77 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$168,759.04**

POND SOD QUANTITIES

POND R/W AREA :	3.77 ac
POND WATER AREA :	2.22 ac
TOTAL POND SOD AREA :	1.55 ac
COST PER SY :	$4.42
TOTAL COST :	**$33,158.84**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
800 ft	200 ft	1000 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$260,850.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $998,987.78

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3000 Dovera Drive, Suite 200
Oviedo, Florida 32765
p: 407.971.8850 f: 407.971.8955

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **Basin 4**
POND NAME : **Pond 4B**

CONSTRUCTION COSTS

Wet Treatment Pond

	ELEVATION	AREA	FILL		EXCAVATION	
			HEIGHT	VOLUME	HEIGHT	VOLUME
EXISTING GROUND (POND R/W)	16.00 ft	4.05 ac				
			2.15 ft	572 cy	2.15 ft	0 cy
BACK OF BERM	18.15 ft	3.72 ac				
			1.00 ft	573 cy	1.00 ft	0 cy
FRONT OF BERM	17.15 ft	3.01 ac				
			1.15 ft	1456 cy	1.15 ft	0 cy
EXISTING GROUND (INSIDE POND)	16.00 ft	2.86 ac				
			5.00 ft	0 cy	5.00 ft	20530 cy
SLOPE BREAK	11.00 ft	2.23 ac				
			6.00 ft	0 cy	6.00 ft	19263 cy
POND BOTTOM	5.00 ft	1.75 ac				
			TOTAL:	**2602 cy**	**TOTAL:**	**39793 cy**

EARTHWORK

	VOLUME	UNIT COST
POND FILL :	2602 cy	$20.82
POND EXCAVATION:	39793 cy	$12.01
TOTAL COST:		**$532,075.6**

CLEARING AND GRUBBING

POND R/W AREA :	4.05 ac
COST PER ACRE :	$44,763.67
TOTAL COST :	**$181,292.86**

POND SOD QUANTITIES

POND R/W AREA :	4.05 ac
POND WATER AREA :	2.60 ac
TOTAL POND SOD AREA :	1.45 ac
COST PER SY :	$4.42
TOTAL COST :	**$31,019.56**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

PIPE QUANTITIES (includes both inflow and outfall pipes)

Length		
Inflow	**Outfall**	**Total**
1200 ft	200 ft	1400 ft
UNIT COST - PIPE (30") (RCP):		$260.85
TOTAL COST:		**$365,190.0**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $1,189,577.98

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3000 Dovera Drive, Suite 200
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p: 407.971.8850 f: 407.971.8955

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DATE: November 21, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**

EXFILTRATION CONSTRUCTION COSTS

BASIN NAME : **Basin 1**

PIPE QUANTITIES (30" Exfiltration Pipe)

Length		
		Total
		7450 ft
UNIT COST - PIPE (30") (RCP):		$423.76
TOTAL COST:		**$3,157,012.0**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $3,237,012.00

BASIN NAME : **Basin 2**

PIPE QUANTITIES (30" Exfiltration Pipe)

Length		
		Total
		17920 ft
UNIT COST - PIPE (30") (RCP):		$423.76
TOTAL COST:		**$7,593,779.2**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $7,673,779.20

BASIN NAME : **Basin 3**

PIPE QUANTITIES (30" Exfiltration Pipe)

Length		
		Total
		17100 ft
UNIT COST - PIPE (30") (RCP):		$423.76
TOTAL COST:		**$7,246,296.0**

MAINTENANCE

20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $7,326,296.00

BASIN NAME : **Basin 4**

PIPE QUANTITIES (30" Exfiltration Pipe)

Length		
		Total
		17100 ft
UNIT COST - PIPE (30") (RCP):		$423.76
TOTAL COST:		**$7,246,296.0**

MAINTENANCE

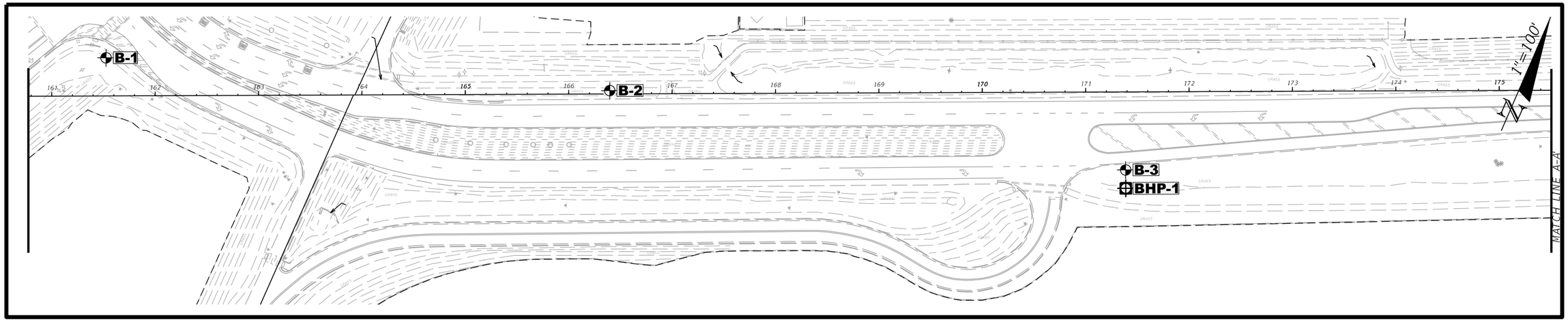
20 YEAR LIFE CYCLE	20
COST PER YEAR :	$4,000.00
TOTAL COST :	**$80,000.00**

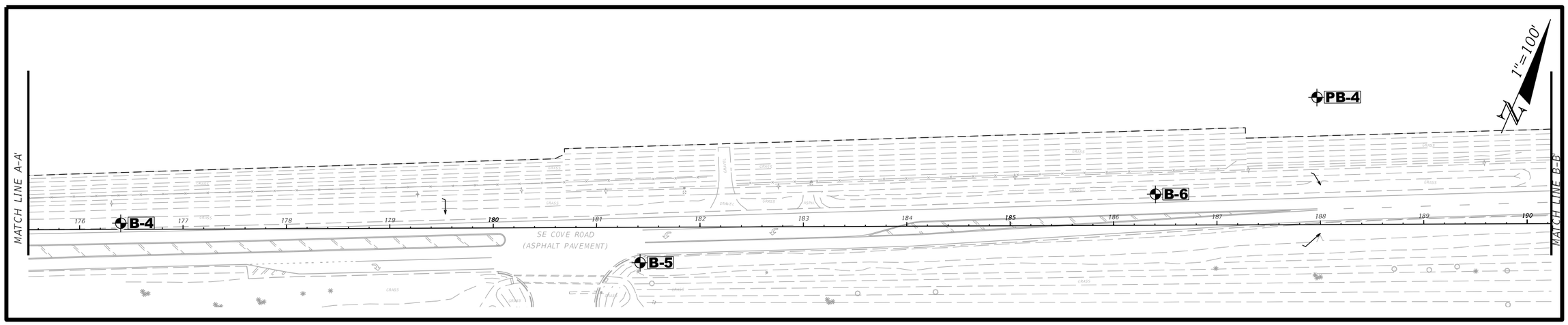
Note: Unit Costs based on 12 Month Moving Statewide Averages from 11/01/2022 to 10/31/2023

TOTAL CONSTRUCTION COST: $7,326,296.00

APPENDIX 5

Geotechnical Information





Approximate Location of SPT Boring

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
RAMAKUMAR VEDULA, P.E.
LICENSE NUMBER 54873
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY
SUITE H10
WEST PALM BEACH, FL 33411

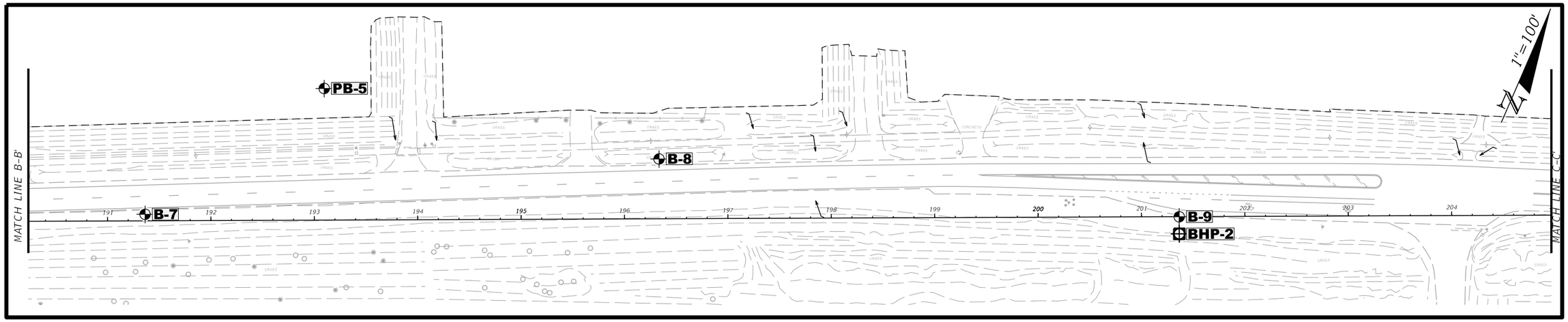
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

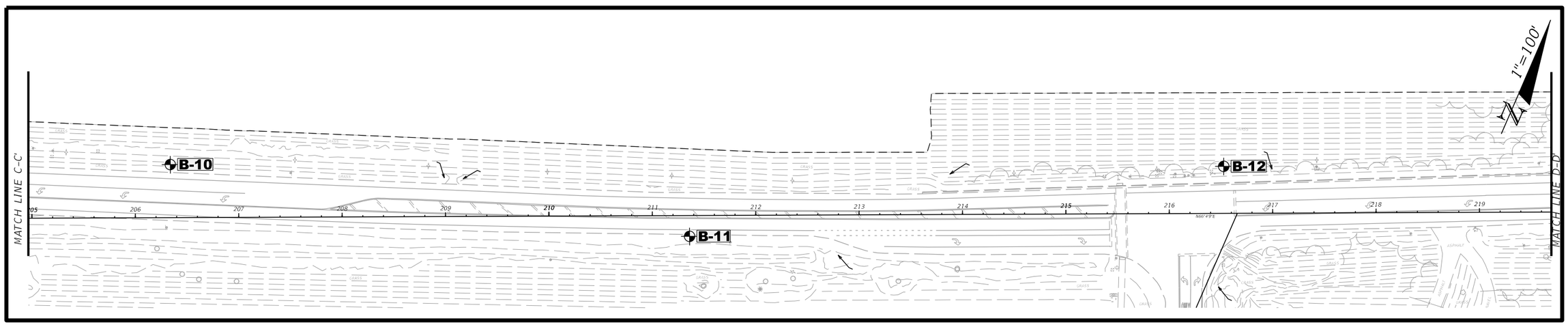
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE RD	MARTIN	441700-1-22-02

ROADWAY BORINGS LOCATION PLAN

SHEET NO.
1

3/29/2024 8:44:27 AM jolivia
J:\Tierra Documents\Projects\TSF 2022\7111-22-342\Cove Rd. from SR-76_Kanner Highway to SR-5_US-1 (Inwood)\441700-1-22-02\Geotechnical\ABORRD50.dgn





Approximate Location of SPT Boring

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
RAMAKUMAR VEDULA, P.E.
LICENSE NUMBER 54873
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY
SUITE H10
WEST PALM BEACH, FL 33411

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE RD	MARTIN	441700-1-22-02

ROADWAY BORINGS LOCATION PLAN

SHEET NO.
2

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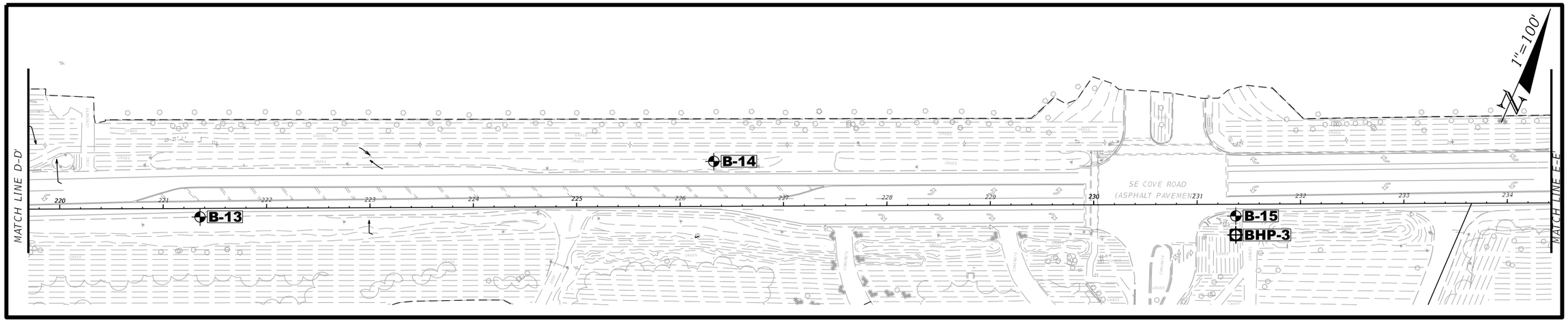

Approximate Location of SPT Boring

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
RAMAKUMAR VEDULA, P.E.
LICENSE NUMBER 54873
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY
SUITE H10
WEST PALM BEACH, FL 33411

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE RD	MARTIN	441700-1-22-02

ROADWAY BORINGS LOCATION PLAN

SHEET NO.
3

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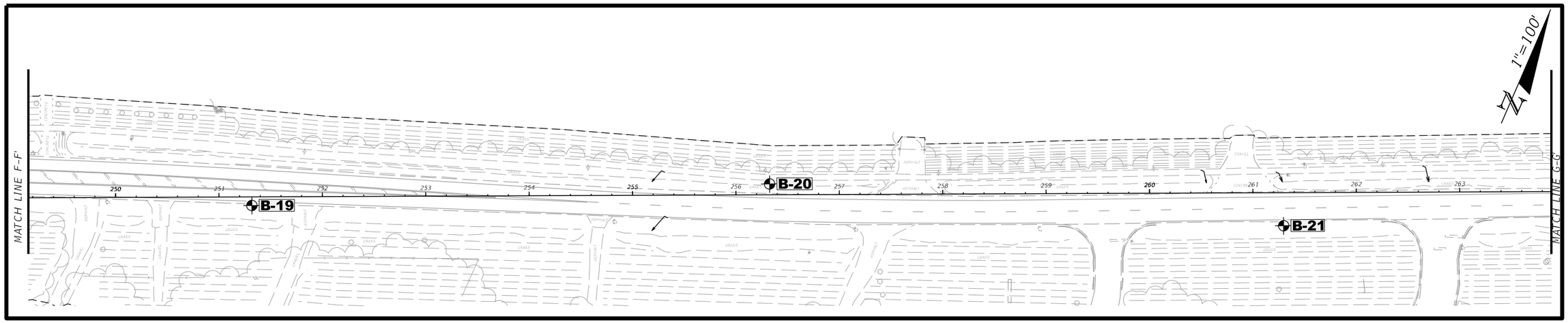

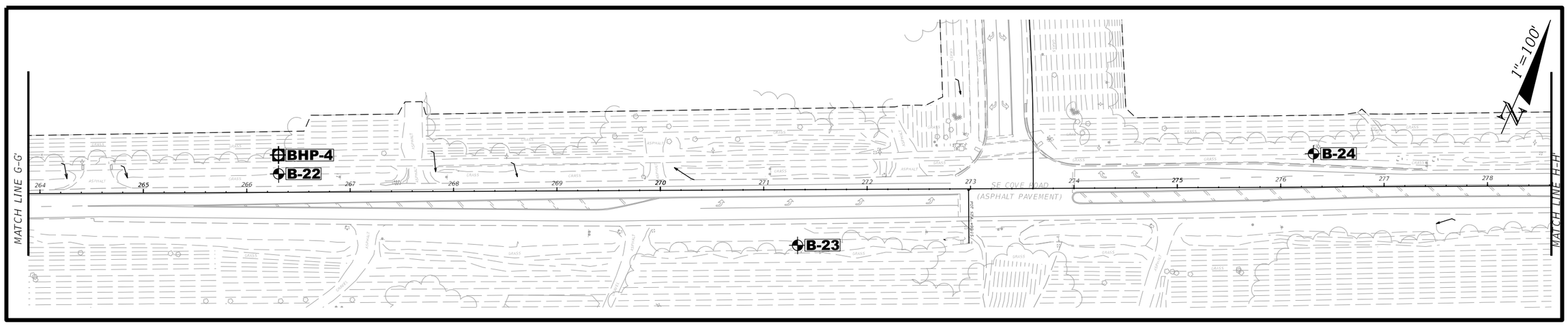

Approximate Location of SPT Boring

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
RAMAKUMAR VEDULA, P.E.
LICENSE NUMBER 54873
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY
SUITE H10
WEST PALM BEACH, FL 33411

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE RD	MARTIN	441700-1-22-02

ROADWAY BORINGS LOCATION PLAN

SHEET NO.
4

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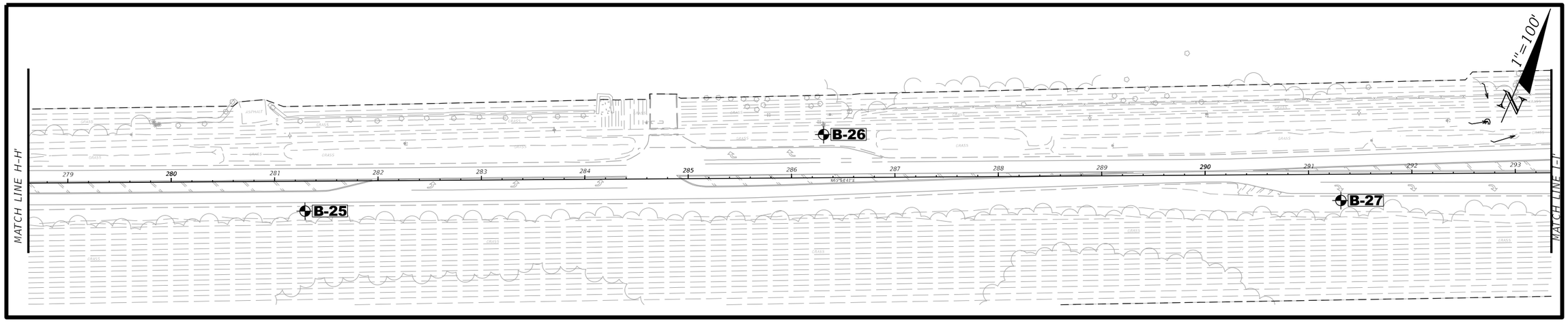
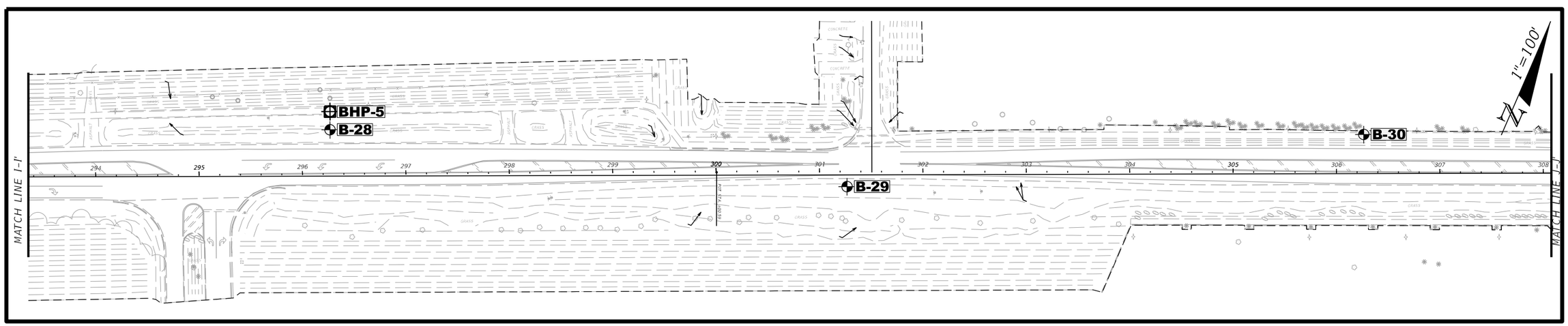




Approximate Location of SPT Boring

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
RAMAKUMAR VEDULA, P.E.
LICENSE NUMBER 54873
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY
SUITE H10
WEST PALM BEACH, FL 33411

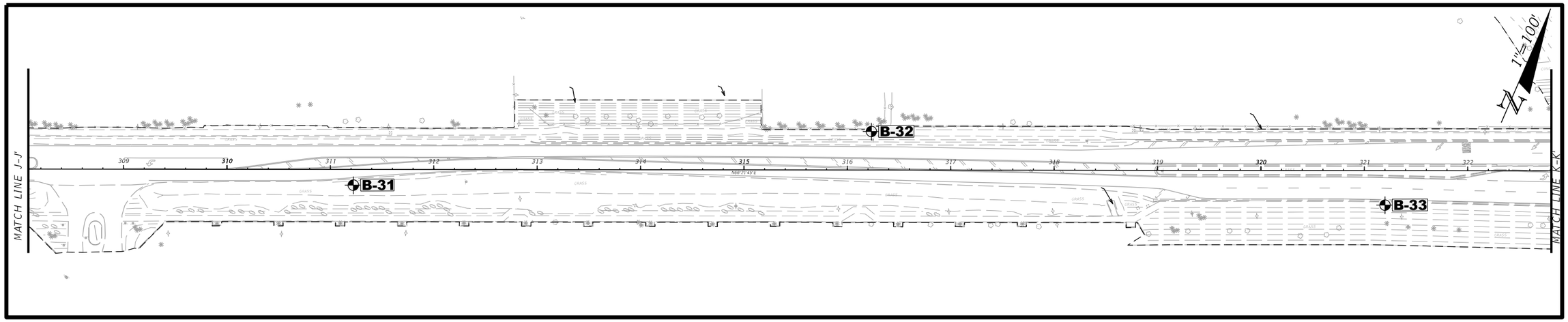
STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

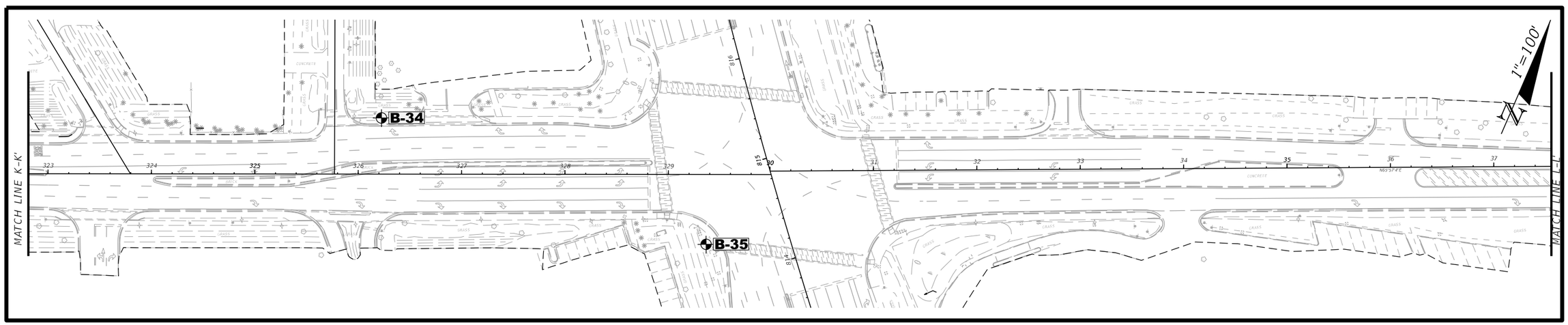
ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE RD	MARTIN	441700-1-22-02

ROADWAY BORINGS LOCATION PLAN

SHEET NO.
5

3/29/2024 8:44:54 AM jolivia
J:\Tierra Documents\Projects\FSF 2022\7111-22-342.Cove Rd. from SR-76_Kanner Highway to SR-5_US-1 (Inwood)\441700-1-22-02\Geotechnical\ABORRD50.dgn





Approximate Location of SPT Boring

Approximate Location of BHP Test

REVISIONS			
DATE	DESCRIPTION	DATE	DESCRIPTION

ENGINEER OF RECORD
RAMAKUMAR VEDULA, P.E.
LICENSE NUMBER 54873
TIERRA SOUTH FLORIDA, INC.
2765 VISTA PARKWAY
SUITE H10
WEST PALM BEACH, FL 33411

STATE OF FLORIDA
DEPARTMENT OF TRANSPORTATION

ROAD NO.	COUNTY	FINANCIAL PROJECT ID
COVE RD	MARTIN	441700-1-22-02

ROADWAY BORINGS LOCATION PLAN

SHEET NO.
6

3/29/2024 8:45:01 AM jolivia
J:\Tierra Documents\Projects\TSF 2022\7111-22-342\Cove Rd. from SR-76_Kanner Highway to SR-5_US-1 (Inwood)\441700-1-22-02\Geotechnical\ABORRD50.dgn

Summary of Exfiltration Test Results

Geotechnical Services
Cove Road from SR-76/Kanner Highway to SR-5/US-1
Martin County, Florida
TSFGeo Project No. 7111-22-342

Test Location	Date Performed	Diameter		Depth of Hole	Depth to Groundwater Level Below Ground Surface (Feet)		Hydraulic Head, H_2	Saturated Hole Depth, Ds	Average Flow Rate, Q	Horizontal Hydraulic Conductivity (K)
		Hole (Inches)	Casing (Inches)	(Feet)	Prior to Test	During Test	(Feet)	(Feet)	(gpm)	($ft^3/sec/ft^2$-ft Head)
BHP-1	2/7/2024	6	4	10.0	5.5	0.0	5.5	4.5	0.60	3.17E-05
BHP-2	2/5/2024	6	4	10.0	5.2	0.0	5.2	4.8	0.30	1.65E-05
BHP-3	2/5/2024	6	4	10.0	3.0	0.0	3.0	7.0	0.40	3.31E-05
BHP-4	2/8/2024	6	4	10.0	3.9	0.0	3.9	6.1	0.40	2.67E-05
BHP-5	2/6/2024	6	4	10.0	3.0	0.0	3.0	7.0	0.30	2.48E-05

Note:

(1) The above hydraulic conductivity 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 percolation test procedure.

(3) Casing diameter was used for the calculation of hydraulic conductivity values.

APPENDIX 6

Nutrient Loading Analysis

Inwood consulting engineers
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: December 5, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **1**
POND NAME : **1B**

Non-DCIA Curve Number Calculations:

Existing Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	6.10		0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84		5.51	462.4
Residential Areas (1.0 acre, 20% Impervious)	D	95	1.29		0.0
		Total:	7.39	5.51	462.4

Non-DCIA CN = 84.00
% DCIA = 57.3%

Proposed Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	7.38 ac		
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	84		4.23 ac	355.3
Proposed Ponds (Water Surface)	D	100		0.45 ac	45.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	84		0.84 ac	70.6
		Total:	7.38 ac	5.52 ac	470.9

Non-DCIA CN = 85.30
% DCIA = 57.2%

Composite Nutrient Loading:

Existing Condition:

Land Use Description	TN	TP	Area	TN* Area	TP*Area
Highway	1.520	0.200	6.10 ac	9.27	1.22
Highway	1.520	0.200	5.51 ac	8.37	1.10
Residential Areas (1.0 acre, 20% Impervious)	1.645	0.270	1.29 ac	2.12	0.35
	Total:		12.90 ac	19.76	2.67

TN = Total TN / Area = 1.533

TP = Total TP / Area = 0.207

Inwood Consulting Engineers, Inc.					
	PROJECT TITLE:	Cove Road PD&E			
	PROJECT NUMBER:	DT4-010-01			
	BASIN NAME:	1	MADE BY:	ZKE	DATE: 12/4/2024
	POND NAME:	1B	CHECKED BY:	REC	DATE: 12/4/2024

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	CN	Product
Roadway Paved Area	7.38	98.00	723.24
Roadway Pervious Area	4.23	84.00	355.32
Pond Pervious Area	0.83	84.00	69.72
Pond Area at NWL	0.45	100.00	45.00
Total	**12.89**		1193.28

% DCIA = **57.25** %
Non DCIA CN = **84**
Composite C = **0.53**
Annual Rainfall (P) = **58** **in**

Meteorlogical Zone : **2**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
3.50	(NWL)	0.45				2.85
			0.40	3.00	1.20	
0.50		0.35				1.65
			0.28	6.00	1.65	
-5.50	Bottom	0.20				

Permanent Pool Volume Provided = **2.85** **ac-ft**

Mean Depth = Permanent Pool Volume / Area at NWL = **6.33** **ft**

Complete Report (not including cost) Ver 4.3.5

Project: Cove Road
Date: 12/5/2024 10:52:21 AM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Basin 1
Rainfall Zone	Florida Zone 2
Annual Mean Rainfall	58.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	12.90
Rational Coefficient (0-1)	0.46
Non DCIA Curve Number	84.00
DCIA Percent (0-100)	47.27
Nitrogen EMC (mg/l)	1.533
Phosphorus EMC (mg/l)	0.207
Runoff Volume (ac-ft/yr)	28.791
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	54.420
Phosphorus Loading (kg/yr)	7.348

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200
Area (acres)	12.90
Rational Coefficient (0-1)	0.53
Non DCIA Curve Number	85.30
DCIA Percent (0-100)	57.25
Wet Pond Area (ac)	0.45
Nitrogen EMC (mg/l)	1.520
Phosphorus EMC (mg/l)	0.200
Runoff Volume (ac-ft/yr)	32.130

Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	60.216
Phosphorus Loading (kg/yr)	7.923

Catchment Number: 1 Name: Basin 1

Project: Cove Road
Date: 12/5/2024

Wet Detention Design

Permanent Pool Volume (ac-ft)	2.850
Permanent Pool Volume (ac-ft) for 31 days residence	2.729
Annual Residence Time (days)	32
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	12.90
Contributing Area (acres)	12.450
Non-DCIA Curve Number	85.30
DCIA Percent	57.25
Rainfall Zone	Florida Zone 2
Rainfall (in)	58.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	10
Provided TN Treatment Efficiency (%)	39
Required TP Treatment Efficiency (%)	7
Provided TP Treatment Efficiency (%)	65

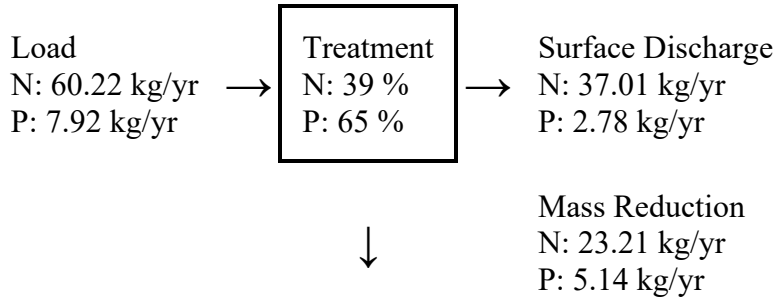
Media Mix Information

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

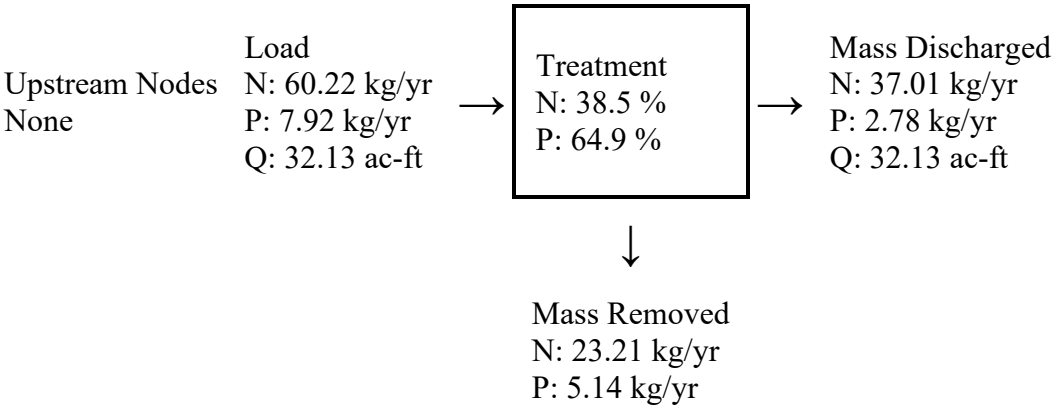
Groundwater Discharge (Stand-Alone)

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

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: Cove Road

Date:12/5/2024

Analysis Type: Net

Routing Summary
Catchment 1 Routed to Outlet

Improvement

BMP Types:

Catchment 1 - (Basin 1)

Wet Detention

Based on % removal values to the nearest percent

Total nitrogen target removal met? **Yes**

Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	54.42 kg/yr	
Total N post load	60.22 kg/yr	
Target N load reduction	10 %	
Target N discharge load	54.42 kg/yr	
Percent N load reduction	39 %	
Provided N discharge load	37.01 kg/yr	81.61 lb/yr
Provided N load removed	23.21 kg/yr	51.17 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	7.348 kg/yr	
Total P post load	7.923 kg/yr	
Target P load reduction	7 %	
Target P discharge load	7.348 kg/yr	
Percent P load reduction	65 %	
Provided P discharge load	2.784 kg/yr	6.14 lb/yr
Provided P load removed	5.139 kg/yr	11.332 lb/yr

Inwood consulting engineers
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: August 12, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **2**
POND NAME : **2**

Non-DCIA Curve Number Calculations:

Existing Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	7.89		0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	84		8.30	697.2
Woods; Good condition (Woods are	D	77		5.63	433.5
		Total:	7.89	13.93	1130.7

Non-DCIA CN = 81.17
% DCIA = 36.2%

Proposed Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	10.20 ac		0.0
Impervious areas; Streets & roads	A	98	2.26 ac		0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	A	49		0.68 ac	33.3
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84		3.05 ac	256.2
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	84		1.74 ac	146.2
Proposed Ponds (Water Surface)	D	100		3.89 ac	389.0
		Total:	12.46 ac	9.36 ac	824.7

Non-DCIA CN = 88.11
% DCIA = 57.1%

Composite Nutrient Loading:

Existing Condition:

Land Use Description	TN	TP	Area	TN* Area	TP*Area
Highway	1.520	0.200	7.89 ac	11.99	1.58
Highway	1.520	0.200	8.30 ac	12.62	1.66
Undeveloped - Wet Flatwoods	1.213	0.021	5.63 ac	6.83	0.12
	Total:		21.82 ac	31.44	3.36

TN = Total TN / Area = 1.441

TP = Total TP / Area = 0.154

Inwood Consulting Engineers, Inc.	PROJECT TITLE:	Cove Road PD&E				
	PROJECT NUMBER:	DT4-010-01				
	BASIN NAME:	2	MADE BY:	ZKE	DATE:	11/21/2024
	POND NAME:	2	CHECKED BY:	REC	DATE:	11/21/2024

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	CN	Product
Roadway Paved Area	12.46	98.00	1221.08
Roadway Pervious Area	3.72	84.00	312.48
Pond Pervious Area	1.74	84.00	146.16
Pond Area at NWL	3.89	100.00	389.00
Total	**21.81**		2068.72

% DCIA = **57.13** %
Non DCIA CN = **84**
Composite C = **0.53**
Annual Rainfall (P) = **58** **in**

Meteorlogical Zone : **2**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
11.00	(NWL)	3.89				30.26
			3.67	3.00	11.00	
8.00		3.44				19.26
			3.21	6.00	19.26	
2.00	Bottom	2.98				

Permanent Pool Volume Provided = **30.26** **ac-ft**

Mean Depth = Permanent Pool Volume / Area at NWL = **7.78** **ft**

Complete Report (not including cost) Ver 4.3.5

Project: Cove Road
Date: 11/21/2024 9:06:13 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Basin 2
Rainfall Zone	Florida Zone 2
Annual Mean Rainfall	58.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	21.82
Rational Coefficient (0-1)	0.37
Non DCIA Curve Number	81.17
DCIA Percent (0-100)	36.20
Nitrogen EMC (mg/l)	1.441
Phosphorus EMC (mg/l)	0.154
Runoff Volume (ac-ft/yr)	39.103
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	69.477
Phosphorus Loading (kg/yr)	7.425

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200
Area (acres)	21.82
Rational Coefficient (0-1)	0.55
Non DCIA Curve Number	88.11
DCIA Percent (0-100)	57.10
Wet Pond Area (ac)	3.89
Nitrogen EMC (mg/l)	1.520
Phosphorus EMC (mg/l)	0.200
Runoff Volume (ac-ft/yr)	47.886

Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	89.747
Phosphorus Loading (kg/yr)	11.809

Catchment Number: 1 Name: Basin 2

Project: Cove Road
Date: 11/21/2024

Wet Detention Design

Permanent Pool Volume (ac-ft)	30.260
Permanent Pool Volume (ac-ft) for 31 days residence	4.067
Annual Residence Time (days)	231
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	21.82
Contributing Area (acres)	17.930
Non-DCIA Curve Number	88.11
DCIA Percent	57.10
Rainfall Zone	Florida Zone 2
Rainfall (in)	58.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	23
Provided TN Treatment Efficiency (%)	43
Required TP Treatment Efficiency (%)	37
Provided TP Treatment Efficiency (%)	81

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)	0.000
TN Concentration (mg/L)	0.000
TP Mass Load (kg/yr)	0.000
TP Concentration (mg/L)	0.000

Load Diagram for Wet Detention (stand-alone)

Load
N: 89.75 kg/yr
P: 11.81 kg/yr

→

Treatment
N: 43 %
P: 81 %

→

Surface Discharge
N: 51.21 kg/yr
P: 2.23 kg/yr

↓

Mass Reduction
N: 38.53 kg/yr
P: 9.58 kg/yr

Load Diagram for Wet Detention (As Used In Routing)

Upstream Nodes
None

Load
N: 89.75 kg/yr
P: 11.81 kg/yr
Q: 47.89 ac-ft

→

Treatment
N: 42.9 %
P: 81.1 %

→

Mass Discharged
N: 51.21 kg/yr
P: 2.23 kg/yr
Q: 47.89 ac-ft

↓

Mass Removed
N: 38.53 kg/yr
P: 9.58 kg/yr

Summary Treatment Report Version: 4.3.5

Project: Cove Road

Date:11/21/2024

Analysis Type: Net

Routing Summary
Catchment 1 Routed to Outlet

Improvement

BMP Types:

Catchment 1 - (Basin 2)

Wet Detention

Based on % removal values to the nearest percent

Total nitrogen target removal met? **Yes**

Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	69.48 kg/yr	
Total N post load	89.75 kg/yr	
Target N load reduction	23 %	
Target N discharge load	69.48 kg/yr	
Percent N load reduction	43 %	
Provided N discharge load	51.21 kg/yr	112.93 lb/yr
Provided N load removed	38.53 kg/yr	84.96 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	7.425 kg/yr	
Total P post load	11.809 kg/yr	
Target P load reduction	37 %	
Target P discharge load	7.425 kg/yr	
Percent P load reduction	81 %	
Provided P discharge load	2.231 kg/yr	4.92 lb/yr
Provided P load removed	9.578 kg/yr	21.118 lb/yr

Inwood consulting engineers
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: August 12, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **3**
POND NAME : **3B**

Non-DCIA Curve Number Calculations:

Existing Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	6.25		0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	80		5.99	479.2
Brush-weed-grass mixture; Fair condition	D	77		4.34	334.2
		Total:	6.25	10.33	813.4

Non-DCIA CN = 78.74
% DCIA = 37.7%

Proposed Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	8.41 ac		
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80		5.86 ac	468.8
Proposed Ponds (Water Surface)	D	100		2.31 ac	231.0
		Total:	8.41 ac	8.17 ac	699.8

Non-DCIA CN = 85.65
% DCIA = 50.7%

Composite Nutrient Loading:

Existing Condition:

Land Use Description	TN	TP	Area	TN* Area	TP*Area
Highway	1.520	0.200	6.25 ac	9.50	1.25
Highway	1.520	0.200	5.99 ac	9.10	1.20
Undeveloped - Scrubby Flatwoods	1.155	0.027	4.34 ac	5.01	0.12
	Total:		16.58 ac	23.62	2.57

TN = Total TN / Area = 1.424

TP = Total TP / Area = 0.155

Inwood Consulting Engineers, Inc.					
	PROJECT TITLE:	Cove Road PD&E			
	PROJECT NUMBER:	DT4-010-01			
	BASIN NAME:	3	MADE BY:	ZKE	DATE: 11/21/2024
	POND NAME:	3B	CHECKED BY:	REC	DATE: 11/21/2024

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	CN	Product
Roadway Paved Area	8.41	98.00	824.18
Roadway Pervious Area	3.83	80.00	306.40
Pond Pervious Area	2.03	80.00	162.40
Pond Area at NWL	2.31	100.00	231.00
Total	**16.58**		1523.98

% DCIA = **50.72** %
Non DCIA CN = **80**
Composite C = **0.47**
Annual Rainfall (P) = **58** **in**

Meteorlogical Zone : **2**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
14.00	(NWL)	2.31				14.43
			2.06	3.00	6.18	
11.00		1.81				8.25
			1.38	6.00	8.25	
5.00	Bottom	0.94				

Permanent Pool Volume Provided = **14.43** **ac-ft**

Mean Depth = Permanent Pool Volume / Area at NWL = **6.25** **ft**

Complete Report (not including cost) Ver 4.3.5

Project: Cove Road
Date: 11/21/2024 9:05:03 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Basin 3
Rainfall Zone	Florida Zone 2
Annual Mean Rainfall	58.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	16.58
Rational Coefficient (0-1)	0.37
Non DCIA Curve Number	78.74
DCIA Percent (0-100)	37.70
Nitrogen EMC (mg/l)	1.424
Phosphorus EMC (mg/l)	0.155
Runoff Volume (ac-ft/yr)	29.570
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	51.919
Phosphorus Loading (kg/yr)	5.651

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200
Area (acres)	16.58
Rational Coefficient (0-1)	0.49
Non DCIA Curve Number	85.65
DCIA Percent (0-100)	50.70
Wet Pond Area (ac)	2.31
Nitrogen EMC (mg/l)	1.520
Phosphorus EMC (mg/l)	0.200
Runoff Volume (ac-ft/yr)	34.123

Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	63.952
Phosphorus Loading (kg/yr)	8.415

Catchment Number: 1 Name: Basin 3

Project: Cove Road
Date: 11/21/2024

Wet Detention Design

Permanent Pool Volume (ac-ft)	14.430
Permanent Pool Volume (ac-ft) for 31 days residence	2.898
Annual Residence Time (days)	154
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	16.58
Contributing Area (acres)	14.270
Non-DCIA Curve Number	85.65
DCIA Percent	50.70
Rainfall Zone	Florida Zone 2
Rainfall (in)	58.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	19
Provided TN Treatment Efficiency (%)	43
Required TP Treatment Efficiency (%)	33
Provided TP Treatment Efficiency (%)	78

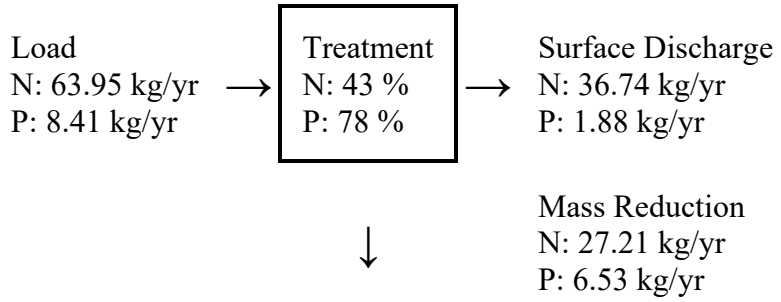
Media Mix Information

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

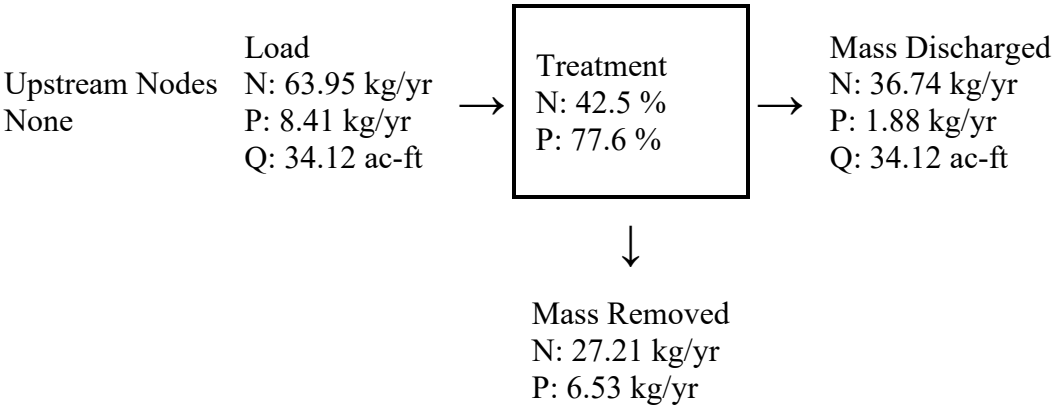
Groundwater Discharge (Stand-Alone)

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

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: Cove Road

Date:11/21/2024

Analysis Type: Net

Routing Summary
Catchment 1 Routed to Outlet

Improvement

BMP Types:

Catchment 1 - (Basin 3)

Wet Detention

Based on % removal values to the nearest percent

Total nitrogen target removal met? **Yes**

Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	51.92 kg/yr	
Total N post load	63.95 kg/yr	
Target N load reduction	19 %	
Target N discharge load	51.92 kg/yr	
Percent N load reduction	43 %	
Provided N discharge load	36.74 kg/yr	81.02 lb/yr
Provided N load removed	27.21 kg/yr	59.99 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	5.651 kg/yr	
Total P post load	8.415 kg/yr	
Target P load reduction	33 %	
Target P discharge load	5.651 kg/yr	
Percent P load reduction	78 %	
Provided P discharge load	1.881 kg/yr	4.15 lb/yr
Provided P load removed	6.534 kg/yr	14.407 lb/yr

Inwood consulting engineers
3000 Dovera Drive, Suite 200, Oviedo, FL 32765
(407) 971-8850 (phone)
(407) 971-8955 (fax)

Made by: ZKE
Checked by: REC

DATE: August 12, 2024
Job Number: DT4-010-01

PROJECT : **Cove Road PD&E**
BASIN NAME : **4**
POND NAME : **4A**

Non-DCIA Curve Number Calculations:

Existing Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	5.42		0.0
Open Space (lawns, parks, golf courses, cemeteries, etc.) Fair condition (grass cover 50% to 75%)	D	80		6.04	483.2
Brush-weed-grass mixture; Fair condition	D	77		3.77	290.3
		Total:	5.42	9.81	773.5

Non-DCIA CN = 78.85
% DCIA = 35.6%

Proposed Condition:

Land Use Description	Soil Group	CN	DCIA Area	Non-DCIA Area	CN* Non-DCIA Area
Impervious areas; Streets & roads	D	98	8.50 ac		
Open Space (lawns, parks, golf courses, cemeteries, etc.) Good condition (grass cover > 75%)	D	80		4.51 ac	360.8
Proposed Ponds (Water Surface)	D	100		2.22 ac	222.0
		Total:	8.50 ac	6.73 ac	582.8

Non-DCIA CN = 86.60
% DCIA = 55.8%

Composite Nutrient Loading:

Existing Condition:

Land Use Description	TN	TP	Area	TN* Area	TP*Area
Highway	1.520	0.200	5.42 ac	8.24	1.08
Highway	1.520	0.200	6.04 ac	9.18	1.21
Undeveloped - Wet Flatwoods	1.213	0.021	3.77 ac	4.57	0.08
	Total:		15.23 ac	21.99	2.37

TN = Total TN / Area = 1.444

TP = Total TP / Area = 0.156

Inwood Consulting Engineers, Inc.	PROJECT TITLE:	Cove Road PD&E				
	PROJECT NUMBER:	DT4-010-01				
	BASIN NAME:	4	MADE BY:	ZKE	DATE:	11/21/2024
	POND NAME:	4A	CHECKED BY:	REC	DATE:	11/21/2024

Permanent Pool Calculations

Basin Characteristics

Land Use	Area (ac)	CN	Product
Roadway Paved Area	8.50	98.00	833.00
Roadway Pervious Area	2.87	80.00	229.60
Pond Pervious Area	1.64	80.00	131.20
Pond Area at NWL	2.22	100.00	222.00
Total	**15.23**		1415.80

% DCIA = **55.81** %
Non DCIA CN = **80**
Composite C = **0.50**
Annual Rainfall (P) = **58** **in**

Meteorlogical Zone : **2**

Stage Storage Calc.

ELEV. (ft)		AREA (ac)	AVG AREA (ac)	Delta D (ft)	Delta storage (ac-ft)	Sum Storage (ac-ft)
14.00	(NWL)	2.22				15.50
			2.04	3.00	6.11	
11.00		1.85				9.39
			1.57	6.00	9.39	
5.00	Bottom	1.28				

Permanent Pool Volume Provided = **15.50** **ac-ft**

Mean Depth = Permanent Pool Volume / Area at NWL = **6.98** **ft**

Complete Report (not including cost) Ver 4.3.5

Project: Cove Road Basin 4
Date: 11/21/2024 9:07:18 PM

Site and Catchment Information

Analysis: Net Improvement

Catchment Name	Basin 4
Rainfall Zone	Florida Zone 1
Annual Mean Rainfall	58.00

Pre-Condition Landuse Information

Landuse	User Defined Values
Area (acres)	15.56
Rational Coefficient (0-1)	0.38
Non DCIA Curve Number	78.87
DCIA Percent (0-100)	32.70
Nitrogen EMC (mg/l)	1.437
Phosphorus EMC (mg/l)	0.152
Runoff Volume (ac-ft/yr)	28.599
Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	50.673
Phosphorus Loading (kg/yr)	5.360

Post-Condition Landuse Information

Landuse	Highway: TN=1.520 TP=0.200
Area (acres)	15.56
Rational Coefficient (0-1)	0.58
Non DCIA Curve Number	87.37
DCIA Percent (0-100)	54.60
Wet Pond Area (ac)	2.60
Nitrogen EMC (mg/l)	1.520
Phosphorus EMC (mg/l)	0.200
Runoff Volume (ac-ft/yr)	36.555

Groundwater N (kg/yr)	0.000
Groundwater P (kg/yr)	0.000
Nitrogen Loading (kg/yr)	68.511
Phosphorus Loading (kg/yr)	9.015

Catchment Number: 1 Name: Basin 4

Project: Cove Road Basin 4
Date: 11/21/2024

Wet Detention Design

Permanent Pool Volume (ac-ft)	15.500
Permanent Pool Volume (ac-ft) for 31 days residence	3.105
Annual Residence Time (days)	155
Littoral Zone Efficiency Credit	
Wetland Efficiency Credit	

Watershed Characteristics

Catchment Area (acres)	15.56
Contributing Area (acres)	12.960
Non-DCIA Curve Number	87.37
DCIA Percent	54.60
Rainfall Zone	Florida Zone 1
Rainfall (in)	58.00

Surface Water Discharge

Required TN Treatment Efficiency (%)	26
Provided TN Treatment Efficiency (%)	43
Required TP Treatment Efficiency (%)	41
Provided TP Treatment Efficiency (%)	78

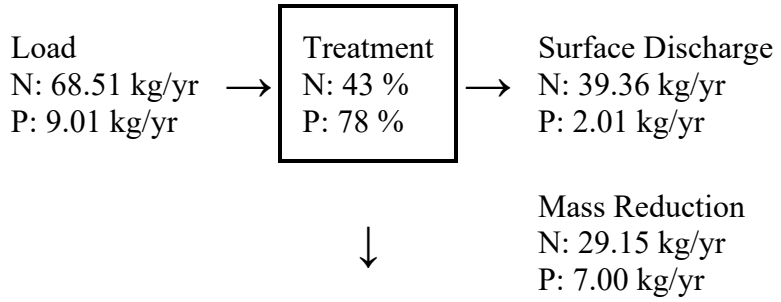
Media Mix Information

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

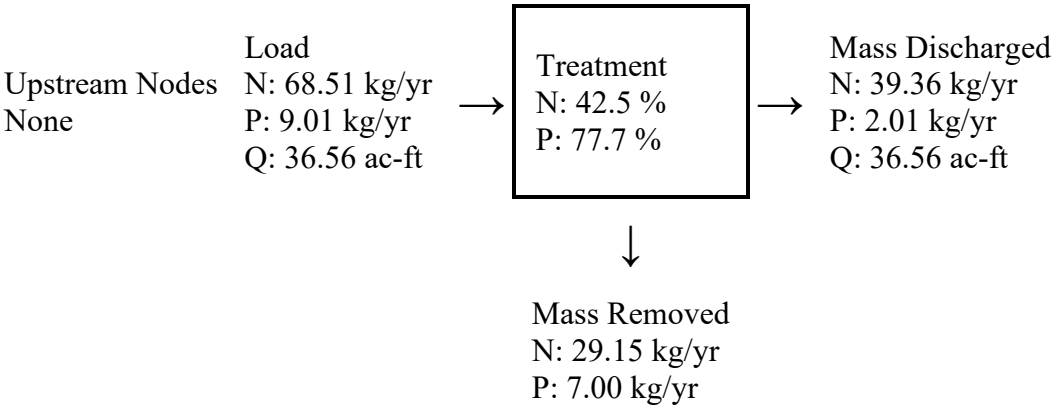
Groundwater Discharge (Stand-Alone)

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

Load Diagram for Wet Detention (stand-alone)



Load Diagram for Wet Detention (As Used In Routing)



Summary Treatment Report Version: 4.3.5

Project: Cove Road Basin 4

Date:11/21/2024

Analysis Type: Net

Routing Summary
Catchment 1 Routed to Outlet

Improvement

BMP Types:

Catchment 1 - (Basin 4)

Wet Detention

Based on % removal values to the nearest percent

Total nitrogen target removal met? **Yes**

Total phosphorus target removal met? **Yes**

Summary Report

Nitrogen

Surface Water Discharge

Total N pre load	50.67 kg/yr	
Total N post load	68.51 kg/yr	
Target N load reduction	26 %	
Target N discharge load	50.67 kg/yr	
Percent N load reduction	43 %	
Provided N discharge load	39.36 kg/yr	86.79 lb/yr
Provided N load removed	29.15 kg/yr	64.27 lb/yr

Phosphorus

Surface Water Discharge

Total P pre load	5.36 kg/yr	
Total P post load	9.015 kg/yr	
Target P load reduction	41 %	
Target P discharge load	5.36 kg/yr	
Percent P load reduction	78 %	
Provided P discharge load	2.013 kg/yr	4.44 lb/yr
Provided P load removed	7.002 kg/yr	15.439 lb/yr

APPENDIX 7

Correspondence

Cove Road PD&E – Meeting Minutes

INWOOD Consulting Engineers, Inc I 3000 Dovera Drive, Suite 200, Oviedo, FL 32765 I P: 407-971-8850

DATE: August 29, 2023

TO: **All Attendees (via email)**

FROM: Zachary K. Evans, PE

RE: Cove Road from SR76 (Kanner Hwy) to SR 5/US 1 PD&E Study (FPID: 441700-1)

CC: File

The Drainage Methodology / Kick-Off Meeting for the Cove Road Project Development and Environment (PD&E) Study was held at 1:15pm on August 29, 2023, via Microsoft Teams. The purpose of this meeting was to review the requirements of the project and provide an opportunity for drainage-specific scope discussion on choices made on pond siting.

The meeting began with introductions and an overview of the project. The bulleted items below summarize the key points of discussion. The meeting agenda and sign-in sheet provided at the meeting are attached to this document for reference.

Discussion Items

- Inwood gave a Project Overview/Scope Discussion
- Inwood then reviewed the existing drainage conditions of the corridor
    - The project is located within the South St. Lucie and Indian River Lagoon South Coastal watersheds and traverses three WBIDs; WBID 3210C – South Fork St. Lucie River (Tidal Segment), WBID 3220 – Basin 2, and WBID 3208C – Manatee Pocket. Manatee Pocket is an Outstanding Florida Water (OFW).
        - The St. Lucie River and Estuary Basin has adopted a Basin Management Action Plan (BMAP), which will require a nutrient loading analysis.
    - The existing roadway was permitted under SFWMD Permit No. 43-00642-S for a 4-lane condition. The existing permit has 5 basins along the corridor and provides treatment within swales along the roadway. The ultimate condition was not built out and Cove Road currently exists as a 2-lane roadway.
    - There are cross drains along the corridor which provide equalization and conveyance for the wetlands that are along the corridor.

- Inwood then reviewed the drainage approach and methodology for the study. Open discussion was had for the Pond alternatives for each basin.
    - A Pond Siting Report (PSR) will be provided. The Five (5) existing basins are anticipated to remain and an offsite pond and exfiltration alternative will be investigated for each basin.
    - Basin 1 begins at Kanner Highway and extends east.
        - There are limited pond sites available within the basin limits due to the majority of the area being built out or planned for development. Potential locations would create significant relocations or impact 4f parcels (Hosford Park)
        - The roadway low point is near Gaines Avenue, creating difficulty in conveying stormwater to the east end of the basin, which is at a higher elevation.
        - Inwood asked about the potential to work with I-95 / Kanner Hwy PD&E and have portions of Basin 1 included in their study.
        - Currently the approach is to shift the easter basin limit to the west and provide treatment for the basin in Pond 2.
        - Martin County stated the outfall structure at Gaines Avenue flows south within a culverted system that crosses Paulson Avenue before crossing underneath Gaines Avenue and ultimately outfalling into the river.

- Martin County stated they would confirm what the plans were for Hosford Park as there may be potential to utilize that parcel if there are no planned improvements.
    - Martin County later followed up stating that Hosford Park has been permitted and planned for a dog park.
    - It was determined that the park would not be considered for a potential Pond Site during the PD&E, but the County is looking to potentially change the land use of the park and it may be reconsidered during design.
- Basin 2
    - Basin 2 has a roadway highpoint at the western limit of the basin and flows east.
    - The pond site being investigated for this basin is currently west of the existing basin divide and will utilize the entirety of the impacted parcel. This will allow for additional volume within the pond to account for portion of Basin 1.
    - Martin County stated the existing basin currently ultimately outfalls both north along Fern Creek and south through the wetland systems.
    - Martin County stated there were several properties within the basin that were not planned for development.
    - Inwood stated the site being investigated was chosen due to its proximity to the basin low point.
    - The basin limit will be controlled hydraulically by the elevation of the roadway that allows stormwater runoff to be conveyed back to the pond.
    - Martin County stated that Legacy Cove outfalls to Fern Creek along the roadway R/W at the southwest corner of the development.
- Basin 3
    - Inwood reviewed multiple sites for a pond within Basin 3 asking for the County's input on preference. Inwood asked if a pond at the corner of Willoughby Blvd and Cove Road as an expansion of the existing County Ponds would be ideal.
    - Martin County stated that the ponds along Willoughby had excess volume to accommodate the future 4 laning of Willoughby, but an additional site would likely be necessary.
    - Martin County also stated pre-application request was submitted for potential future development on the site being investigated at the intersection of Willoughby and Cove Road.
    - In order to avoid future conflict with this development the site west of Willoughby would be preferred.
    - Martin County stated the existing ponds on Willoughby discharge north along a bypass ditch before outfalling into the Tower Road ditch.
    - Martin County stated there is a drainage easement for the inlets along the west side of Willoughby Blvd.
    - Martin County asked if parcel 55-38-41-000-066-00071-0 had been considered. Stating that the parcel has a Preserve Area Management Plan (PAMP) for a portion of the site, but it does not encompass the entire site.
    - Inwood stated the site was avoided due to likely wetland impacts, but would coordinate with the ecological team and review the site.
        - Review of the National Wetlands Inventory (NWI) indicated that the majority of the parcel has wetland FLUCFCS.
- Basin 4
    - Inwood reviewed Basin 4 and the limited pond site availability citing the existing development to the south and conservation easements over the wetlands.
    - A potential pond site was identified near the Hibiscus Park outfall ditch at back of parcel.

- Martin County stated the Hibiscus Park ditch was County R/W and could be utilized as an access easement to the pond.
- Inwood agreed and will remove the easement shown along the property line.
- Inwood stated the property to the north is owned by Indian River State College District Board of Trustees and asked if the County knew of any planned developments or if the State College would be interested in a joint use opportunity.
    - The County stated they would provide contact information to Inwood so that a coordination meeting can be scheduled regarding future plans for the school's vacant parcel.

- Basin 5
    - Inwood reviewed Basin 5, stating there were limited options for offsite ponds. The north side of the roadway are single family homes, in which the potential R/W impacts from the roadway would not be significant enough to be total takes. Siting a pond to the north would cause a multitude of relocations.
    - There are developments along the southside of the roadway and conservation easements over existing wetlands.
    - Inwood identified a site south within Montego Cove, in which the parcels were not fully built out. The potential pond site would utilize the vacant lots and an access easement to convey stormwater.

- Inwood reviewed the design criteria that would be utilized for this project.
    - The proposed study would analyze treatment of total impervious for the proposed roadway due to the existing treatment swales being impacted.
        - 50% additional water quality would be provided for basins outfalling to OFW
        - Nutrient loading analysis would be provided due to the adopted BMAP
    - Inwood asked to clarify Martin County criteria
        - Attenuation
            - 25-year/72-hour storm
            - 3-year/24-hour storm
        - Treatment
            - Pre- vs post-development mass pollutant loading
        - Martin County Municode design analysis volumes were clarified:
            - 3 inches over impervious for dry retention ponds
            - 3 inches over impervious + 25% for dry detention ponds
            - 3 inches over impervious + 50% for wet detention ponds
- Inwood stated there were not any anticipated floodplain impacts associated with this study. A hydraulics memo would be provided documenting this and would provide preliminary analysis of the cross drains along the corridor.
- Inwood requested that this projected be added to FDOT's September agenda for pre-app with SFWMD

Action Items

- FDOT
    - Include Cove Road on agenda for September Interagency meeting with SFWMD
- Martin County
    - Provide contact information for Indian River State College District Board of Trustees
        - Contact information has been provided and as a follow-up. Inwood will contact and schedule a meeting with the Indian River State College District Board of Trustees.

Note: The above reflects the writer's understanding of the contents of the meeting. If any misinterpretations or inaccuracies are included, please contact Zach Evans (407-971-8850) as soon as possible for resolution and revisions if necessary.

Attendees

Name	Firm/Dept	E-mail	Phone
Zach Evans, PE	*Inwood Drainage*	*zevans@inwoodinc.com*	
David Dangel, PE	*Inwood PD&E*	*ddangel@inwoodinc.com*	
Kevin Iannarone, PE	*Inwood Roadway*	*Kiannarone@inwoodinc.com*	
Forrest McClellan, EI	*Inwood Drainage*	*fmcclellan@inwoodinc.com*	
Alex Paradiz	*FDOT*	*Alex.paradiz@dot.state.fl.us*	
Robert Vater	*FDOT*	*Robert.vater@dot.state.fl.us*	
Lisa Wichser	*Martin Co*	*lwichser@martin.fl.us*	
Nick Muzia	*Martin Co*	*nmuzia@martin.fl.us*	

9:00 to 9:30 AM

Cove Road from SR76 (Kanner Hwy) to SR 5/US 1 PD&E Study (FM 441700-1)

Consultant: David Dangel of Ardurra Group *(DDangel@ardurra.com)*

FLORIDA DEPARTMENT OF TRANSPORTATION
INTERAGENCY MEETING MINUTES

9:00–9:30 am: (D4) Cove Rd from SR76 (Kanner Hwy) to SR 5/US 1 PD&E Study (FM 441700-1)

AGENDA SUMMARY:

PROJECT INFO

1. FPID/FM Number: 441700-1

2. FDOT Project Name: Cove Road from SR76 (Kanner Hwy) to SR 5/US 1 PD&E Study

3. FDOT Project Manager: Vanita Saini
   FDOT Drainage Liaison: Ruben Rodriguez
   FDOT PLEMO Liaison: Fernando Ascanio

4. Consultant/Company Name and Contact information:
   Ardurra Group, Inc.
   3000 Dovera Dr., Suite 200, Oviedo, FL 32765
   DDangel@ardurra.com
   ZEvans@ardurra.com
   407-971-8850

5. SR/Local Name: Cove Road

6. County: Martin

7. Project Limits (provide location map and figures): From SR76 (Kanner Hwy) to SR 5/US 1

8. General Project Scope (include stage of project - PD&E, Design, Design/Build, Construction, etc.):
   This PD&E Study for Cove Road includes urbanizing, constructing median, widening from 2 lanes to 4 lanes with a bike lane in each direction. Upgrade existing signalized intersections and evaluate and propose new signalization where needed. Propose new drainage system with retention basins, lighting, signing and pavement markings, sidewalk, and shared use path.

9. Anticipated Permits:
   Permit Modification for SFWMD Permit No. 43-00642-S
   Irrigation Water Use Permit
   Dewatering Permit
   National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)
   Pre-Construction Notification (ENG 4345)

10. Provide specific agenda discussion topics (i.e. goal of meeting):
    Permitting Criteria
    Stormwater Management Approach

11. Requested Attendees (SFWMD - Environmental Resources, Surface Water Management, Water Use, ROW; USACE; USFWS; NMFS, etc.):
    SFWMD – Environmental Resources, Surface Water Management, Water Use

12. Does your project include impacts to any environmental resources? If yes, please answer Questions a- d: Yes

    a. Have wetland and/or protected species impacts been identified? If so define the impact amount and type: Yes, Development of the NRE is ongoing to identify impacted species.

    b. Have the project representatives discussed the wetland and/or protected species impacts with PL&EM? (List the PL&EM person who you discussed with and the date of the meeting/discussion): Yes, methodology was discussed with Fernando Ascanio. Coordination is ongoing.

    c. During the meeting/discussion with PL&EM did project representatives discuss avoidance and minimization criteria? Has PL&EM concurred these criteria were applied? (For District IV projects, participation in this interagency meeting is not permitted if elimination and reduction has not been explored with PL&EM): Meeting to discuss avoidance and minimization upcoming. Will be scheduled once impacts are identified from preferred alignment.

    d. Have mitigation options for unavoidable impacts been discussed with PL&EM, and concurrence on the amount and type been achieved? (For District IV projects, participation in this interagency meeting is not permitted if options for unavoidable impacts been discussed with PL&EM): Meeting to discuss mitigation needs upcoming. Will be scheduled once impacts are identified from preferred alignment.

PRIOR COORDINATION

13. Has the project approach been discussed with:
    a. FDOT Drainage Liaison? Robert Vater
    b. PLEMO Liaison? Fernando Ascanio

14. Have you coordinated with Cultural Resource Manager to determine if a SHPO concurrence letter has been received and can be included in the application?
    Yes, coordination with the Cultural Resource Manager consultant is ongoing.

15. Have you coordinated with the Contamination Coordinator to determine if there are contamination concerns in the event a dewatering permit is required?
    Yes, the initial plans have been reviewed by the Contamination Reviewer and coordination is ongoing.

16. Have you coordinated with Natural Resource Manager to determine if a USFWS concurrence letter has been received and can be included in the application? Development of NRE is ongoing. Will be coordinated with Natural Resource Manager upon completion.

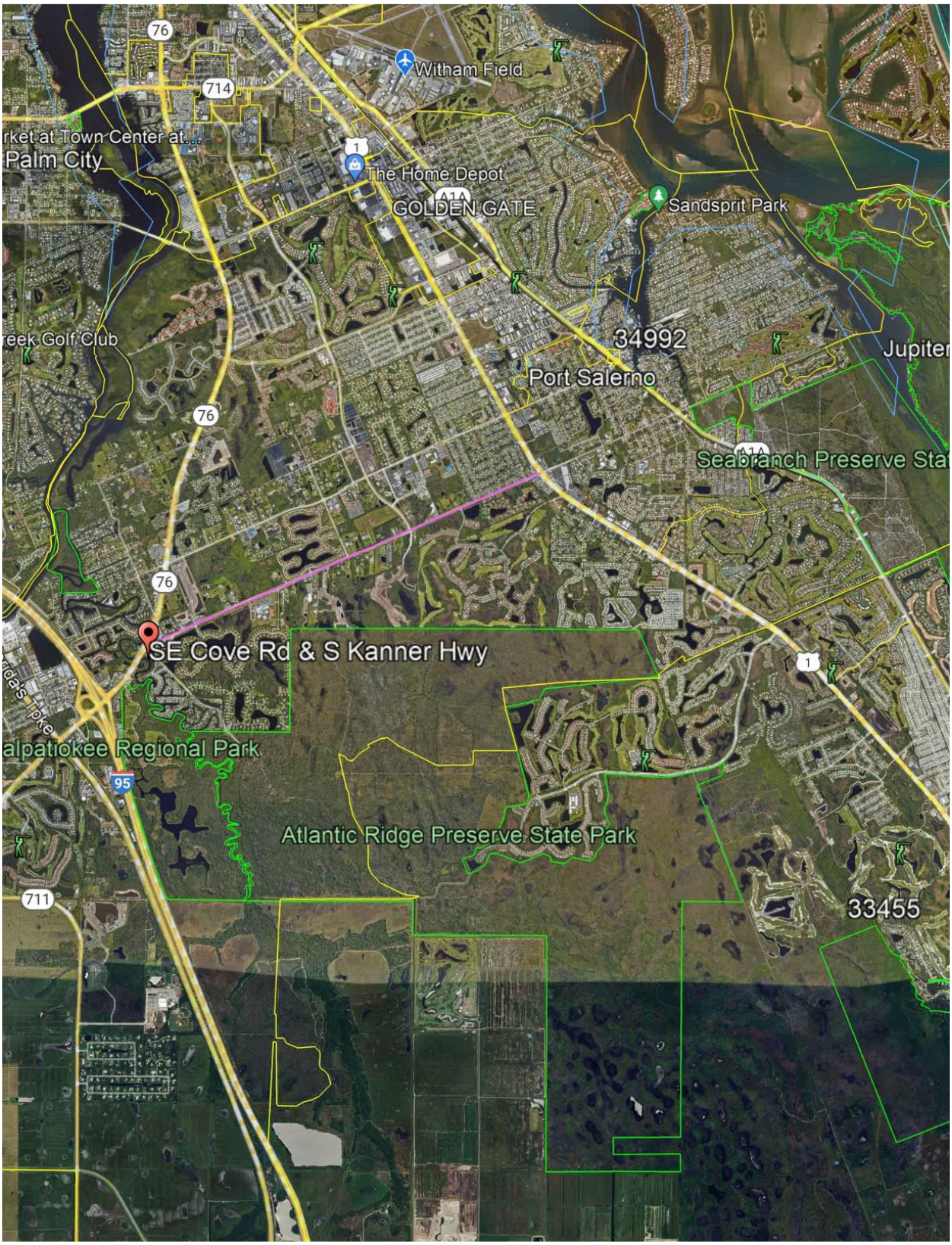
17. For projects going into the permitting phase: Has a pre-application meeting been held or any preliminary correspondence been made by FDOT PM or Consultant with the regulatory agencies/reviewers? Specify the agencies and dates when meetings were held:
    Martin County – Drainage Methodology Meeting

18. For project in the permitting phase, please provide any application numbers and the reviewer's name: N/A

19. Anticipated Permits (or, if you already applied for or received any permits, please include the application/permit numbers):
    Irrigation Water Use Permit
    Dewatering Permit
    National Pollutant Discharge Elimination System (NPDES) Construction General Permit (CGP)
    Pre-Construction Notification (ENG 4345)

MEETING INFO

20. Discussion Time Needed: 30 minutes


Witham Field
Palm City
The Home Depot
GOLDEN GATE
Sandsprit Park
34992
Port Salerno
Jupiter
Seabranch Preserve Stat
SE Cove Rd & S Kanner Hwy
Atlantic Ridge Preserve State Park
33455

PROJECT MEETING SUMMARY:

Prepared by Jennifer Shipley of Miller Legg on behalf of FDOT District 4.

ATTENDEES:

Name	Organization	Email Address
Jess Markle	SFWMD	jmarkle@sfwmd.gov
Barb Conmy	SFWMD	bconmy@sfwmd.gov
Arifa Sultana	SFWMD	asultana@sfwmd.gov
Simon Sunderland	SFWMD	ssunder@sfwmd.gov
Heather Mason	USACE	heather.m.mason@usace.army.mil
Veronica Beech	USACE	veronica.c.beech@usace.army.mil
Kristee Booth	FWC	Kristee.Booth@MyFWC.com
Elijah McBride	FWC	Elijah.McBride@MyFWC.com
Rupa Magar-Chhabra	FDOT (Env. Permit)	Rupa.Magar-Chhabra@dot.state.fl.us
Robert Vater	FDOT	Robert.Vater@dot.state.fl.us
Johnathan Turner	FDOT	Jonathan.Turner@dot.state.fl.us
Zach Evans	Ardurra	zevans@ardurra.com
Jada Barhorst	Ardurra (Env)	jbarhorst@ardurra.com
Renado Chuw	Ardurra (Drainage)	rchuw@ardurra.com

The Project meeting started around 9:00 am and was completed around 9:30am. After roll call of attendees, the overall project scope, limits, and approach were reviewed and presented by Zach Evans of Ardurra, the Consultant for the project on behalf of FDOT. The Project is a PD&E for widening with addition of a shared use path. It is south of the St. Lucie and Indian River watersheds and outfalls to outstanding waters. The existing roadway is permitted under 4300642-S for a four-lane highway with water quality treatment along the roadway through existing swales. The current swales have enough capacity for the four-lanes, and therefore they are proposing to keep the swales in place rather than modify to the typical curb and gutter. Following is a summary of the discussion.

QUESTIONS/DISCUSSION

Stormwater (SFWMD):

- **Overall:** Jesse of SFWMD indicated the overall stormwater approach should offer replacement volume for volume. Need to provide additional volume of storage for every additional of impervious or loss in swales. The new impervious areas must comply with current rules for stormwater treatment. And as a reminder, addition 50% will be required for the project being in the St. Lucie Basin.
    - Consultant asked to confirm understanding…. If they impact the swales, will need to replace in-kind. And will need to add storage for new additional impervious.

        - SFWMD confirmed that is required. And reminded that the new impervious would be subject to the new rules. Including NTDL rules which requires nutrient loading and pre vs post for 25-yr/72hr storm
- **West End (Basins 1 and 2):** Zach (Consultant) inquired on handling of treatment at the west end of the project. The Existing permit covers 5 basins along the corridor: some constraints in the 1st basin (west end of the project). Therefore, two options are being considered:
    - Providing additional swales along Gaines Avenue for additional treatment OR
    - Move the Basin 1 and Basin 2 divide line to more east to allow treatment with a shared pond.
        - Question: The Roadway in this area already includes 4 lanes in some sections. Would the district allow treatment of roadway and not shared use path or turn lane extensions from the highway? Essentially, treatment of roadway without treatment of the shared use path?
        - SFWMD indicated they are open to compensating treatment, but new areas (including shared-use paths) must be treated. **Mathematically all impervious (roadway and shared use path) needs to be provided.** Can be lumped together.
- **Shared-Use Path Exemption**
    - SFWMD confirmed that shared-use paths in uplands are NOT exempt, and treatment is still required.
- **Over Attenuation:**
    - Consultant indicated they would most likely shift the drainage Basin dividing line between 1 and 2 as described above and would likely provide over-attenuation of Basin 2 or propose a double outfall (one to Basin 1 and one to Basin 2).
        - SFWMD indicated over-attenuation is allowed, however it depends on how much the current BMP's are already providing. Will need to consider the math if it is in a special basin with higher standards. May not be enough removal capacity available. Can't over attenuate in one basin to offset less in the other basin.
- **East End Constraints:**
    - Basin 3 will be treated with existing attenuation and outfall
    - Basin 4 outfalls through a ditch;
    - Basin 5 may not have viable pond sites
    - Therefore, may provide attenuation for both Basins 4 and 5 in that shared outfall.
- **Permit Considerations:**
    - Consultant reminded this is a PD&E study in early stages, so permitting is a longer way off.
    - SFWMD reminded the existing permit is not valid if there is no active construction. Project will require a new permit due to outdated construction authorization from the early 1980s.
        - New permit will require pre vs. post but the pre will be evaluated at the time of submittal, not the time the original permit was issued.
        - Existing discharge rates must be evaluated for flood control, considering current offsite facilities and private developments. For example, Ex if new permit allows for drainage to offsite facilities, we will make sure that still works from a flood standpoint for those offsite areas.
        - Consultant indicated the current outfalls would remain and the offsite flows would be considered.

- **Water Quality Rule Update per SFWMD:**
  - PD&E study may be subject to new water quality rules expected to be signed in July 2024.
  - Grandfathering: PD&E study must be completed within 1-2 years of adoption to be grandfathered under current regulations.
- **Wetland Impacts: (Summary Presented by Jada of Ardurra)**
  - Construction is within existing FDOT ROW, therefore minimal wetland impacts anticipated (0.5-acre). Don't have the breakdown but anticipate use of a bank.
  - Mitigation Bank: Slated Blue Field Ranch available with adequate credits.
  - SFWMD provided some considerations:
    - Consider secondary impacts to wetlands for any widening or path adjacent to wetlands even if not encroaching.
    - For proper pond siting ensure compliance with the applicant's handbook for wetland impact elimination and reduction steps.
    - In section C of application, include narrative of avoid and minimize wetland impacts.
- **USACE Input:**
  - Wetland delineation must follow USACE (2015) rules, not state standards.
  - Will need information on wetland impacts for future submissions.
- **Miscellaneous:**
  - No landscaping currently planned for the project.
  - FDOT to issue a master dewatering permit; fees dependent on duration or letter modification.

APPENDIX 8

Existing Permits

FORM 0499
5 87

South Florida Water Management District

BEG. PERMIT NUMBER 43-00642-S

43-00642-S

APPLICATION/PERMIT FILE RECORD & ACTION SHEET

Name Martin County (Cove Road)

Permit No 43-00642-S

Application No. 900829-4

This file contains:

- ☐ ORIGINAL APPLICATION
- ☐ PERMIT
- ☐ SPECIAL CONDITION SHEET(S)
- ☐ STAFF CALCULATION SHEET(S)
- ☐ DRAWING(S)
- ☐ STAFF REPORT

Chronological Correspondence/Action Record

Date	Subject	By	Comments
3/14/91	Permit Issued	J.C.	
6/6/91	Database Input	RAC	

Form #0113
Rev. 10/89

South Florida Water Management District

CERTIFICATION FOR STORMWATER DISCHARGE

SURFACE WATER MANAGEMENT PERMIT NO. 43-00642-5

(NON-ASSIGNABLE)

DATE ISSUED: March 14, 1991

AUTHORIZING: CONSTRUCTION AND OPERATION OF A WATER MANAGEMENT SYSTEM SERVING 52.21 ACRES OF ROADWAY DISCHARGING INTO THE ST. LUCIE RIVER AND MANATEE POCKET VIA FERN CREEK AND ROADSIDE SWALES.

LOCATED IN: MARTIN COUNTY, SECTION 34, 35 4, 33 TWP. 38,39S RGE. 41E

ISSUED TO:

Martin County
(Cove Road)
2401 S.E. Monterey Road
Stuart, FL 34996

This Permit is issued pursuant to Application for Permit No. 900829-4 dated Aug. 24, 19 90. Permittee agrees to hold and save the South Florida Water Management District and its successors harmless from any and all damages, claims or liabilities which may arise by reason of the construction, operation, maintenance or use of any work or structure involved in the Permit. Said Application, including all plans and specifications attached thereto, as addressed by the Staff Report, is by reference made a part hereof.

This Permit may be revoked or modified at anytime pursuant to the appropriate provisions of Chapter 373, Florida Statutes.

This Permit does not convey to Permittee any property rights or privileges other than those specified herein, nor relieve the Permittee from complying with any law, regulation or requirement affecting the rights of other bodies or agencies. All structures and works installed by Permittee hereunder shall remain the property of the Permittee.

Within thirty (30) days after the completion of the construction of any work or structure relative to this Permit, the Permittee shall file with the District a written statement of completion on the appropriate form provided by the Board.

SPECIAL CONDITIONS ARE AS FOLLOWS:

SEE SHEETS 2, 3 & 4 OF 4 - 20 SPECIAL CONDITIONS.

FILED WITH THE CLERK OF THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT

ON _____

BY Original signed by: Vern Kaiser
DEPUTY CLERK

SOUTH FLORIDA WATER MANAGEMENT DISTRICT, BY ITS GOVERNING BOARD

By Original signed by TONY BURNS
Assistant Secretary

SPECIAL CONDITIONS

1. DISCHARGE FACILITIES:

DESCRIPTION:

BASIN 1: 1-0.5' WIDE WEIR WITH A CREST AT ELEVATION 7.92' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 5.0' NGVD.

CONTROL ELEVATION: 5.0 FEET NGVD (WET SEASON WATER TABLE).

BASIN 2: TWO STRUCTURES, EACH CONSISTING OF 1-0.50' WIDE WEIR WITH A CREST AT ELEVATION 13.03' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 12.5' NGVD.

CONTROL ELEVATION: 10.1 FEET NGVD (WET SEASON WATER TABLE).

BASIN 3: 1-0.83' WIDE WEIR WITH A CREST AT ELEVATION 17.64' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 16.0' NGVD.

CONTROL ELEVATION: 16.0 FEET NGVD (WET SEASON WATER TABLE).

RECEIVING BODY FOR BASINS 1, 2 AND 3: SOUTH FORK OF THE ST. LUCIE RIVER.

BASIN 4: 1-0.67' WIDE WEIR WITH A CREST AT ELEVATION 14.55' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 13.3' NGVD.

CONTROL ELEVATION: 13.3 FEET NGVD (WET SEASON WATER TABLE).

BASIN 5: 1-3.0' WIDE WEIR WITH A CREST AT ELEVATION 17.09' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 14.5' NGVD.

CONTROL ELEVATION: 14.5 FEET NGVD (WET SEASON WATER TABLE).

BASIN 6: N/A

RECEIVING BODY FOR BASINS 4, 5 AND 6: MANATEE POCKET

2. OPERATION OF THE SURFACE WATER MANAGEMENT SYSTEM SHALL BE THE RESPONSIBILITY OF MARTIN COUNTY.

SPECIAL CONDITIONS (CONT'D)

3. WATER QUALITY DATA FOR THE WATER DISCHARGED FROM THE PERMITTEE'S PROPERTY OR INTO SURFACE WATERS OR GROUNDWATERS OF THE STATE SHALL BE SUBMITTED TO THE DISTRICT AS REQUIRED. PARAMETERS TO BE MONITORED MAY INCLUDE THOSE LISTED IN CHAPTER 17-3. IF WATER QUALITY DATA IS REQUIRED, THE PERMITTEE SHALL PROVIDE DATA AS REQUIRED ON VOLUMES OF WATER DISCHARGED, INCLUDING TOTAL VOLUME DISCHARGED DURING THE DAYS OF SAMPLING AND TOTAL MONTHLY DISCHARGES FROM THE PROPERTY OR INTO SURFACE WATERS OR GROUNDWATERS OF THE STATE.

4. LIMITING CONDITIONS OF RULE 40E-4.381 (SURFACE WATER MANAGEMENT) ARE WAIVED UNLESS OTHERWISE PROVIDED HEREIN.

5. FACILITIES OTHER THAN THOSE STATED HEREIN SHALL NOT BE CONSTRUCTED WITHOUT AN APPROVED MODIFICATION OF THIS PERMIT.

6. 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.

7. THE PERMITTEE SHALL PROSECUTE THE WORK AUTHORIZED IN A MANNER SO AS TO MINIMIZE ANY ADVERSE IMPACT OF THE WORKS ON FISH, WILDLIFE, NATURAL ENVIRONMENTAL VALUES, AND WATER QUALITY. THE PERMITTEE SHALL INSTITUTE NECESSARY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING FULL COMPACTION OF ANY FILL MATERIAL PLACED AROUND NEWLY INSTALLED STRUCTURES, TO REDUCE EROSION, TURBIDITY, NUTRIENT LOADING AND SEDIMENTATION IN THE RECEIVING WATER.

8. THE PERMITTEE SHALL HOLD AND SAVE THE DISTRICT HARMLESS FROM ANY AND ALL DAMAGES, CLAIMS, OR LIABILITIES WHICH MAY ARISE BY REASON OF THE CONSTRUCTION, OPERATION, MAINTENANCE OR USE OF ANY FACILITY AUTHORIZED BY THE PERMIT.

9. THIS PERMIT IS ISSUED BASED ON THE APPLICANT'S SUBMITTED INFORMATION WHICH REASONABLY DEMONSTRATES THAT ADVERSE OFF-SITE WATER RESOURCE RELATED IMPACTS WILL NOT BE CAUSED BY THE COMPLETED PERMIT ACTIVITY. IT IS ALSO THE RESPONSIBILITY OF THE PERMITTEE TO INSURE THAT ADVERSE OFF-SITE WATER RESOURCE RELATED IMPACTS DO NOT OCCUR DURING CONSTRUCTION.

10. OFF-SITE DISCHARGES DURING CONSTRUCTION AND DEVELOPMENT SHALL BE MADE ONLY THROUGH THE FACILITIES AUTHORIZED BY THIS PERMIT. WATER DISCHARGED FROM THE PROJECT SHALL BE THROUGH STRUCTURES HAVING A MECHANISM SUITABLE FOR REGULATING UPSTREAM WATER STAGES. STAGES MAY BE SUBJECT TO OPERATING SCHEDULES SATISFACTORY TO THE DISTRICT.

11. PRIOR TO DEWATERING, PLANS SHALL BE SUBMITTED TO THE DISTRICT FOR APPROVAL. INFORMATION SHALL INCLUDE AS A MINIMUM: PUMP SIZES, LOCATIONS AND HOURS OF OPERATION FOR EACH PUMP. IF OFF-SITE DISCHARGE IS PROPOSED, OR OFF-SITE ADVERSE IMPACTS ARE EVIDENT, AN INDIVIDUAL WATER USE PERMIT MAY BE REQUIRED. THE PERMITTEE IS CAUTIONED THAT SEVERAL MONTHS MAY BE REQUIRED FOR CONSIDERATION OF THE WATER USE PERMIT APPLICATION.

SPECIAL CONDITIONS (CONT'D)

12. THE PERMIT DOES NOT CONVEY TO THE PERMITTEE ANY PROPERTY RIGHT NOR ANY RIGHTS OR PRIVILEGES OTHER THAN THOSE SPECIFIED IN THE PERMIT AND CHAPTER 40E-40, FAC.

13. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF ADDITIONAL LANES OR MODIFICATIONS WHICH REQUIRE REVISIONS TO THE TO THE ATTACHED PLANS, PAVING, GRADING, AND DRAINAGE PLANS SHALL BE SUBMITTED TO THE DISTRICT FOR PERMIT MODIFICATION.

14. AT LEAST 30 DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT FIELD ENGINEERING DIVISION SHALL BE NOTIFIED BY THE PERMITTEE OR PROJECT ENGINEER OF THE CONSTRUCTION START DATE.

15. CONSTRUCTION STATUS REPORTS SHALL BE SUBMITTED TO THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT FIELD ENGINEERING DIVISION ON AN ANNUAL BASIS BEGINNING WITH THE INITIAL COMMENCEMENT OF CONSTRUCTION DATE.

16. WITHIN 30 DAYS OF COMPLETION OF CONSTRUCTION, THE PERMITTEE OR THE PROJECT ENGINEER SHALL NOTIFY THE SFWMD FIELD ENGINEERING DIVISION OF THAT COMPLETION DATE. THIS NOTIFICATION SHALL INCLUDE CERTIFICATION INFORMATION AS REQUIRED BY STANDARD LIMITING CONDITION NUMBER 4. SUCH NOTIFICATION SHALL INCLUDE, BUT NOT BE LIMITED TO, CERTIFICATION OF CONSTRUCTION COMPLETION OF THE SURFACE WATER MANAGEMENT SYSTEM BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER AND AS BUILT DRAWINGS OF THE SITE WHICH SHALL INCLUDE ELEVATIONS, LOCATIONS AND DIMENSIONS OF COMPONENTS OF THE SURFACE WATER MANAGEMENT SYSTEM.

17. THE OPERATION PHASE OF THIS PERMIT SHALL NOT BECOME EFFECTIVE UNTIL A FLORIDA REGISTERED PROFESSIONAL ENGINEER CERTIFIES THAT ALL FACILITIES HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE DESIGN APPROVED BY THE DISTRICT. WITHIN 30 DAYS AFTER COMPLETION OF CONSTRUCTION OF THE SURFACE WATER MANAGEMENT SYSTEM, THE PERMITTEE SHALL SUBMIT THE CERTIFICATION AND NOTIFY THE DISTRICT THAT THE FACILITIES ARE READY FOR INSPECTION AND APPROVAL. UPON APPROVAL OF THE COMPLETED SURFACE WATER MANAGEMENT SYSTEM, THE PERMITTEE SHALL REQUEST TRANSFER OF THE PERMIT TO THE RESPONSIBLE ENTITY APPROVED BY THE DISTRICT.

18. PRIOR TO CONSTRUCTION IN WATERS OF THE STATE, THE PERMITTEE SHALL SUBMIT COPIES OF ANY DEPARTMENT OF ENVIRONMENTAL REGULATION DREDGE AND FILL PERMITS FOR DISTRICT STAFF REVIEW.

19. THE DISTRICT RESERVES THE RIGHT TO REQUIRE ADDITIONAL MEASURES TO BE TAKEN BY THE PERMITTEE IF ADVERSE IMPACTS TO PROTECTED, CONSERVED, INCORPORATED, OR MITIGATED WETLANDS HAVE OCCURRED DUE TO PROJECT RELATED ACTIVITIES.

20. PRIOR TO CONSTRUCTION, THE PERMITTEE SHALL FIELD STAKE AND ROPE OFF THE PROTECTED WETLANDS WHICH EXTEND OFF SITE NEAR STATIONS 281-291. FIELD ROPING SHALL BE APPROVED BY DISTRICT'S ENVIRONMENTAL STAFF. THE ROPING SHALL REMAIN IN PLACE UNTIL SURROUNDING IMPROVEMENTS HAVE BEEN COMPLETELY CONSTRUCTED TO PREVENT ANY ENCROACHMENT INTO THE CONSERVATION AREAS.

South Florida Water Management District
P.O. Box 24680 • 3301 Gun Club Road • West Palm Beach, FL 33416-4680 • (407) 686-8800 • FL WATS 1-800-432-2045

CON 24-06

February 25, 1991

Martin County
2401 S. E. Monterey Road
Stuart, FL 34996

Dear Sir or Madam:

Subject: Application No. 900829-4, Cove Road,
Martin County, S4,33,34,35/T38,39S/R41E

Enclosed is a copy of this District's staff report covering the permit application referenced therein. It is requested that you read this staff report thoroughly and understand its contents. The recommendations as stated in the staff report will be presented to our Governing Board for consideration on March 14, 1991.

Should you wish to object to the staff recommendation or file a petition, please provide written objections, petitions and/or waivers (refer to the attached "Notice of Rights") to:

Vern [illegible]ser, Deputy Clerk
South Florida Water Management District
Post Office Box 24680
West Palm Beach, Florida 33416-4680

The "Notice of Rights" addresses the procedures to be followed if you desire a public hearing or other review of the proposed agency action. You are advised, however, to be prepared to defend your position regarding the permit application when it is considered by the Governing Board for final agency action, even if you agree with the staff recommendation, as the Governing Board may take final agency action which differs materially from the proposed agency action.

Please contact the District if you have any questions concerning this matter. If we do not hear from you prior to the date on the "Notice of Rights", we will assume you concur with our recommendations.

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a "Notice of Rights" has been mailed to the addressee and the persons listed in the attached distribution list not later than 5:00 p.m. this 25th day of February 1991, in accordance with Section 120.60 (3), Florida Statutes.

Sincerely,

Jeanne Hall
Director
Regulation Department

CERTIFIED MAIL #P 281 825 272
RETURN RECEIPT REQUESTED

FINAL APPROVED BY GB

MAR 14 1991

WPB

Governing Board
James E. Garner, Chairman, Fort Myers
Doran A. Jason, Vice Chairman, Key Biscayne
Arsenio Milian, Miami
Fritz Stein, Belle Glade
Mike Stout, Windermere
Ken Adams, West Palm Beach
Valerie Boyd, Naples
James E. Nail, Fort Lauderdale
Charles W. Causey, Islamorada
John R. Wodraska, Executive Director
Tilford C. Creel, Deputy Executive Director
Thomas R. MacVicar, Deputy Executive Director

South Florida Water Management District

Notice Of Rights

Form #0300
Rev 11/90

This Notice of Rights is intended to inform the recipient of the administrative and judicial review which may be available as mandated by section 120 60(3), Florida Statues Be advised that although this notice is intended to be comprehensive, the review procedures set forth herein have been the subject of judicial construction and interpretation which may affect the administrative of judicial review available Recipients are therefore advised to become familiar with Chapters 120 and 373, Florida Statues, and the judicial interpretation of the provisions of these chapters.

1. If a substantially affected person objects to the staff's recommendation, that person has the right to request an administrative hearing on the proposed agency action The substantially affected person may request either a formal or an informal hearing, as set forth below Failure to comply with the prescribed time periods shall constitute a waiver of the right to a hearing

2. If the substantially affected person believes that a genuine issue of material fact is in dispute, that person may request a formal hearing pursuant to section 120 57(1), Florida Statutes, by filing a petition for hearing not later than March 11, 1991 The request for a 120 57(1) formal hearing must comply with the requirements of rule 40E-1.521 Florida Administrative Code, a copy of which is attached Petitions are deemed filed upon receipt by the District. Failure to substantially comply with the provisions of rule 40E-1 521 Florida Administrative Code shall constitute a waiver of the right to a right to a 120.57(1) hearing.

3. If a substantially affected person believes that no issues of material fact are in dispute, that person may request an informal hearing pursuant to section 120 57(2), Florida Statutes, by filing a petition for hearing not later than March 11, 1991 A request for informal hearing shall be considered as a waiver of the right to request a formal section 120.57(1) hearing A request for a section 120.57(1) formal hearing not in substantial compliance with the provisions of rule 40E-1 521 Florida Administrative Code, may be considered by the District as a request for informal hearing

4. Pursuant to section 373 114, Florida Statutes, a party to the proceeding below may seek review of a Final Order rendered on the permit application before the Land and Water Adjudicatory Commission, as provided therein Review under this section is initiated by filing a request for review with the Land and Water Adjudicatory Commission and serving a copy on the Department of Environmental Regulation and any person named in the Order within 20 days after rendering of the District's Order However, when the order to be reviewed has statewide or regional significance, as determined by the Land and Water Adjudicatory Commission within 60 days after receipt of a request for review, the commission may accept a request for review from any affected person within 30 days after the rendering of the order Review under section 373.114, Florida Statutes, is limited solely to a determination of consistency with the provisions and purposes of Chapter 373, Florida Statutes. This review is appellate in nature and limited to the record below

5. A party who is adversely affected by final agency action on the permit application is entitled to judicial review in the District Court of Appeal pursuant to section 120 68, Florida Statutes, as provided therein. Review under section 120 68, Florida Statutes in the District Court of Appeal is initiated by filing a petition in the appropriate District Court of Appeal in accordance with Florida rule of appellate Procedure 9.110. The Notice of Appeal must be filed within 30 days of the final agency action

6. Section 373 617(2), Florida Statutes, provides.

   > Any person substantially affected by a final action of any agency with respect to a permit may seek review within 90 days of the rendering of such decision and request monetary damages and other relief in the circuit court in the judicial circuit in which the affected property is located; however, circuit court review shall be confined solely to determining whether final agency action is an unreasonable exercise of the state's police power constituting a taking without just compensation. Review of final agency action for the purpose of determining whether the action is in accordance with existing statutes or rules and based on component substantial evidence shall proceed in accordance with Chapter 120.

7. Please be advised that exhaustion of administrative remedies is generally a prerequisite to appeal to the District Court of Appeal or the seeking of Circuit Court review of final agency action by the District on the permit application There are, however, exceptions to the exhaustion requirement. The applicant is advised to consult the case law as to the requirements of exhaustion exceptions

40E-1.521 Initiation of Formal Proceedings

(1) Initiation of formal proceedings shall be made by petition to the District. The term petition as used herein includes any application or other document which expresses a request for formal proceedings. Each petition should be printed, typewritten or otherwise duplicated in legible form on white paper or standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double-spaced and indented.

(2) All petitions filed under these rules shall contain:

(a) The name and address of the District and the District's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) An explanation of how each petitioner's substantial interests will be affected by the District's determination;

(d) A statement of when and how petitioner received notice of the District's decision or intent to render a decision;

(e) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(f) A concise statement of the ultimate facts which petitioner believes entitle petitioner to the relief sought as well as the rules and statutes which support petitioner's claim for relief;

(g) A demand for the relief to which the petitioner deems himself entitled; and

(h) Other information which the petitioner contends is material.

(3) Upon receipt of a petition for formal proceedings, the District shall review the petition for the degree of compliance with subsection (2) and shall accept those petitions in substantial compliance therewith which have been timely filed and which state a dispute which is within the jurisdiction of the District to resolve. If accepted, the District shall designate the presiding officer. The District shall promptly give written notice to all parties of the action taken on the petition, and shall state with particularity its reasons therefor.

(4) If the District designates a Hearing Officer assigned by the Division of Administrative Hearings as the presiding officer, the District Clerk shall forward the petition and all materials filed with the District to the Division of Administrative Hearings, and shall notify all parties of its action.

Specific Authority 373.044, 373.113 F.S.
Law Implemented 120.53(1), 120.57 F.S.
History --- New 9-3-81.
Formerly 16K-1.09(1), 16K-1.112(1) through (3), 16K-1.12.

DRAFT
Subject to Governing Board Approval

LAST DATE FOR GOVERNING BOARD ACTION:
MARCH 14, 1991

SURFACE WATER MANAGEMENT STAFF REVIEW SUMMARY

APPLICATION NO.: 900829-4

PROJECT NAME: Cove Road

LOCATION: Martin County S4,33,34,35/T38,39S/R41E

FINAL APPROVED BY GB

APPLICANTS NAME AND ADDRESS: Martin County
2401 S.E. Monterey Road
Stuart, FL 34996

MAR 14 1991

OWNER: Martin County

WPB

DEVELOPER: Martin County

ENGINEER: Keith and Schnars, Stuart Division

PROJECT AREA: 52.21 ACRES DRAINAGE AREA: 52.21 ACRES

FACILITIES:

1. EXISTING: Cove road presently consists of 2.7 miles of 12' wide unpaved road and 0.5 mile of 24' wide paved road with swale drainage. There are some existing cross drains and side drains located within the project limits. All adjacent developments which presently drain to Cove Road will be accommodated by the proposed surface water management system.

2. PROPOSED: The applicant is requesting construction and operation approval for a surface water management system serving 52.21 acres of roadway. The project consists of the construction of a four-lane divided highway (ultimate alignment) with a roadway swale drainage system. The highway has been divided into the following six basins (basins 4, 5 and 6 ultimately discharge into Manatee Pocket, a designated Outstanding Florida Water), five of which have discharge points:

   Basin 1: (Sta. 162+00 to Sta. 198+00, 11.59 acres) - Storm water runoff from the roadway is routed into a system of swales, inlets and culverts. Discharge is into the South Fork of the St. Lucie River through 1-0.5' wide weir with a crest at elevation 7.92' NGVD and 1-0.25' diameter circular orifice with an invert at elevation 5.0' NGVD via Gaines Avenue roadside swale and culvert (refer to Exhibit 2).

PROPOSED FACILITIES (CONT'D)

Basin 2: (Sta. 198+00 to Sta. 247+00, 16.18 acres) - Runoff is routed into a system of roadside swales, inlets and culverts. Discharge is into the South Fork of the St. Lucie River through two structures, each consisting of 1-0.50' wide weir with a crest at elevation 13.03' NGVD and 1-0.25' diameter circular orifice with an invert at elevation 12.5' NGVD via Fern Creek (refer to Exhibits 2 & 3).

Basin 3: (Sta. 247+00 to Sta. 285+00, 11.86 acres) - Runoff is routed into a system of roadside swales, inlets and culverts. Discharge is into the South Fork of the St. Lucie River through 1-0.83' wide weir with a crest at elevation 17.64' NGVD and 1-0.25' diameter circular orifice with an invert at elevation 16.0' NGVD via Tower Road ditch (refer to Exhibits 3 & 4).

Basin 4: (Sta. 285+00 to Sta. 308+80, 7.13 acres) - Runoff is routed through a system of roadside swales, inlets and culverts. Discharge is into Manatee Pocket through 1-0.67' wide weir with a crest at elevation 14.55' NGVD and 1-0.25' diameter circular orifice with an invert at elevation 13.3' NGVD via Hibiscus Park ditch (refer to Exhibit 4).

Basin 5: (Sta. 308+80 to Sta. 328+85, 4.59 acres) - Runoff is routed through a system of roadside swales, inlets and culverts. Discharge is into Manatee Pocket through 1-3.0' wide weir with a crest at elevation 17.09' NGVD and 1-0.25' diameter circular orifice with an invert at elevation 14.5' NGVD via US Highway 1 roadside swale and Florida Department of Transportation (FDOT) lateral ditch (refer to Exhibit 4).

Basin 6: (Sta. 330+70 to Sta. 333+47, 0.86 acres) - Runoff from this small basin will be routed through roadside swales to an existing U.S. Highway 1 FDOT ditch (refer to Exhibit 4).

DRAINAGE BASIN SOUTH COASTAL RECEIVING BODY SOUTH FORK OF THE ST. LUCIE RIVER AND MANATEE POCKET

FINAL APPROVED BY GB

MAR 14 1991

WPB

WATER QUALITY

A. ADVERSE IMPACTS EXPECTED: NO

B. BEST MANAGEMENT PRACTICES UTILIZED: Dry detention is provided equal to 2.5 inches over the impervious areas for all basins (refer to Table 1). Water quality for basin 6 is provided within basin 5.

Dry pretreatment in excess of one half inch over the basins will be provided prior to discharge into Manatee Pocket in accordance with District requirements for discharge into Outstanding Florida Waters.

TABLE 1

BASIN	1	2	3	4	5	6
REQUIRED WATER QUALITY VOLUME (AC-FT)	1.27	1.64	1.30	0.68	0.38	0.07
WATER QUALITY VOLUME PROVIDED (AC-FT)	1.27	1.64	1.30	0.68	0.38	0.07

ENVIRONMENTAL

1. Applicant submitted information indicates that construction of the proposed project will impact approximately 0.21 acres of historic wetlands within and adjacent to existing roadside swales through the edge of an isolated wetland which extends off site to the south (approximately near stations 281 to 291). The area to be filled for construction of the road has been previously impacted by the existing road, and is heavily vegetated with exotic and nuisance species including water primrose and Brazilian pepper. Removal of these species within the right of way and future maintenance of the roadway swales should be an improvement over the existing nuisance vegetation. The few areas of swale excavation within 200 feet of the wetland will be confined to upland areas, and will not extend below elevation 17' NGVD (the protected wetland control elevation is approximately elevation 16.6' NGVD). Due to the degraded quality of wetlands to be impacted and minimal size of the impact, no mitigation was required for the proposed construction. Adverse impacts are not anticipated as a result of the construction and operation of the proposed water management facilities.

2. Review of possible wetlands associated with Fern Creek was deferred to the Department of Environmental Regulation (DER). DER staff determined that no mitigation would be required for proposed impacts in that area. Both outfall structures at Fern Creek have been sized to allow for a maximum discharge velocity of 2 feet/second.

FINAL APPROVED BY GB

MAR 14 1991

WPB

APPLICABLE LAND AREA

TABLE 2

	PROJECT	BASIN 1	BASIN 2	BASIN 3	BASIN 4	BASINS 5 & 6
PERVIOUS (ACRES)	26.55	5.49	8.29	5.61	3.89	3.27
IMPERVIOUS (ACRES)	25.66	6.10	7.89	6.25	3.24	2.18
TOTAL (ACRES)	52.21	11.59	16.18	11.86	7.13	5.45

MAJOR ISSUES RESOLVED: WETLANDS IMPACTS, OUTSTANDING FLORIDA WATERS

SECONDARY ISSUES: NONE

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MAR 14 1991

WPB

APPLICATION NO. 900829-4
PROJECT: COVE ROAD
COUNTY: MARTIN

The Staff recommends that the following be issued:

X Authorization to construct and operate a surface water management system serving 52.21 acres of Roadway discharging into the St. Lucie River and Manatee Pocket via Fern Creek and roadside swales.

Based on the information provided, District rules have been adhered to.

Staff recommendation is for approval subject to the attached Special Conditions.

NATURAL RESOURCE MANAGEMENT
DIVISION APPROVAL

	APPLICATION REVIEWER:	SUPERVISOR/CHECKER:
ENVIRONMENTAL:	Lisa Chiles 2/20/91 Lisa Chiles	Deborah Goss 2/20/91 Deborah Goss
DIVISION DIRECTOR:	Stuart Bradow Stuart Bradow	DATE: 2/20/91

SURFACE WATER MANAGEMENT
DIVISION APPROVAL

	APPLICATION REVIEWER:	SUPERVISOR/CHECKER:
TECHNICAL:	Juan A. Chan Juan A. Chan, E.I.	Jenni M. Hiscock S. McNabb/J.M. Hiscock
WATER QUALITY:	Juan A. Chan Juan A. Chan, E.I.	James F. Marshall Jay Marshall

ASST. DIVISION DIRECTOR: Anthony M. Waterhouse, P.E. DATE: 2/21/91

DRAFT
Subject to Governing
Board Approval

FINAL APPROVED BY GB

MAR 14 1991

WPB

SPECIAL CONDITIONS

1. DISCHARGE FACILITIES:

DESCRIPTION:

BASIN 1: 1-0.5' WIDE WEIR WITH A CREST AT ELEVATION 7.92' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 5.0' NGVD.

CONTROL ELEVATION: 5.0 FEET NGVD (WET SEASON WATER TABLE).

BASIN 2: TWO STRUCTURES, EACH CONSISTING OF 1-0.50' WIDE WEIR WITH A CREST AT ELEVATION 13.03' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 12.5' NGVD.

CONTROL ELEVATION: 10.1 FEET NGVD (WET SEASON WATER TABLE).

BASIN 3: 1-0.83' WIDE WEIR WITH A CREST AT ELEVATION 17.64' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 16.0' NGVD.

CONTROL ELEVATION: 16.0 FEET NGVD (WET SEASON WATER TABLE).

RECEIVING BODY FOR BASINS 1, 2 AND 3: SOUTH FORK OF THE ST. LUCIE RIVER.

BASIN 4: 1-0.67' WIDE WEIR WITH A CREST AT ELEVATION 14.55' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 13.3' NGVD.

CONTROL ELEVATION: 13.3 FEET NGVD (WET SEASON WATER TABLE).

BASIN 5: 1-3.0' WIDE WEIR WITH A CREST AT ELEVATION 17.09' NGVD AND 1-0.25' DIAMETER CIRCULAR ORIFICE WITH AN INVERT AT ELEVATION 14.5' NGVD.

CONTROL ELEVATION: 14.5 FEET NGVD (WET SEASON WATER TABLE).

BASIN 6: N/A

RECEIVING BODY FOR BASINS 4, 5 AND 6: MANATEE POCKET

2. OPERATION OF THE SURFACE WATER MANAGEMENT SYSTEM SHALL BE THE RESPONSIBILITY OF MARTIN COUNTY.

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MAR 14 1991

WPB

SPECIAL CONDITIONS (CONT D)

3. WATER QUALITY DATA FOR THE WATER DISCHARGED FROM THE PERMITTEE'S PROPERTY OR INTO SURFACE WATERS OR GROUNDWATERS OF THE STATE SHALL BE SUBMITTED TO THE DISTRICT AS REQUIRED. PARAMETERS TO BE MONITORED MAY INCLUDE THOSE LISTED IN CHAPTER 17-3. IF WATER QUALITY DATA IS REQUIRED, THE PERMITTEE SHALL PROVIDE DATA AS REQUIRED ON VOLUMES OF WATER DISCHARGED, INCLUDING TOTAL VOLUME DISCHARGED DURING THE DAYS OF SAMPLING AND TOTAL MONTHLY DISCHARGES FROM THE PROPERTY OR INTO SURFACE WATERS OR GROUNDWATERS OF THE STATE.

4. LIMITING CONDITIONS OF RULE 40E-4.381 (SURFACE WATER MANAGEMENT) ARE WAIVED UNLESS OTHERWISE PROVIDED HEREIN.

5. FACILITIES OTHER THAN THOSE STATED HEREIN SHALL NOT BE CONSTRUCTED WITHOUT AN APPROVED MODIFICATION OF THIS PERMIT.

6. 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.

7. THE PERMITTEE SHALL PROSECUTE THE WORK AUTHORIZED IN A MANNER SO AS TO MINIMIZE ANY ADVERSE IMPACT OF THE WORKS ON FISH, WILDLIFE, NATURAL ENVIRONMENTAL VALUES, AND WATER QUALITY. THE PERMITTEE SHALL INSTITUTE NECESSARY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING FULL COMPACTION OF ANY FILL MATERIAL PLACED AROUND NEWLY INSTALLED STRUCTURES, TO REDUCE EROSION, TURBIDITY, NUTRIENT LOADING AND SEDIMENTATION IN THE RECEIVING WATER.

8. THE PERMITTEE SHALL HOLD AND SAVE THE DISTRICT HARMLESS FROM ANY AND ALL DAMAGES, CLAIMS, OR LIABILITIES WHICH MAY ARISE BY REASON OF THE CONSTRUCTION, OPERATION, MAINTENANCE OR USE OF ANY FACILITY AUTHORIZED BY THE PERMIT.

9. THIS PERMIT IS ISSUED BASED ON THE APPLICANT'S SUBMITTED INFORMATION WHICH REASONABLY DEMONSTRATES THAT ADVERSE OFF-SITE WATER RESOURCE RELATED IMPACTS WILL NOT BE CAUSED BY THE COMPLETED PERMIT ACTIVITY. IT IS ALSO THE RESPONSIBILITY OF THE PERMITTEE TO INSURE THAT ADVERSE OFF-SITE WATER RESOURCE RELATED IMPACTS DO NOT OCCUR DURING CONSTRUCTION.

10. OFF-SITE DISCHARGES DURING CONSTRUCTION AND DEVELOPMENT SHALL BE MADE ONLY THROUGH THE FACILITIES AUTHORIZED BY THIS PERMIT. WATER DISCHARGED FROM THE PROJECT SHALL BE THROUGH STRUCTURES HAVING A MECHANISM SUITABLE FOR REGULATING UPSTREAM WATER STAGES. STAGES MAY BE SUBJECT TO OPERATING SCHEDULES SATISFACTORY TO THE DISTRICT.

11. PRIOR TO DEWATERING, PLANS SHALL BE SUBMITTED TO THE DISTRICT FOR APPROVAL. INFORMATION SHALL INCLUDE AS A MINIMUM: PUMP SIZES, LOCATIONS AND HOURS OF OPERATION FOR EACH PUMP. IF OFF-SITE DISCHARGE IS PROPOSED, OR OFF-SITE ADVERSE IMPACTS ARE EVIDENT, AN INDIVIDUAL WATER USE PERMIT MAY BE REQUIRED. THE PERMITTEE IS CAUTIONED THAT SEVERAL MONTHS MAY BE REQUIRED FOR CONSIDERATION OF THE WATER USE PERMIT APPLICATION.

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MAR 14 1991

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SPECIAL CONDITIONS (CONT'D)

12. THE PERMIT DOES NOT CONVEY TO THE PERMITTEE ANY PROPERTY RIGHT NOR ANY RIGHTS OR PRIVILEGES OTHER THAN THOSE SPECIFIED IN THE PERMIT AND CHAPTER 40E-40, FAC.

13. PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF ADDITIONAL LANES OR MODIFICATIONS WHICH REQUIRE REVISIONS TO THE TO THE ATTACHED PLANS, PAVING, GRADING, AND DRAINAGE PLANS SHALL BE SUBMITTED TO THE DISTRICT FOR PERMIT MODIFICATION.

14. AT LEAST 30 DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION, THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT FIELD ENGINEERING DIVISION SHALL BE NOTIFIED BY THE PERMITTEE OR PROJECT ENGINEER OF THE CONSTRUCTION START DATE.

15. CONSTRUCTION STATUS REPORTS SHALL BE SUBMITTED TO THE SOUTH FLORIDA WATER MANAGEMENT DISTRICT FIELD ENGINEERING DIVISION ON AN ANNUAL BASIS BEGINNING WITH THE INITIAL COMMENCEMENT OF CONSTRUCTION DATE.

16. WITHIN 30 DAYS OF COMPLETION OF CONSTRUCTION, THE PERMITTEE OR THE PROJECT ENGINEER SHALL NOTIFY THE SFWMD FIELD ENGINEERING DIVISION OF THAT COMPLETION DATE. THIS NOTIFICATION SHALL INCLUDE CERTIFICATION INFORMATION AS REQUIRED BY STANDARD LIMITING CONDITION NUMBER 4. SUCH NOTIFICATION SHALL INCLUDE, BUT NOT BE LIMITED TO, CERTIFICATION OF CONSTRUCTION COMPLETION OF THE SURFACE WATER MANAGEMENT SYSTEM BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER AND AS BUILT DRAWINGS OF THE SITE WHICH SHALL INCLUDE ELEVATIONS, LOCATIONS AND DIMENSIONS OF COMPONENTS OF THE SURFACE WATER MANAGEMENT SYSTEM.

17. THE OPERATION PHASE OF THIS PERMIT SHALL NOT BECOME EFFECTIVE UNTIL A FLORIDA REGISTERED PROFESSIONAL ENGINEER CERTIFIES THAT ALL FACILITIES HAVE BEEN CONSTRUCTED IN ACCORDANCE WITH THE DESIGN APPROVED BY THE DISTRICT. WITHIN 30 DAYS AFTER COMPLETION OF CONSTRUCTION OF THE SURFACE WATER MANAGEMENT SYSTEM, THE PERMITTEE SHALL SUBMIT THE CERTIFICATION AND NOTIFY THE DISTRICT THAT THE FACILITIES ARE READY FOR INSPECTION AND APPROVAL. UPON APPROVAL OF THE COMPLETED SURFACE WATER MANAGEMENT SYSTEM, THE PERMITTEE SHALL REQUEST TRANSFER OF THE PERMIT TO THE RESPONSIBLE ENTITY APPROVED BY THE DISTRICT.

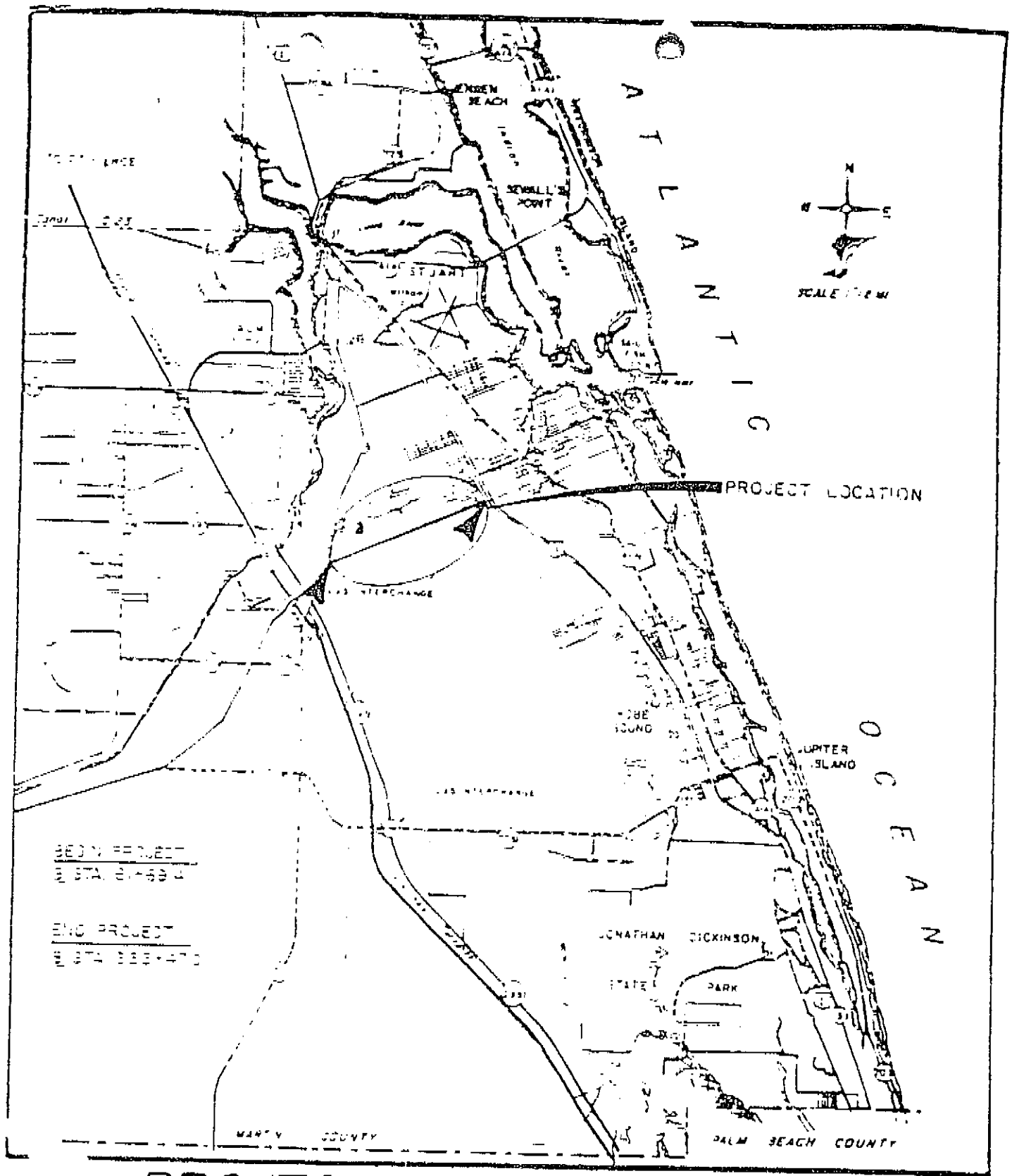
18. PRIOR TO CONSTRUCTION IN WATERS OF THE STATE, THE PERMITTEE SHALL SUBMIT COPIES OF ANY DEPARTMENT OF ENVIRONMENTAL REGULATION DREDGE AND FILL PERMITS FOR DISTRICT STAFF REVIEW.

19. THE DISTRICT RESERVES THE RIGHT TO REQUIRE ADDITIONAL MEASURES TO BE TAKEN BY THE PERMITTEE IF ADVERSE IMPACTS TO PROTECTED, CONSERVED, INCORPORATED, OR MITIGATED WETLANDS HAVE OCCURRED DUE TO PROJECT RELATED ACTIVITIES.

20. PRIOR TO CONSTRUCTION, THE PERMITTEE SHALL FIELD STAKE AND ROPE OFF THE PROTECTED WETLANDS WHICH EXTEND OFF SITE NEAR STATIONS 281-291. FIELD ROPING SHALL BE APPROVED BY DISTRICT'S ENVIRONMENTAL STAFF. THE ROPING SHALL REMAIN IN PLACE UNTIL SURROUNDING IMPROVEMENTS HAVE BEEN COMPLETELY CONSTRUCTED TO PREVENT ANY ENCROACHMENT INTO THE CONSERVATION AREAS.

FINAL APPROVED BY CB

MAR 14 1991



PROJECT LOCATION MAP

FINAL APPROVED BY GB

MAR 14 1991

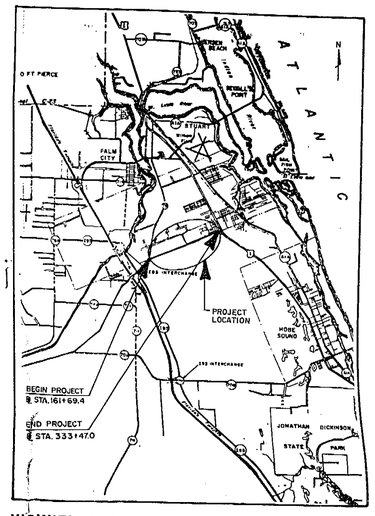
MARTIN COUNTY ENGINEERING DEPT.

COVE ROAD

PROJECT NO. 89 - 112208

THESE PLANS ARE DESIGNED IN ACCORDANCE WITH THE MANUAL OF UNIFORM MINIMUM STANDARDS FOR DESIGN CONSTRUCTION AND MAINTENANCE FOR STREETS AND HIGHWAYS AS DIRECTED BY CHAPTER - 336.045 FLORIDA STATUTES.

GOVERNING SPECIFICATIONS ARE THE STATE OF FLORIDA DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS, DATED 1986 AND SUPPLEMENTS THERETO AS NOTED IN THE SPECIAL PROVISIONS FOR THIS PROJECT.



VICINITY MAP

BOARD OF COUNTY COMMISSIONERS

WALTER W. THOM JR.	CHAIRMAN
THOMAS J. HIGGINS	VICE CHAIRMAN
FRANK A. WACHA	COMMISSIONER
MAGGY HURCHALLA	COMMISSIONER
MARY DAWSON	COMMISSIONER
JOSEPH R. GRASSIE	COUNTY ADMINISTRATOR

LENGTH OF PROJECT		
	LINEAR FT.	MILES
ROADWAY	15671.7	2.97
NET LENGTH	15609.2	2.96
EXCEPTIONS	1580	0.299
CROSS LENGTH	17251.7	3.267

8/28/90

900829-4

DRAWING INDEX

SHEET	DESCRIPTION
1-3	DRAINAGE MAPS
4-6	TYPICAL SECTIONS
7-8	SUMMARY DRAINAGE STRUCTURES
9-20	PLAN AND PROFILE
21	INTERSECTION U.S. 1
22-25	DRAINAGE STRUCTURES/DETAILS
26	MEDIAN DETAILS
27	GENERAL NOTES
28-29	SOILS SURVEY
30-56	CROSS SECTIONS
57-61	SIGNING AND MARKING
62-63	SIGNALIZATION

43-00642-5

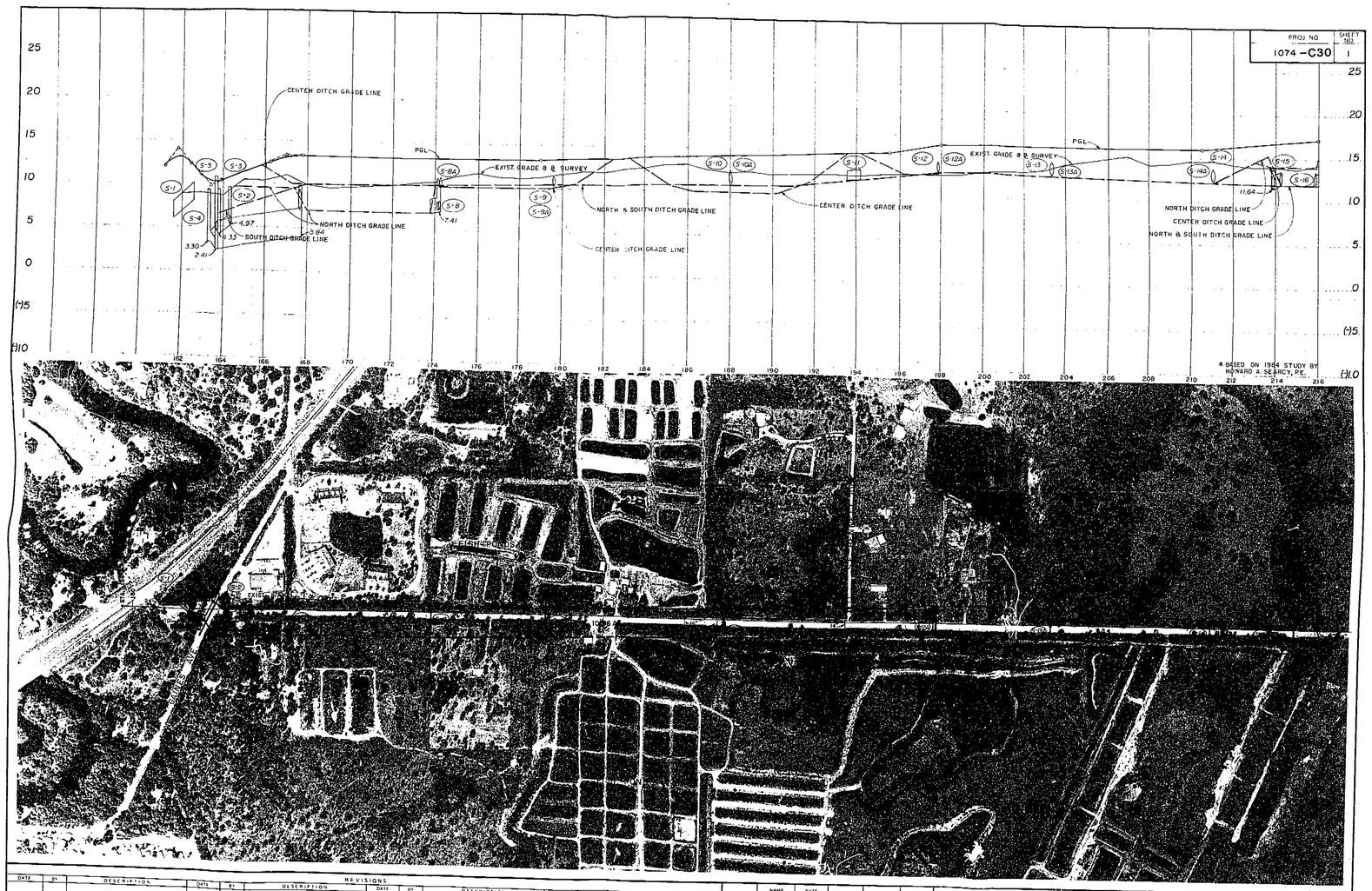
FOR PERMITTING ONLY

PLANS PREPARED BY: 08/28/90

Keith and Schnars - Stuart Division
ENGINEERS • PLANNERS • SURVEYORS
141 S.W. FLAGLER AVE. STUART, FL. 34994 (407) 287-2626

43-00642-5

PROJ NO	SHEET NO.
1074 -C30	1



REVISIONS									
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	

PHOTOGRAPHY DATA	
FLOWN BY	
PHOTO DATE	
PHOTO SENTERFAC IN NO	

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY		
CHECKED BY			CHECKED BY		
SUPERVISED BY					

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY

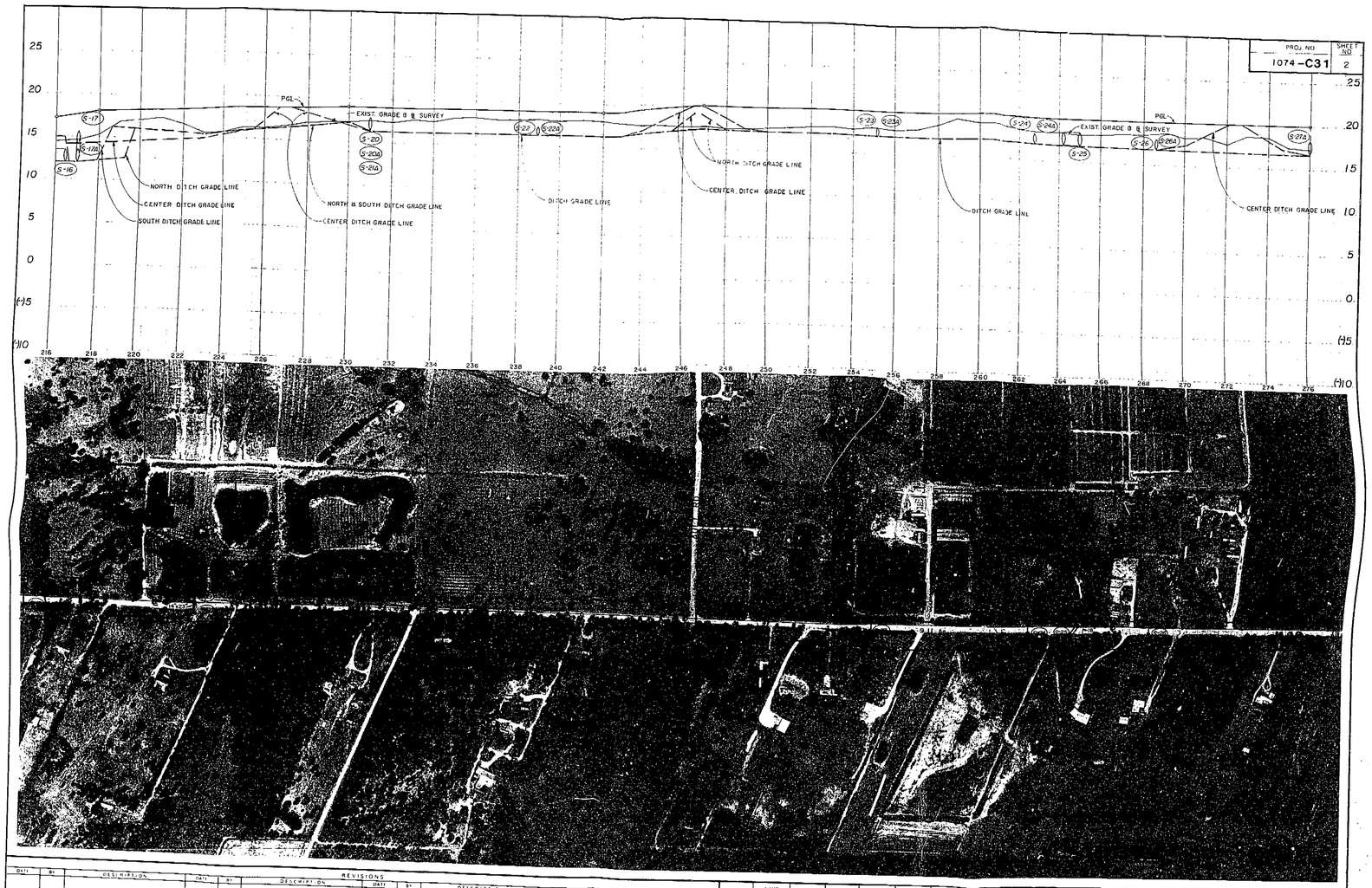
DATE

DRAINAGE MAP

8/28/90

FOR REFERENCE ONLY 09/

43-00642-5



REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

PHOTOGRAPHY DATA
FLOWN BY
PHOTO SCALE
PHOTO IDENTIFICATION NO.

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY		
CHECKED BY			CHECKED BY		
SUPERVISED BY					

FLORIDA DEPARTMENT OF TRANSPORTATION

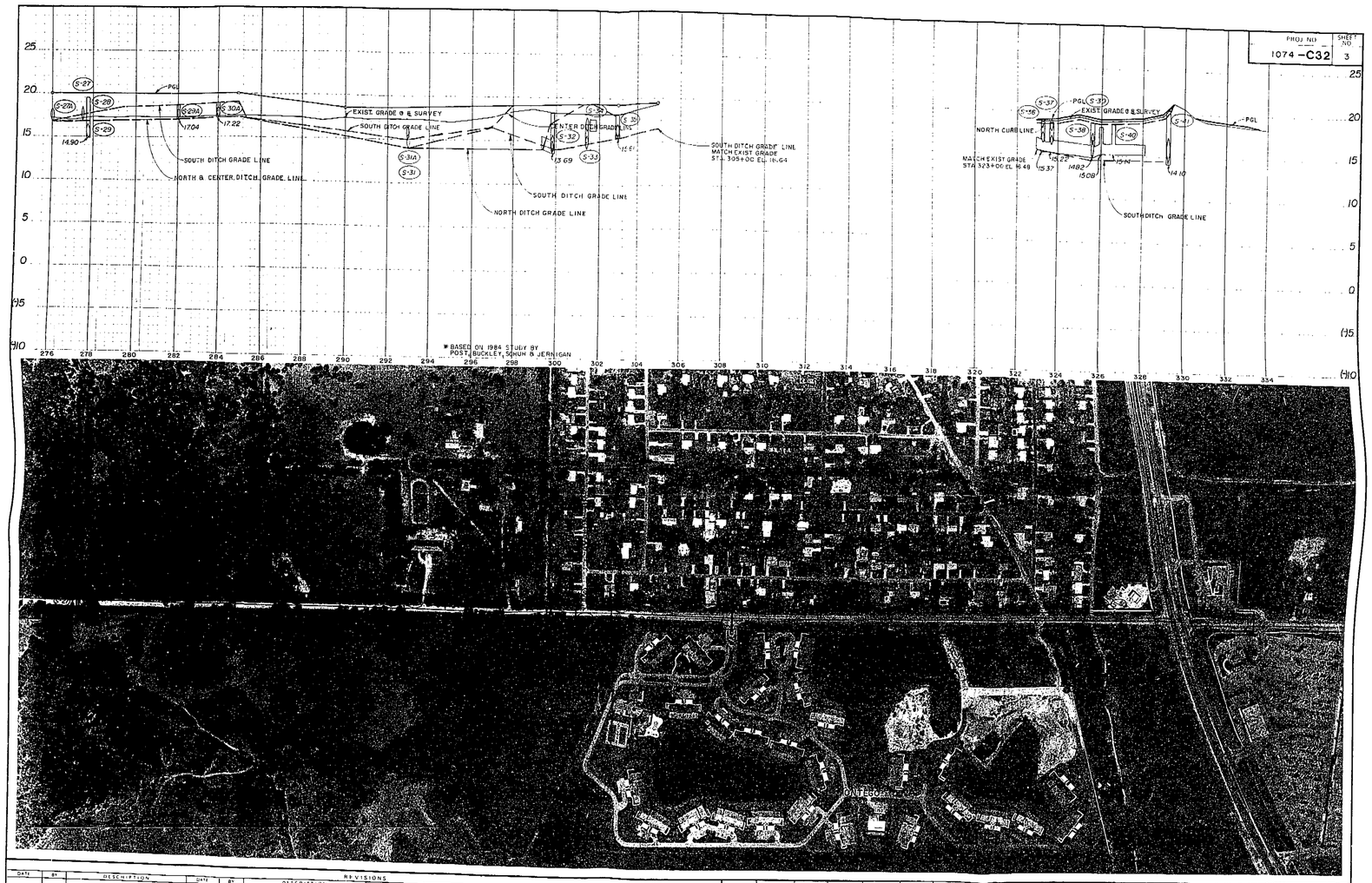
APPROVED BY

DATE

DRAINAGE MAP

8/28/92

43-00642-5



REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

PHOTOGRAPHY DATA
FLOWN BY
PHOTO DATE
PHOTO SCALE & SECTION NO

	NAME	DATE		NAME	DATE
DESIGNED BY			DRAWN BY		
CHECKED BY			CHECKED BY		
SUPERVISED BY					

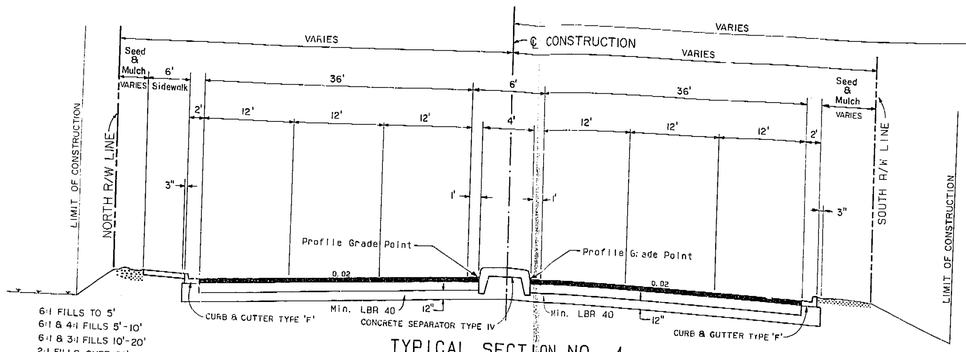
FLORIDA DEPARTMENT OF TRANSPORTATION
APPROVED BY
DATE

DRAINAGE MAP

8/28/90

43-00042-8

1990 ADT = 2,500
1995 ADT = 10,360
2000 ADT = 21,100
2010 ADT = 38,300
K=9% D=50% T=5% (24 Hr.)
DESIGN SPEED = 50 MPH



6:1 FILLS TO 5'
6:1 & 4:1 FILLS 5'-10'
6:1 & 3:1 FILLS 10'-20'
2:1 FILLS OVER 20'

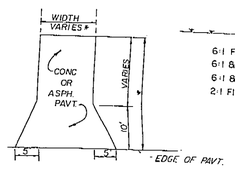
TYPICAL SECTION NO. 1

STATION 161+69.4 TO STATION 165+29.9 ℄ SURVEY VARIES FROM 150.49' SOUTH OF ℄ CONST. TO 47.45' NORTH OF ℄ CONST.

OPTIONAL BASE GROUP 9 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (2 1/2", AND FRICTION COURSE FC-2 (5/8")

OPTIONAL BASE COURSES PERMITTED	OPTION CODE
9" ASPHALT BASE COURSE (TYPE 1)	325
7" ASPHALT BASE COURSE (TYPE 2)	326
6" ASPHALT BASE COURSE (TYPE 3)	327
10" CEMENTED COQUINA LBR 100	989

FOR ADDITIONAL DETAILS SEE INDEX NOS. 300,302,303,304,500,513 & 515

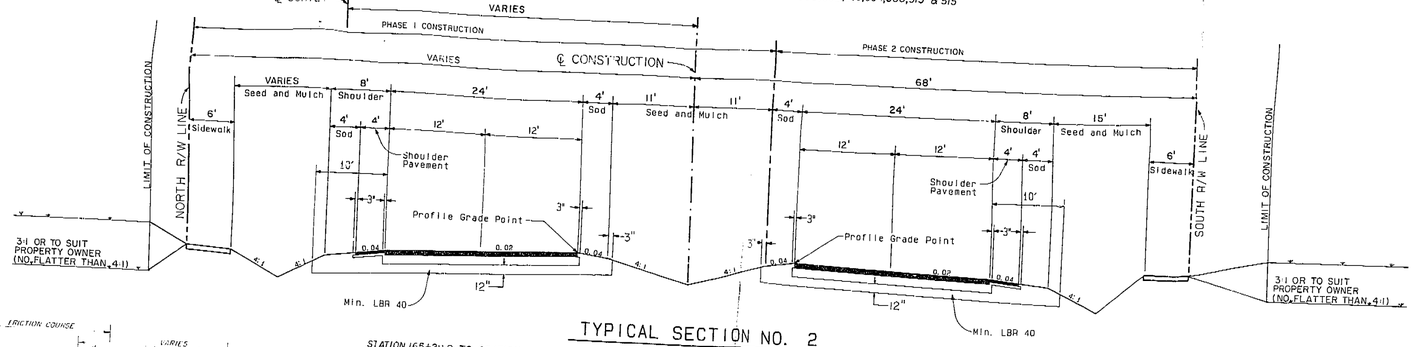


DRIVEWAY TURNOUT DETAILS
AT LOCATIONS WITHOUT CURB & GUTTER

* SEE DETAIL PLANS FOR DISTANCE

NOTES:

1. ALL PERMANENT GRASS AREAS ARE TO RECEIVE A 4 INCH MUCK BLANKET OR TOPSOIL TREATMENT.
2. THE CONTRACTOR SHOULD IDENTIFY THE "PROPOSED" OPTION ON WHICH HIS INITIAL BID IS BASED BY ENTERING THE THREE DIGIT OPTION CODE TO THE RIGHT SIDE OF THE ITEM NUMBER OF OPTIONAL BASE ITEM ON THE SUBMITTED BID PROPOSAL.
3. AT THE CONTRACTOR'S OPTION, THE AREA UNDER PAVED SHOULDERS MAY BE CONSTRUCTED OF ROADWAY BASE MATERIAL AT NO ADDITIONAL COMPENSATION.
4. PRICE OF TACK TO BE INCLUDED IN PRICE OF ASPHALT.
5. THE COST FOR RELOCATION OF ALL MAIL BOXES SHALL BE INCLUDED IN THE COST OF CLEARING AND GRUBBING.
6. FOR BASE CONSTRUCTION AT INTERSECTIONS SEE STANDARD INDEX NO. 515. SEE TYPICAL SECTION FOR WIDTH. CONSTRUCT BASE TO 3" OUTSIDE EDGE OF TYPE S STRUCTURE COURSE.
7. ASPHALT ON EXISTING APPROACH SLABS SHALL BE MILLED AND NEW PLACED WITH TYPE S STRUCTURE COURSE (125LBS/SY) AND FRICTION COURSE ALTERNATE.



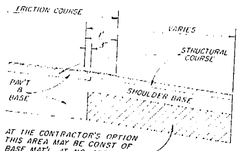
TYPICAL SECTION NO. 2

STATION 165+29.9 TO STATION 174+09.0 ℄ SURVEY VARIES FROM 47.45' NORTH OF ℄ CONST. TO 48.13' NORTH OF ℄ CONST.
STATION 174+09.0 TO STATION 200+49.6 ℄ SURVEY VARIES FROM 48.13' NORTH OF ℄ CONST. TO 19.84' SOUTH OF ℄ CONST.
STATION 200+49.6 TO STATION 213+68.5 ℄ SURVEY VARIES FROM 19.84' SOUTH OF ℄ CONST. TO 39.29' NORTH OF ℄ CONST.

OPTIONAL BASE GROUP 9 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (2 1/2") AND FRICTION COURSE FC-2 (5/8")

OPTIONAL BASE COURSES PERMITTED	OPTION CODE
9" ASPHALT BASE COURSE (TYPE 1)	325
7" ASPHALT BASE COURSE (TYPE 2)	326
6" ASPHALT BASE COURSE (TYPE 3)	327
10" CEMENTED COQUINA LBR 100	989

FOR ADDITIONAL DETAILS SEE INDEX NOS. 300,303,304,500,513 & 515



SHOULDER PAVEMENT DETAIL

FOR PERMITTING ONLY

8/28/90

SHOULDER PAVEMENT

OPTIONAL BASE GROUP 16 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (1")

08/28/90

OPTIONAL BASE COURSES PERMITTED	OPTION CODE
3" ASPHALT BASE COURSE (TYPE 1)	604
3" ASPHALT BASE COURSE (TYPE 2)	605
3" ASPHALT BASE COURSE (TYPE 3)	606
4" CEMENTED COQUINA LBR 100	980

Keith and Schnars
ENGINEERS - PLANNERS - SURVEYORS
1415 W. Fletcher Avenue • (813) 267-2626 • Submit Fax (813) 264-2664

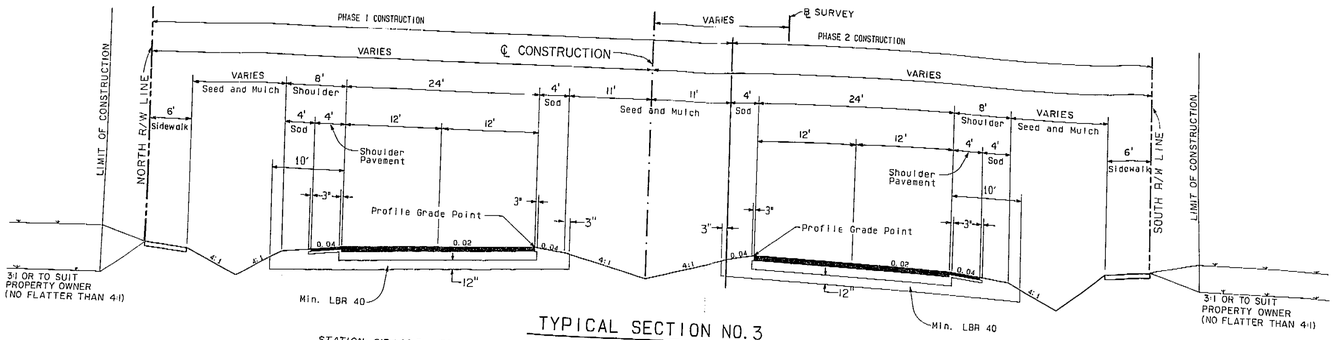
DATE	REVISIONS
9/18/89	STATIONING

DATE 8/18/89
SCALE N/A
FIELD BK. N/A
DWNG. BY G.S.
CHECKED BY S.K.M.

COVE ROAD

TYPICAL SECTIONS

SHEET NO. 4
OF 63 SHEETS
PROJECT NO. 1074-003



TYPICAL SECTION NO. 3

STATION 213+68.5	TO	STATION 233+04.5	SURVEY VARIES FROM	39.29' NORTH OF ℄ CONST. TO	8.81' NORTH OF ℄ CONST.
STATION 233+04.5	TO	STATION 241+25.8	SURVEY VARIES FROM	8.81' NORTH OF ℄ CONST. TO	4.27' SOUTH OF ℄ CONST.
STATION 241+25.8	TO	STATION 249+45.2	SURVEY VARIES FROM	4.27' SOUTH OF ℄ CONST. TO	2.35' SOUTH OF ℄ CONST.
STATION 249+45.2	TO	STATION 256+40.5	SURVEY VARIES FROM	2.35' SOUTH OF ℄ CONST. TO	47.54' NORTH OF ℄ CONST.
STATION 256+40.5	TO	STATION 273+31.6	SURVEY VARIES FROM	47.54' NORTH OF ℄ CONST. TO	29.16' NORTH OF ℄ CONST.
STATION 273+31.6	TO	STATION 300+19.1	SURVEY VARIES FROM	29.16' NORTH OF ℄ CONST. TO	8.23' NORTH OF ℄ CONST.

* STATION 213+68.5 TO STATION 220+13.7 R/W WIDTH VARIES FROM 200' TO 165'
STATION 273+31.6 TO STATION 284+86.9 R/W WIDTH VARIES FROM 136' TO 130'
STATION 284+96.9 TO STATION 308+20.0 R/W WIDTH VARIES FROM 150' TO 90'

OPTIONAL BASE GROUP 9 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (2 1/2") AND FRICTION COURSE FC-2 (5/8")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
9" ASPHALT BASE COURSE (TYPE 1)	325
7" ASPHALT BASE COURSE (TYPE 2)	326
6" ASPHALT BASE COURSE (TYPE 3)	327
10" CEMENTED COQUINA LBR 100	989

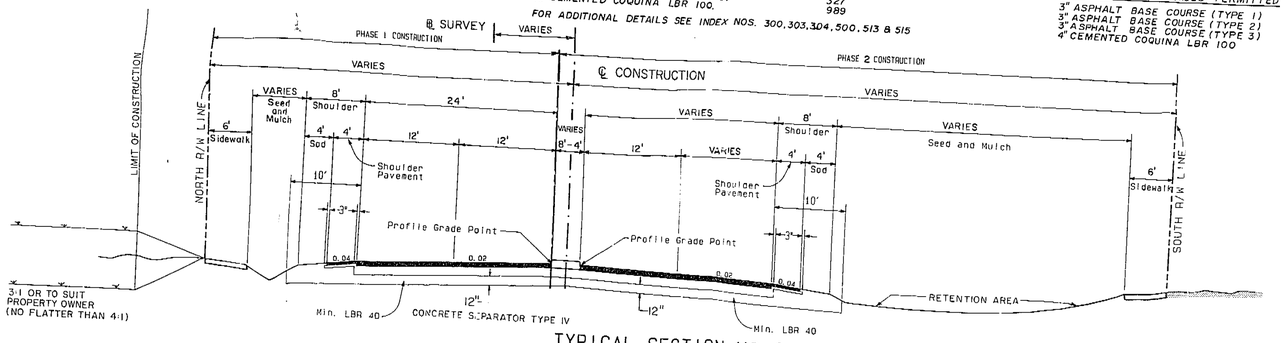
FOR ADDITIONAL DETAILS SEE INDEX NOS. 300, 303, 304, 500, 513 & 515

SHOULDER PAVEMENT

OPTIONAL BASE GROUP 16 (FOR THICKNESS, SEE BELOW; WITH TYPE S STRUCTURE COURSE (1")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
3" ASPHALT BASE COURSE (TYPE 1)	604
3" ASPHALT BASE COURSE (TYPE 2)	605
3" ASPHALT BASE COURSE (TYPE 3)	606
4" CEMENTED COQUINA LBR 100	980



TYPICAL SECTION NO. 4

STATION 300+19.1 TO STATION 301+18.7 ℄ SURVEY VARIES FROM 8.23' NORTH OF ℄ CONST. TO 4.87' NORTH OF ℄ CONST.

OPTIONAL BASE GROUP 9 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (2 1/2") AND FRICTION COURSE FC-2 (5/8")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
9" ASPHALT BASE COURSE (TYPE 1)	325
7" ASPHALT BASE COURSE (TYPE 2)	326
6" ASPHALT BASE COURSE (TYPE 3)	327
10" CEMENTED COQUINA LBR 100	989

FOR ADDITIONAL DETAILS SEE INDEX NOS. 300, 303, 304, 500, 513 & 515

SHOULDER PAVEMENT

OPTIONAL BASE GROUP 16 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (1")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
3" ASPHALT BASE COURSE (TYPE 1)	604
3" ASPHALT BASE COURSE (TYPE 2)	605
3" ASPHALT BASE COURSE (TYPE 3)	606
4" CEMENTED COQUINA LBR 100	980

8/28/90

08/28/00

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2415 S.W. Flagler Avenue • (305) 237-2205 • Stuart, Florida 34994

DATE	REVISIONS
9/18/89	STATIONING

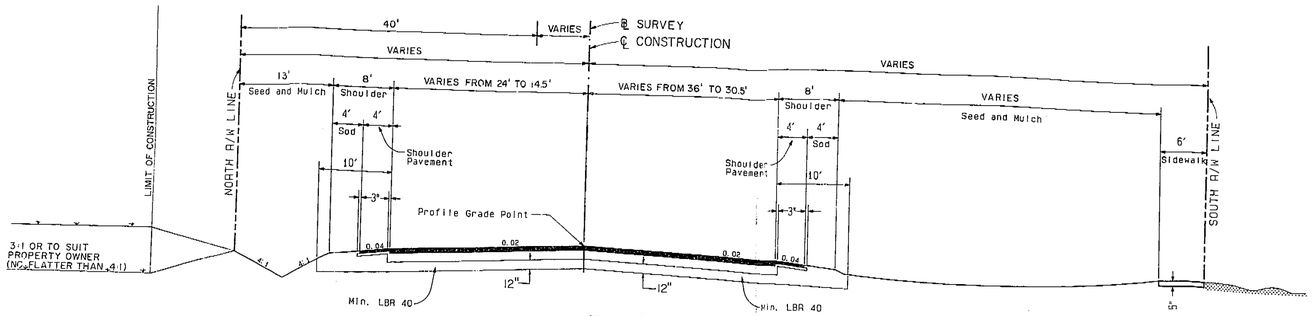
DATE 5/18/89
SCALE N/A
FIELD BK. N/A
DWNG. BY G.S.
CHECKED BY S.K.M.

COVE ROAD

TYPICAL SECTIONS

SHEET NO. 5
OF 63 SHEETS
PROJECT NO. 1074-C34

43-00642-3



TYPICAL SECTION NO. 5

STATION 301+18.7 TO STATION 304+23.0 ℄ SURVEY VARIES FROM 4.87' NORTH OF ℄ CONST TO 6.86' SOUTH OF ℄ CONST.

OPTIONAL BASE GROUP 9 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (2 1/2") AND FRICTION COURSE FC-2 (5/8")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
9" ASPHALT BASE COURSE (TYPE 1)	325
7" ASPHALT BASE COURSE (TYPE 2)	326
6" ASPHALT BASE COURSE (TYPE 3)	327
10" CEMENTED COQUINA LBR 100	989

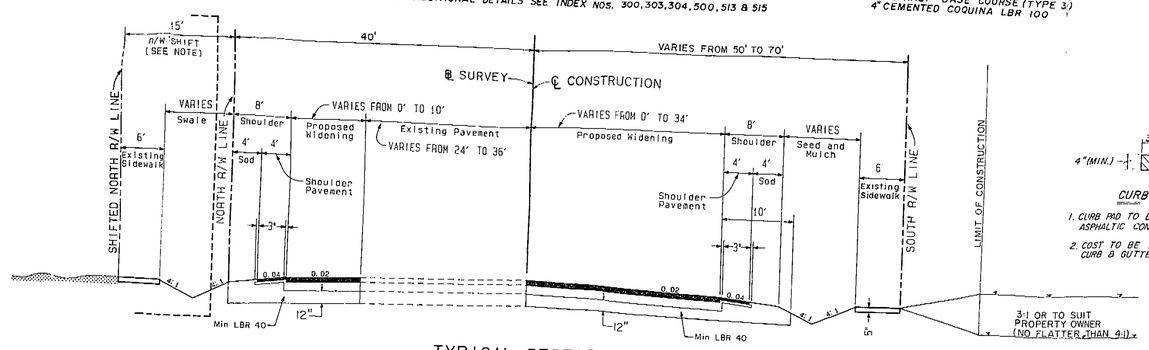
FOR ADDITIONAL DETAILS SEE INDEX NOS. 300,303,304,500,513 & 515

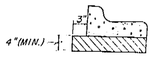
SHOULDER PAVEMENT

OPTIONAL BASE GROUP 16 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (1")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
3" ASPHALT BASE COURSE (TYPE 1)	604
3" ASPHALT BASE COURSE (TYPE 2)	605
3" ASPHALT BASE COURSE (TYPE 3)	606
4" CEMENTED COQUINA LBR 100	980





CURB PAD DETAIL

1. CURB PAD TO BE EITHER LIMEROCK OR ASPHALTIC CONCRETE.
2. COST TO BE INCLUDED IN PRICE OF CURB & GUTTER.

NEW CONSTRUCTION - EASTBOUND LANES

OPTIONAL BASE GROUP 9 (FOR THICKNESS, SEE BELOW) WITH EITHER TYPE S STRUCTURAL COURSE (2 1/2") AND FRICTION COURSE FC-2 (5/8")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
9" ASPHALT BASE COURSE (TYPE 1)	325
7" ASPHALT BASE COURSE (TYPE 2)	326
6" ASPHALT BASE COURSE (TYPE 3)	327
10" CEMENTED COQUINA LBR 100	989

FOR ADDITIONAL DETAILS SEE INDEX NOS. 300,303,304,500,513 & 515

TYPICAL SECTION NO. 6

STATION 304+23.0 TO STATION 308+20.0
STATION 321+45.0 TO STATION 333+47.0
STATION 318+80.0 TO STATION 329+10.0 SOUTH R/W IS 70' SOUTH OF ℄
NOTE: STATION 326+00 TO STATION 329+50 SIDEWALK SHIFTS TO EXTENDED NORTH RIGHT-OF-WAY LINE.
STATION 323+10 TO STATION 329+50 NORTH SIDE TO HAVE TYPE F CURB. (SEE DETAIL)

RESURFACING (EXISTING PAVEMENT)

TYPE S LEVELING COURSE (75 LBS/SY AVG.) WITH TYPE S STRUCTURAL COURSE (125 LBS/SY AVG.) AND FRICTION COURSE FC-2 (5/8")

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08/20/90

SHOULDER PAVEMENT

OPTIONAL BASE GROUP 16 (FOR THICKNESS, SEE BELOW) WITH TYPE S STRUCTURE COURSE (1")

OPTIONAL BASE COURSES PERMITTED

	OPTION CODE
3" ASPHALT BASE COURSE (TYPE 1)	604
3" ASPHALT BASE COURSE (TYPE 2)	605
3" ASPHALT BASE COURSE (TYPE 3)	606
4" CEMENTED COQUINA LBR 100	980

8/28/90

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1415 W. Flagler Avenue · (305) 267-2525 · Miami, Florida 33126

DATE	REVISIONS
9/18/89	STATIONING

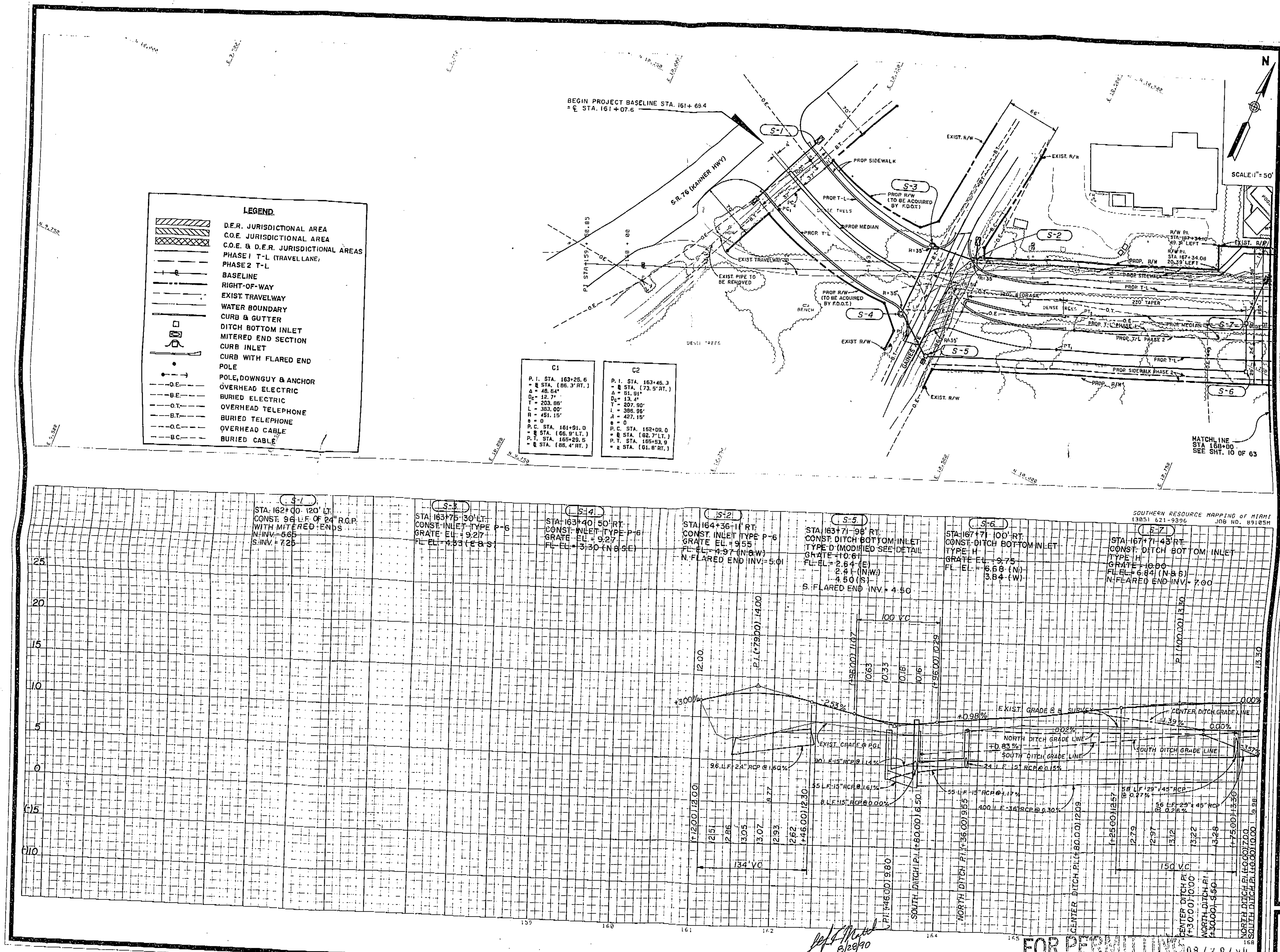
DATE 5/19/89
SCALE N/A
FIELD BK. N/A
DWNG. BY G.S.
CHECKED BY S.K.M.

COVE ROAD

TYPICAL SECTIONS

SHEET NO. 6
OF 63 SHEETS
PROJECT NO. 1074-C35

98-00642-S



FOR PERMITTING ONLY 08/28/90

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141 S.W. Flagler Avenue • Stuart, Florida 34994 • (305) 287-2626

DATE	REVISIONS

DATE 5/17/89
SCALE H-1"=50' V-1"=5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM

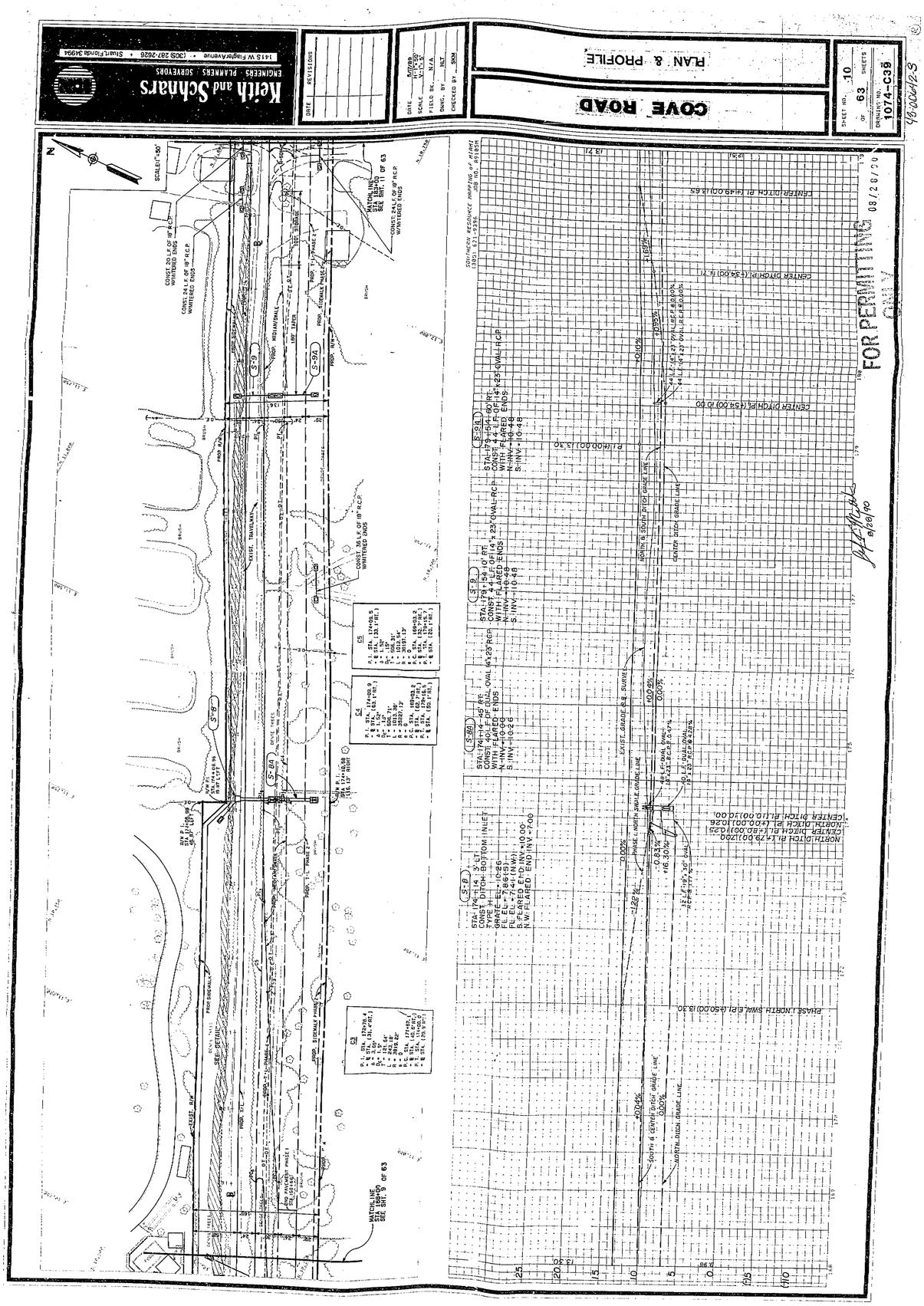
COVE ROAD

PLAN & PROFILE

SHEET NO. 9 OF 63 SHEETS
DRAWING NO. 1074-C38

8/28/90

43-00642-S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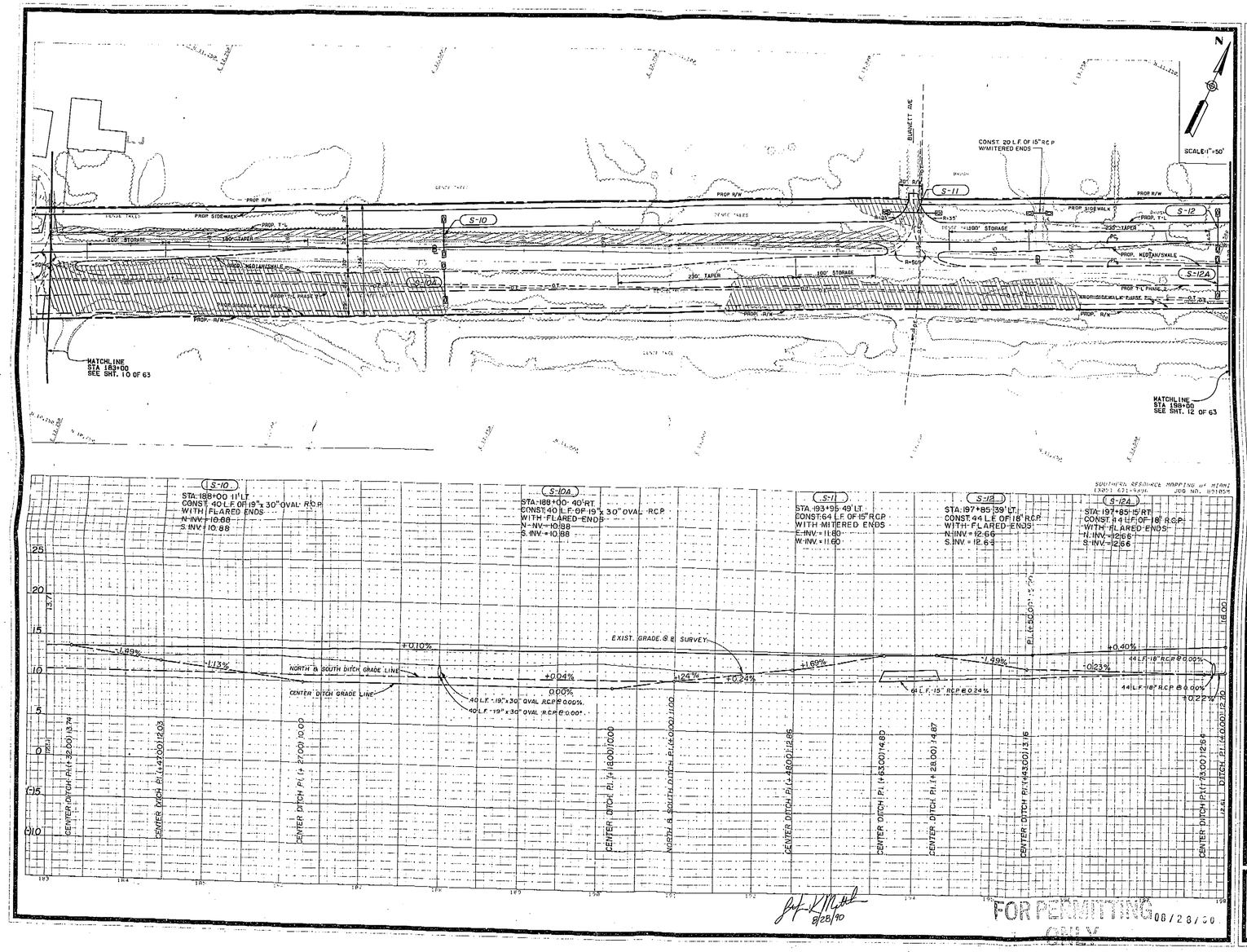
1415 W Flagler Avenue • (305 287-2626 • Stuart Florida 34994
DATE
REVISIONS
DATE 5/17/89
SCALE V-1" H-50'
FIELD BK. N/A
DWG. BY JKT
CHECKED BY JBM
COVE ROAD
PLAN & PROFILE
SHEET NO. 10
OF 63 SHEETS
ORIGINAL NO. 1074-C39
FOR PERMIT
08/28/90
SOUTHERN RESOURCE MAPPING OF FLORIDA
(305) 621-9396
CENTER DITCH PL (49.00)1.65
CENTER DITCH PL (54.00)1.71
CENTER DITCH PL (54.00)10.00
PHASE I NORTH SWALE PL (50.00)13.30
NORTH DITCH PL (-79.00)1.20
NORTH DITCH PL (-80.00)10.25
CENTER DITCH PL (100.00)10.26
NORTH & SOUTH DITCH GRADE LINE
CENTER DITCH GRADE LINE
EXIST. GRADE @ ℄ SURVEY
PHASE I NORTH SWALE GRADE LINE
SOUTH & CENTER DITCH GRADE LINE
NORTH DITCH GRADE LINE
EXIST. TRAVELWAY
PROP. SIDEWALK
PROP. MEDIAN TABLE
PROP. STREET PHASE I
PROP. STREET PHASE II
PROP. STREET PHASE III
PROP. DTC.
EXIST. DITCH
SEE DETAIL
MATCHLINE STA. 159+00 SEE SHT. 9 OF 63
MATCHLINE STA. 179+00 SEE SHT. 11 OF 63
CONST. 20 LF OF 18" R.C.P. W/MITERED ENDS
CONST. 24 LF OF 18" R.C.P. W/MITERED ENDS
CONST. 36 LF OF 18" R.C.P. W/MITERED ENDS
CONST. 24 LF OF 18" R.C.P. W/MITERED ENDS
CS
P.I. STA. 174+09.5
= 8 STA. (33.1 FRI.)
Δ = 18°
D = 1.0°
L = 1013.54'
T = 509.34'
R = 5729.58'
P.C. STA. 169+03.2
P.T. STA. 179+16.7
= 8 STA. (120.1 FRI.)
C4
P.I. STA. 174+09.9
= 8 STA. (33.1 FRI.)
Δ = 1.0°
D = 1.0°
L = 1013.54'
T = 506.74'
R = 5729.58'
P.C. STA. 169+03.2
P.T. STA. 179+16.7
= 8 STA. (120.1 FRI.)
C3
P.I. STA. 174+09.1
= 8 STA. (32.1 FRI.)
Δ = 1.0°
D = 1.0°
L = 243.18'
T = 121.59'
R = 5729.58'
P.C. STA. 173+87.5
P.T. STA. 176+00.7
= 8 STA. (13.1 FRI.)
S-9
S-9A
S-9B
S-9B1
S-8
S-8A
S-8B
STA. 179+15.10 RT.
CONST. 44 LF OF 14" x 23" OVAL RCP
WITH FLARED ENDS
N-INV.-10.48
S-INV.-10.48
STA. 179+15.10 RT.
CONST. 44 LF OF 14" x 23" OVAL RCP
WITH FLARED ENDS
N-INV.-10.48
S-INV.-10.48
STA. 174+14.5 RT.
CONST. 40 LF OF 14" x 23" OVAL RCP
WITH FLARED ENDS
N-INV.-10.05
S-INV.-10.26
STA. 174+14 3' LT
TYPE I DITCH BOTTOM INLET
GRATE EL.-10.26
FL. EL.-7.86(S)
B. FLARED END INV.-10.00
N.W. FLARED END INV.-7.00
MATCHLINE STA. 159+00 SEE SHT. 9 OF 63
+0.10%
+0.04%
0.00%
-1.29%
-0.83%
+16.30%
+0.05%
0.00%
+0.05%
0.00%
+0.04%
0.00%
15" LF 18" OVAL RCP @ 1.77% RCP @ 0.47%
15" LF 18" OVAL RCP @ 1.65 RCP @ 0.52%
15" LF 18" OVAL RCP @ 1.77% RCP @ 0.47%
48 00042-3



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1415 W. Flagler Avenue · (305) 757-2626 · Stuart, Florida 34994

DATE	REVISIONS

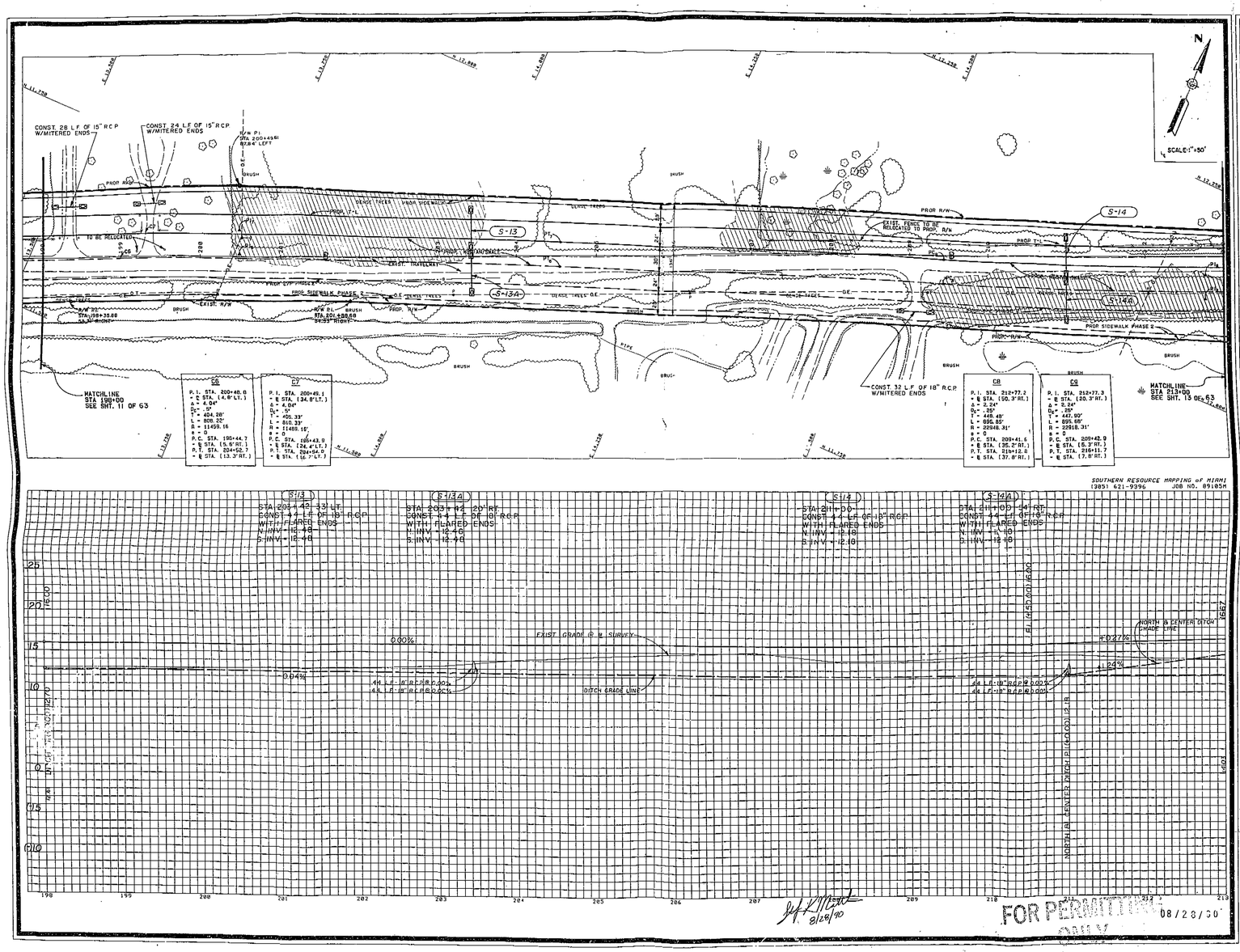
DATE 5/18/89
SCALE H: 1"=50' V: 1"=5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM

COVE ROAD

PLAN & PROFILE

SHEET NO. 11
OF 63 SHEETS
DRAWING NO. 1074-C40

43-00642-S



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1415 S.W. 107th Avenue • (305) 262-0600 • Miami, Florida 33174

DATE	REVISIONS

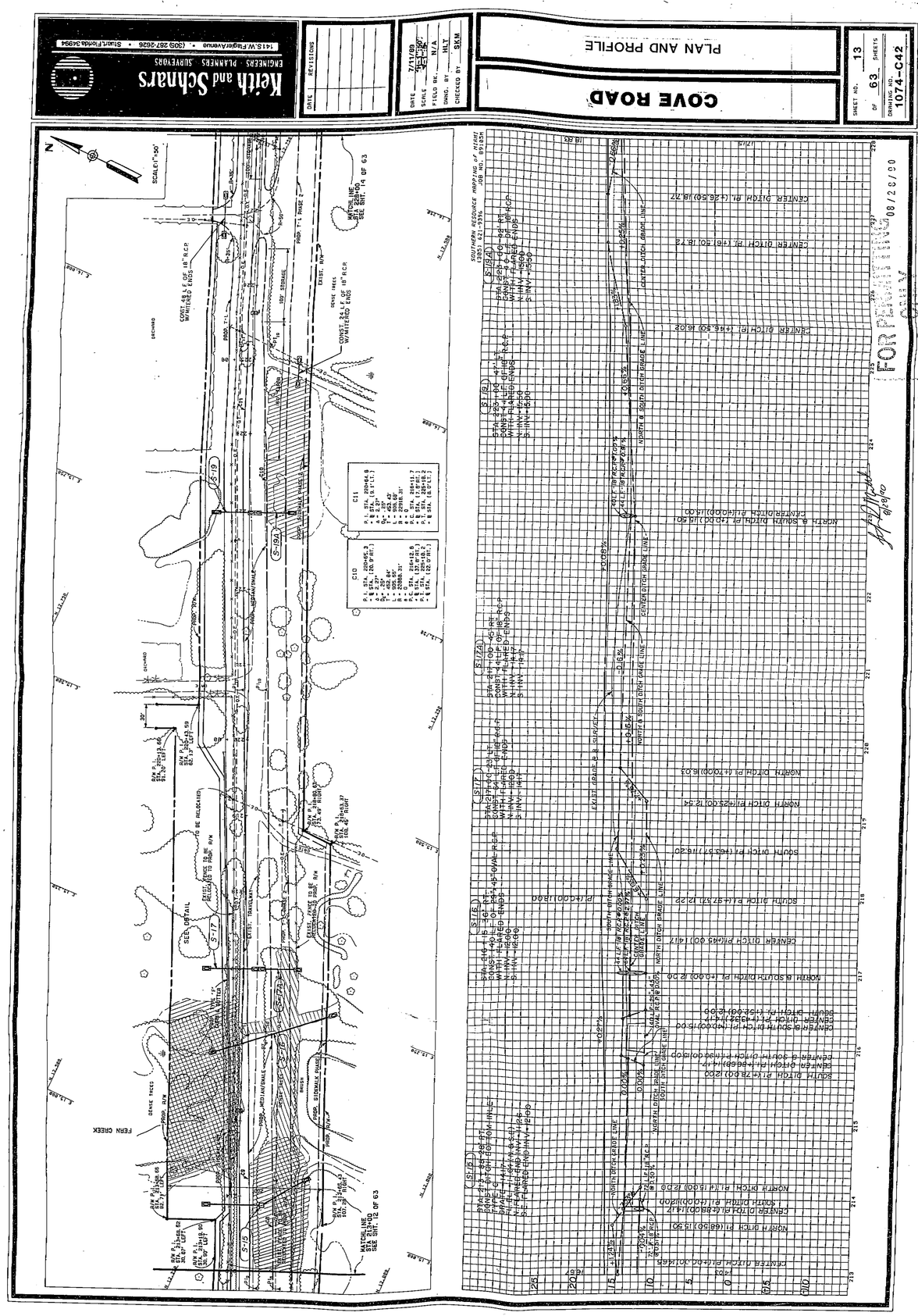
DATE 7/11/89
SCALE V.1"=50' H.1"=5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM

COVE ROAD

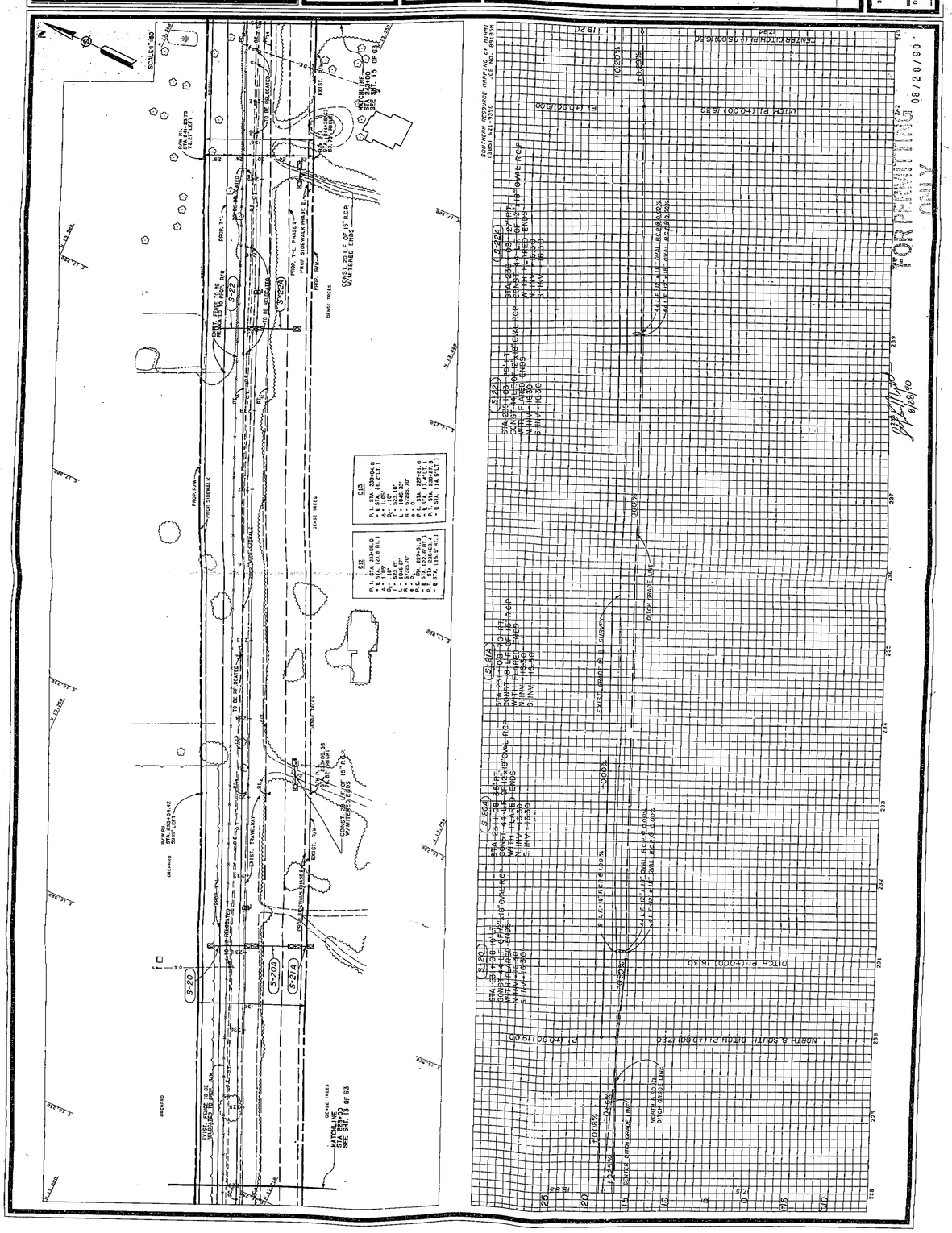
PLAN AND PROFILE

SHEET NO. 12
OF 63 SHEETS
DRAWING NO. 1074-C41

43-00642-S


Keith and Schnars
ENGINEERS · PLANNERS · SURVEYORS
141 S.W. Flagler Avenue · (305) 287-2626 · Stuart, Florida 34994
DATE REVISIONS
DATE 7/11/89
SCALE 1"=50'
FIELD BK. N/A
DWG. BY HLT
CHECKED BY SKM
COVE ROAD
PLAN AND PROFILE
SHEET NO. 13 OF 63 SHEETS
DRAWING NO. 1074-C42
SCALE 1"=50'
FERN CREEK
DENSE TREES
PROP. R/W
PROP. MEDIAN/SWALE
PROP. SIDEWALK
PROP. CURB
EXIST. TRAVELWAY
EXIST. GROUND
SEE DETAIL
S-17
S-16
S-15
S-19A
S-18
C10
C11
MATCHLINE SEE SHT. 12 OF 63
MATCHLINE SEE SHT. 14 OF 63
CONST. 48 L.F. OF 18" R.C.P. W/MITERED ENDS
CONST. 24 L.F. OF 18" R.C.P. W/MITERED ENDS
SOUTHERN RESOURCE MANAGING of FLORIDA
(305) 621-7936
JOB NO. 81205
CENTER DITCH PL (+26.50) 18.72
CENTER DITCH PL (+16.50) 18.76
CENTER DITCH PL (+46.50) 18.02
NORTH & SOUTH DITCH PL (+00.00) 18.50
CENTER DITCH PL (+00.00) 18.50
NORTH DITCH PL (+70.00) 16.03
NORTH DITCH PL (+25.00) 12.94
SOUTH DITCH PL (+63.37) 16.20
SOUTH DITCH PL (+27.37) 12.22
CENTER DITCH PL (+45.00) 14.17
NORTH & SOUTH DITCH PL (+00.00) 12.00
SOUTH DITCH PL (+78.00) 12.00
CENTER & SOUTH DITCH PL (+00.00) 15.00
NORTH DITCH PL (+15.00) 12.00
CENTER DITCH PL (+68.50) 15.30
NORTH DITCH PL (+66.50) 15.30
CENTER DITCH PL (+00.30) 16.65
FOR PERMIT
08/28/90

43-00642-S


Keith and Schnars
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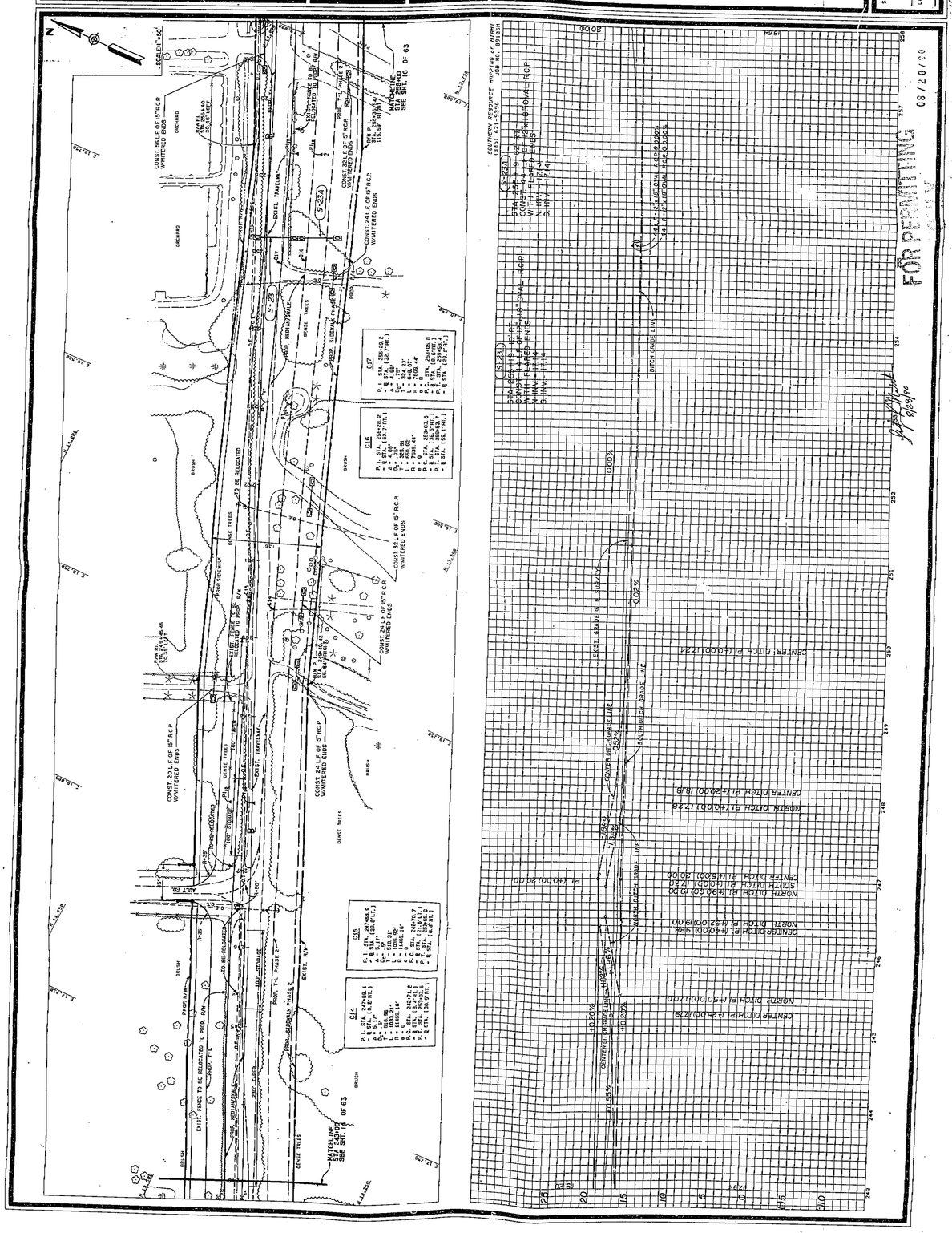
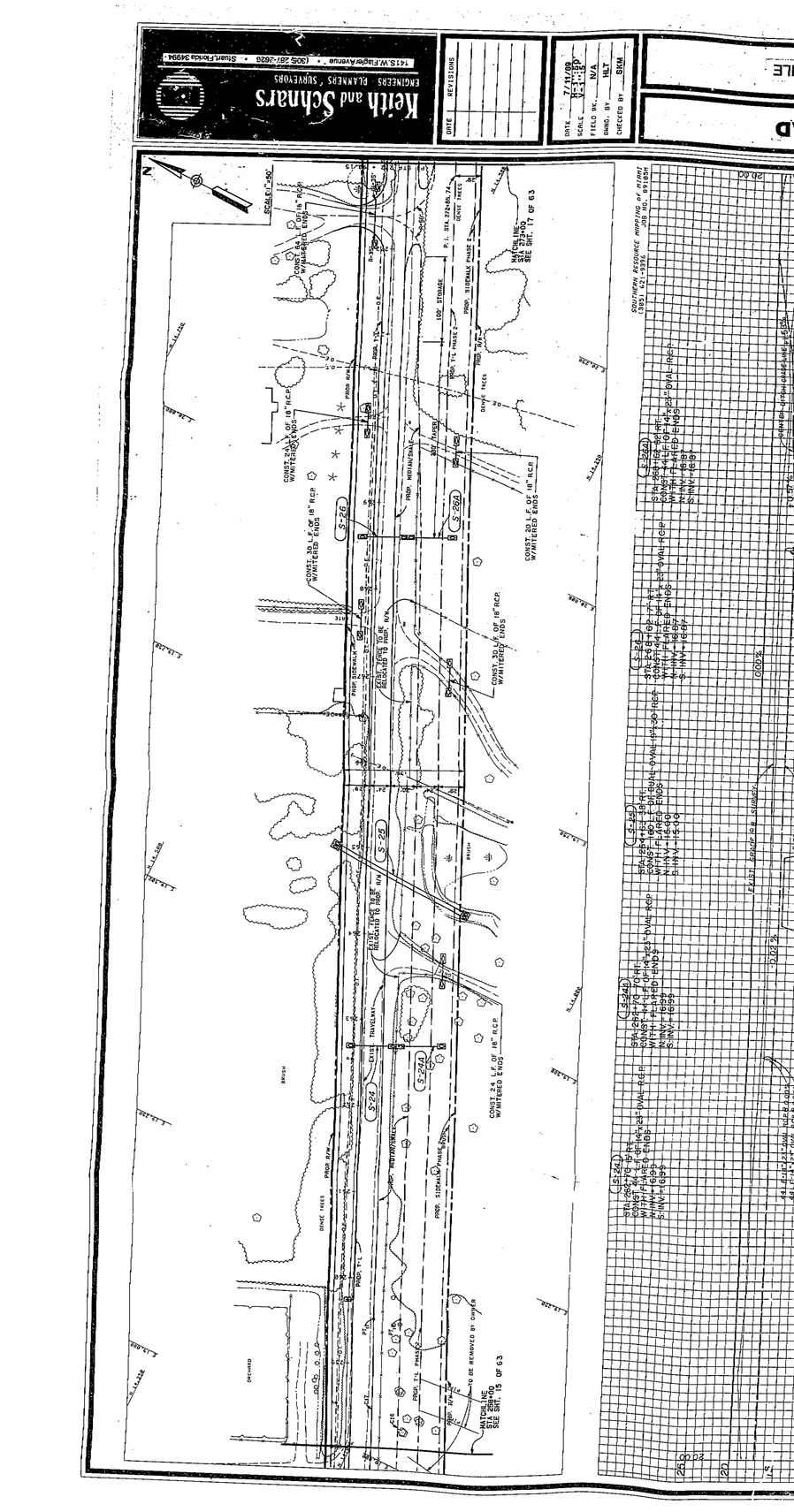
1415 W. Fugler Avenue · (305) 287-2626 · Stuart, Florida 34994
DATE
REVISIONS
DATE 7/11/89
SCALE HORZ. 1"=50' VERT. 1"=5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM
COVE ROAD
PLAN AND PROFILE
SHEET NO. 14
OF 63 SHEETS
DRAWING NO. 1074-C43
93-00042-S
SCALE 1"=50'
PROP. R/W
PROP. SIDEWALK
PROP. T.L.
PROP. SIDEWALK PHASE II
DENSE TREES
EXIST. FENCE TO BE RELOCATED TO PROP. R/W
EXIST. TRAVELWAY
EXIST. R/W
MATCHLINE SEE SHT. 15 OF 63
MATCHLINE SEE SHT. 13 OF 63
S-20
S-20A
S-21A
S-22
S-22A
S-12
S-13
CONST. 20 L.F. OF 15" R.C.P. W/WINGED ENDS
CONST. 20 L.F. OF 15" R.C.P. W/WINGED ENDS
CONST. 20 L.F. OF 15" R.C.P. W/WINGED ENDS
SOUTHERN RESOURCE MAPPING of FLORIDA
DATUM: N.G.V.D. 1929
JOB NO. 89-1874
DITCH FLOW LINE
DITCH BANK LINE
EXIST. GRAD. @ R.R. SURVEY
NORTH & SOUTH DITCH CENTER LINE
CENTER DITCH FLOW LINE
08/28/90


Keith and Schnars
ENGINEERS · PLANNERS · SURVEYORS
1415 W. Flagler Avenue · (305) 287-2626 · Miami, Florida 33126
DATE
REVISIONS
DATE 7/11/89
SCALE 1"=50'
FIELD BK. N/A
DWG. BY HLT
CHECKED BY SKM
COVE ROAD
PLAN AND PROFILE
SHEET NO. 15 OF 63 SHEETS
DRAWING NO. 1074-C44
SOUTHERN RESOURCE MAPPING OF FLORIDA
JOB NO. 891831
(813) 621-5316
FOR PERMITTING
08/28/90
MATCHLINE SEE SHT. 14 OF 63
MATCHLINE SEE SHT. 16 OF 63
CONST. 20 L.F. OF 15" R.C.P. WINTERED ENDS
CONST. 24 L.F. OF 15" R.C.P. WINTERED ENDS
CONST. 32 L.F. OF 15" R.C.P. WINTERED ENDS
CONST. 28 L.F. OF 15" R.C.P. WINTERED ENDS
CONST. 28 L.F. OF 15" R.C.P. WINTERED ENDS
CONST. 32 L.F. OF 15" R.C.P. WINTERED ENDS
EXIST. PIPE TO BE RELOCATED TO PROP. R/W
EXIST. TRAVELWAY
PROP. SIDEWALK
PROP. R/W
BRUSH
DENSE TREES
ORCHARD
CENTER DITCH
NORTH DITCH
SOUTH DITCH
POWER ATTACHMENT LINE
DITCH GRADE LINE
EXIST. GRADE & SURVEY
SCALE 1"=50'
N

49-00842-S



COVE ROAD

PLAN AND PROFILE

DATE	7/14/99
SCALE	H: 1"=50' V: 1"=5'
FIELD BK.	N/A
DWNG. BY	HLT
CHECKED BY	SKM

SHEET NO.	16
OF	63 SHEETS
DRAWING NO.	1074-C45

98-00092-S

Keith and Schnars
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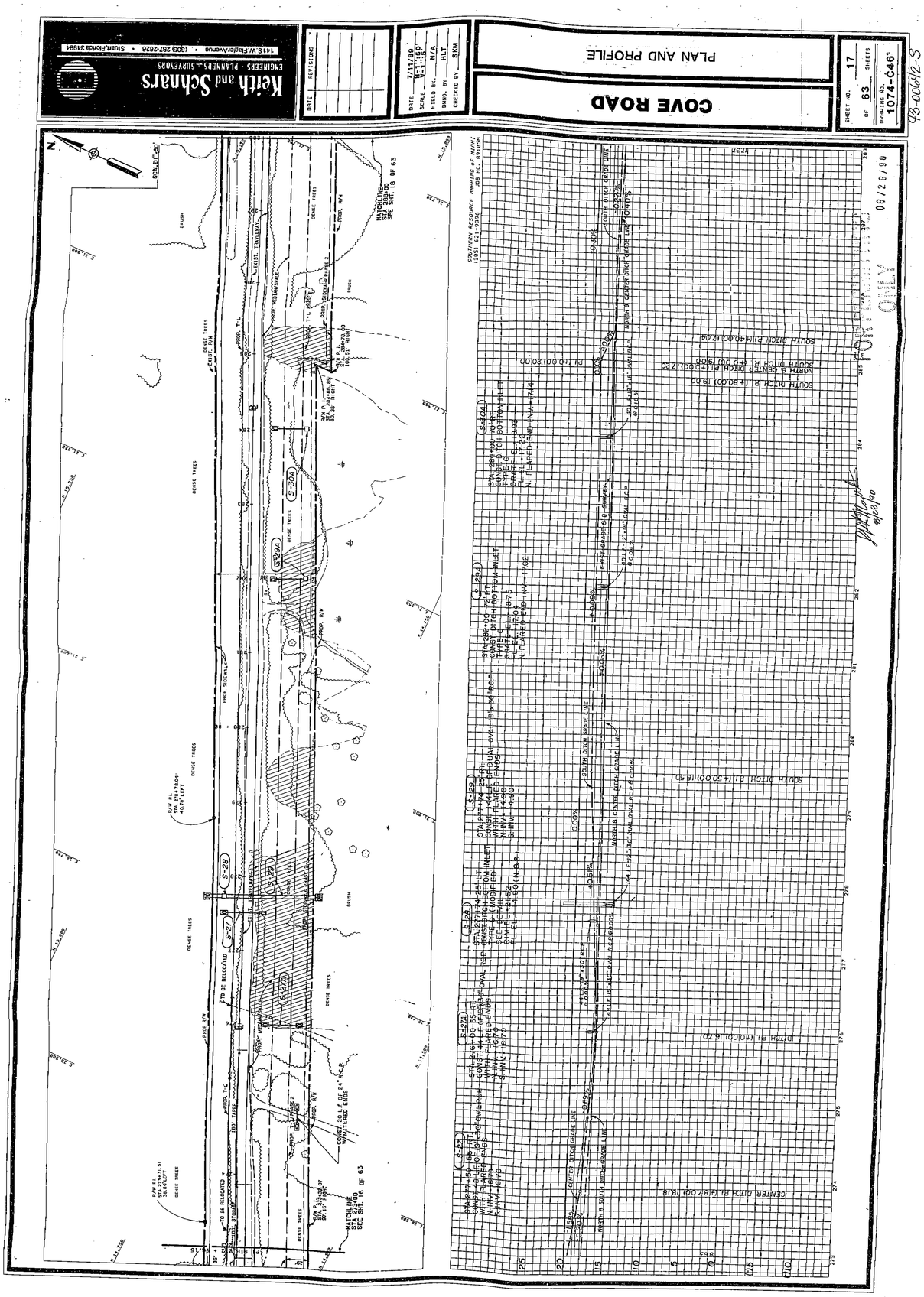
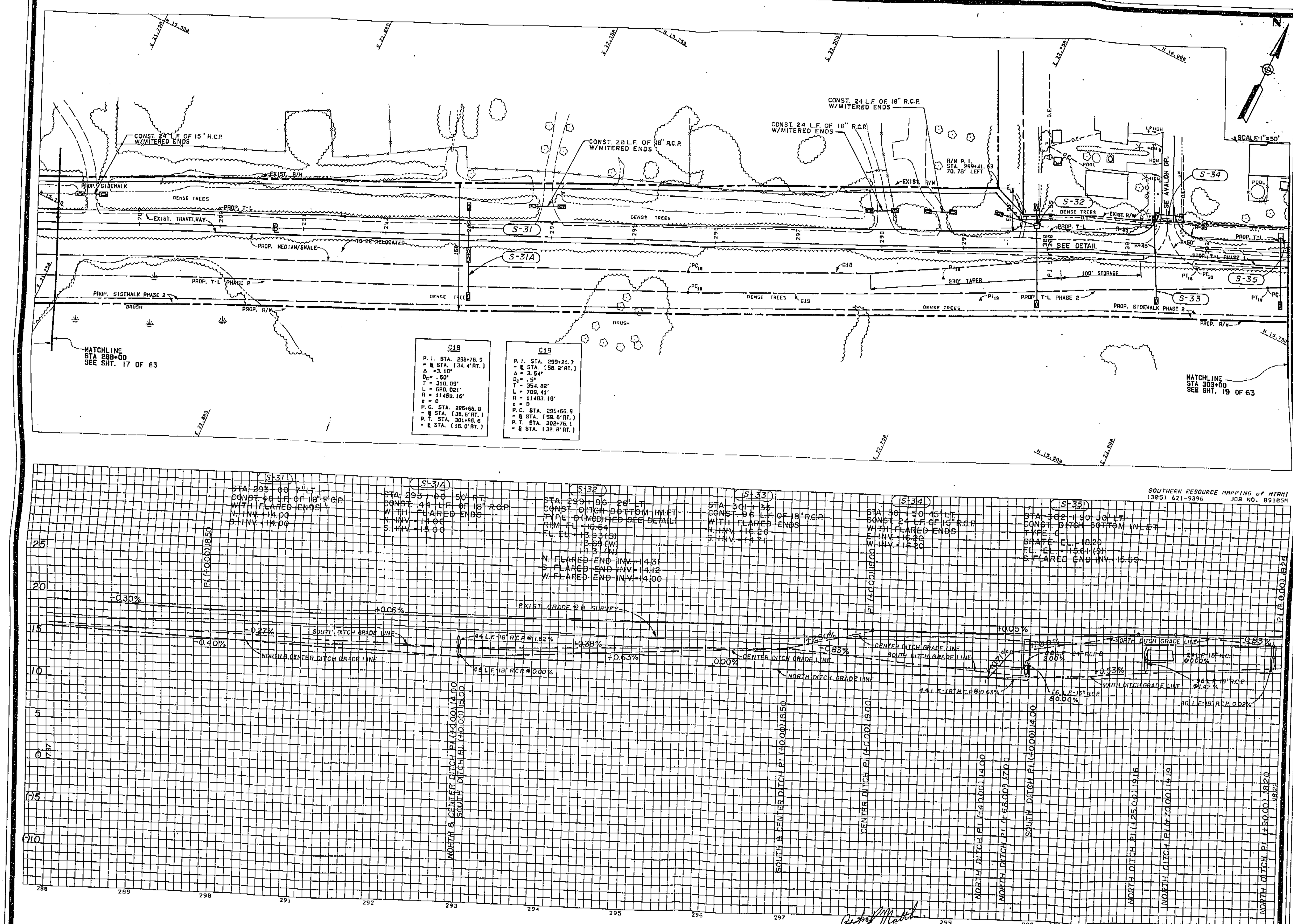
1415 W. Eager Avenue · (305 281-2820 · Stuart, Florida 34994

DATE	REVISIONS


COVE ROAD
PLAN AND PROFILE
Keith and Schnars
ENGINEERS · PLANNERS · SURVEYORS
1415 W. Flagler Avenue • (305) 267-2626 • Sturt, Florida 34994
DATE REVISIONS
DATE 7/11/89
SCALE 1"=50'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM
SHEET NO. 17
OF 63 SHEETS
DRAWING NO. 1074-646
93-006912-S
SCALE 1"=50'
MATCHLINE SEE SHT. 10 OF 63
MATCHLINE STA 27+00 SEE SHT. 10 OF 63
TO BE RELOCATED
CONST 20 L.F. OF 24" R.C.P. WINTERED ENDS
SOUTH DITCH PL 14+80.00 TO 19.00
NORTH & CENTER DITCH PL 14+00.00 TO 20.00
SOUTH DITCH PL 14+40.00 TO 24
SOUTH DITCH PL 14+50.00 TO 60
DITCH PL 14+00.00 TO 20
CENTER DITCH PL 14+80.00 TO 18
08/28/90



FOR PERMITTING ONLY 08/28/90

8/28/90

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141 S.W. Flagler Avenue • (305) 287-2626 • Stuart, Florida 34994

DATE	REVISIONS

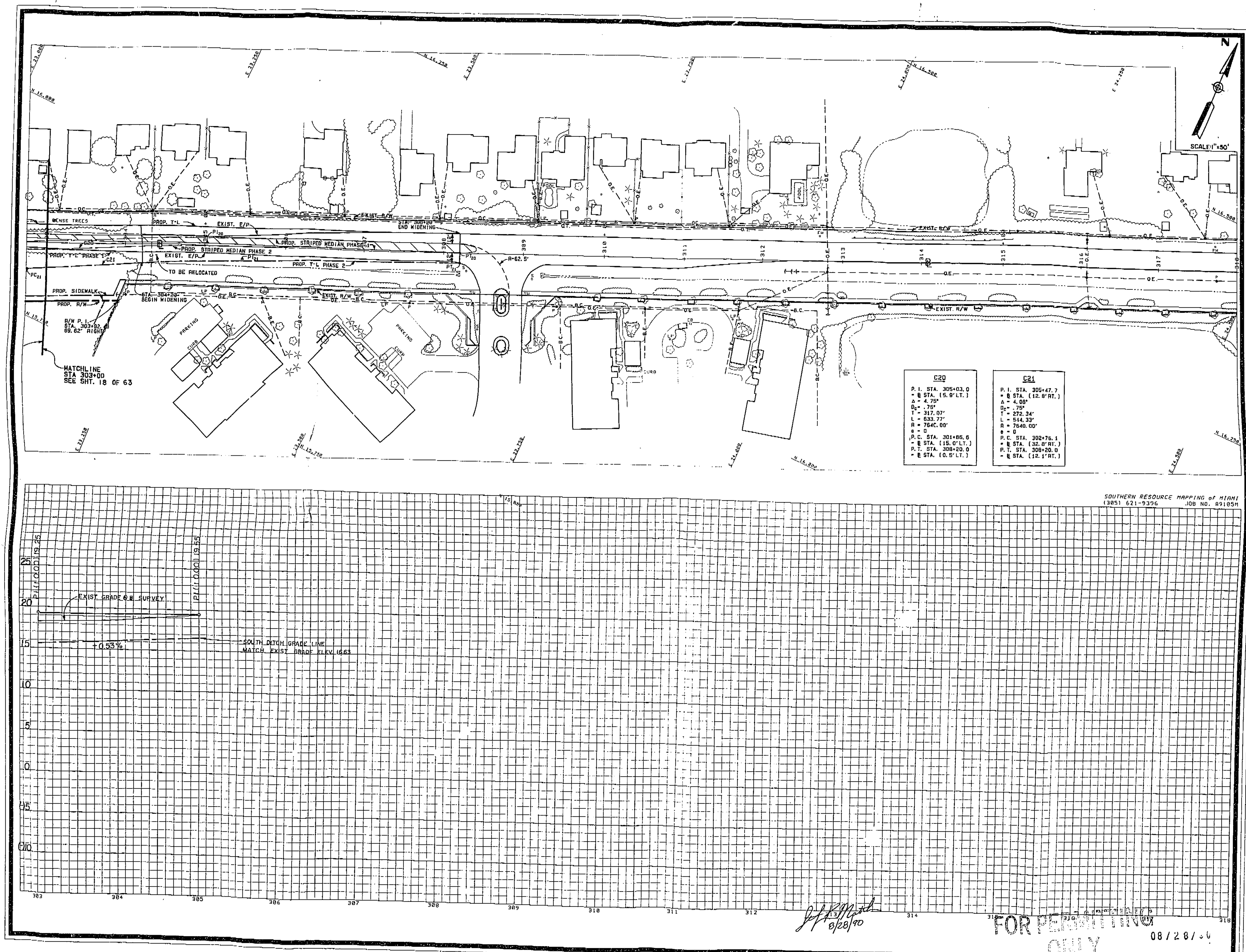
DATE 7/11/89
SCALE H=1":50' V=1":5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM

COVE ROAD

PLAN AND PROFILE

SHEET NO. 18
OF 63 SHEETS
DRAWING NO. 1074-C47

93-00642-S



8/28/90

FOR PERMITTING ONLY

08/28/90

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ENGINEERS · PLANNERS · SURVEYORS
141 S.W. Flagler Avenue • (305) 287-2626 • Stuart, Florida 34994

DATE	REVISIONS

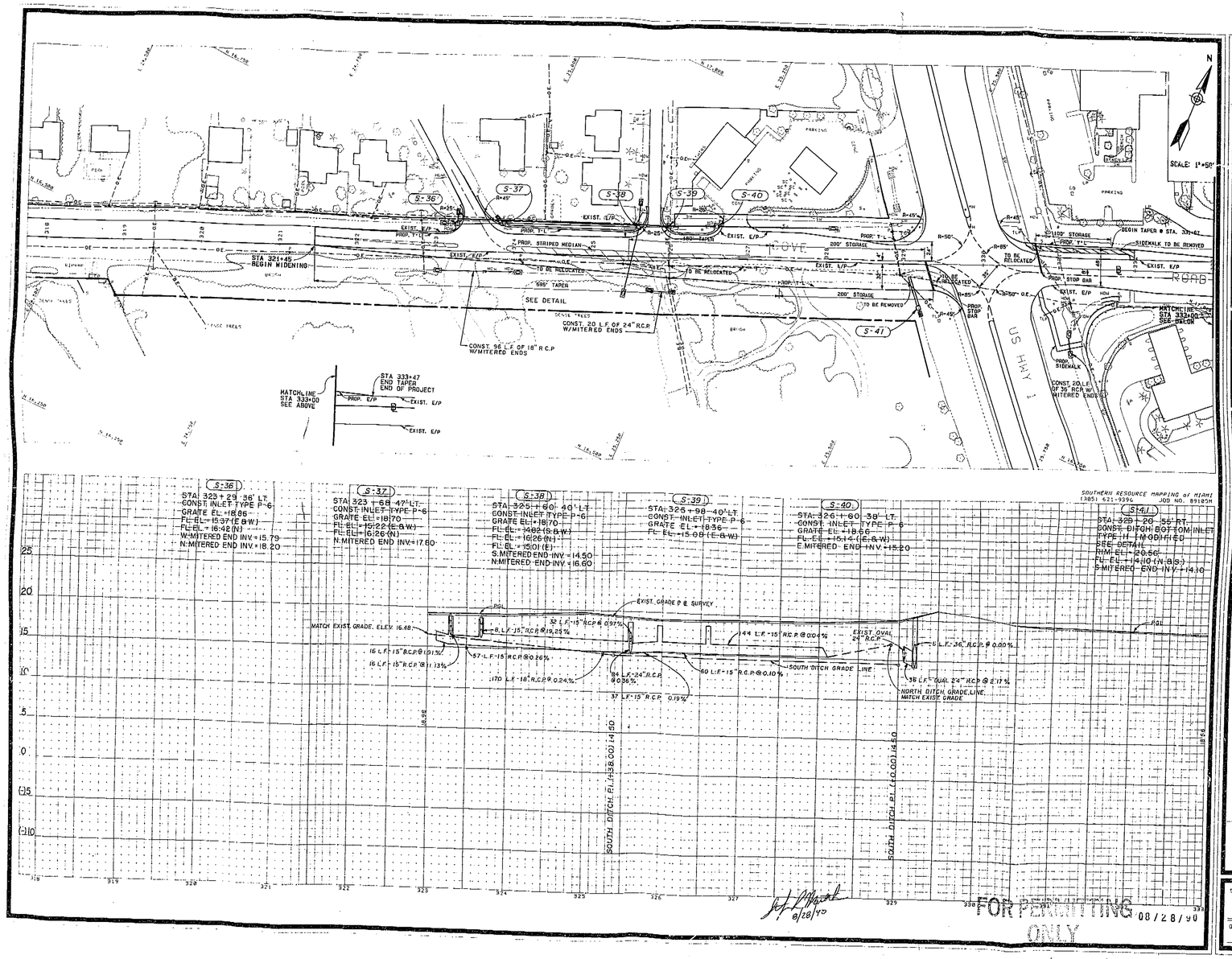
DATE 7/11/89
SCALE H-1":50' V-1":5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM

COVE ROAD

PLAN AND PROFILE

SHEET NO. 19
OF 63 SHEETS
DRAWING NO. 1074-C48

93-00642-S



Keith and Schnars
ENGINEERS PLANNERS SURVEYORS
141 S.W. Flagler Avenue • (305) 467-2828 • Miami Florida 34594

DATE	REVISIONS

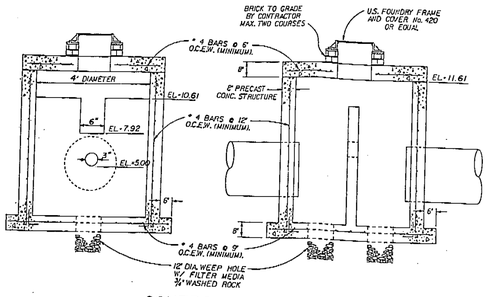
DATE 7/25/89
SCALE H-1"=50' V-1"=5'
FIELD BK. N/A
DWNG. BY HLT
CHECKED BY SKM

COVE ROAD

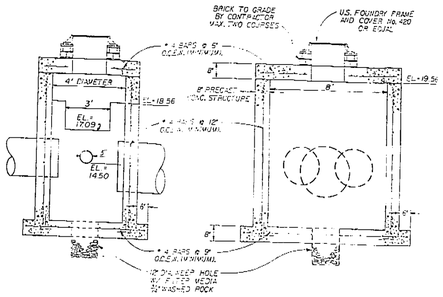
PLAN AND PROFILE

SHEET NO. 20
OF 63 SHEETS
DRAWING NO: 1074-C49

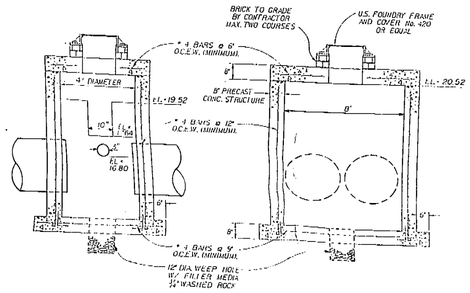
93-00642-S



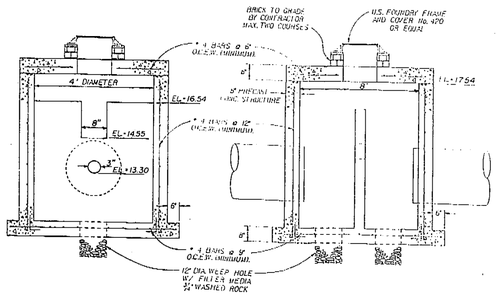
CONTROL STRUCTURE S-5



CONTROL STRUCTURE S-41



CONTROL STRUCTURE S-28



CONTROL STRUCTURE S-32

Jeff K Smith 8/28/90

FOR PERMITTING ONLY

08/28/90

Keith and Schnars
ENGINEERS · PLANNERS · SURVEYORS
141 S.W. Flagler Avenue • (407) 287-2808 • Stuart, Florida 34994

DATE	REVISIONS

DATE 7/11/89
SCALE N/A
FIELD BK. N/A
DWNG. BY C.A.B.
CHECKED BY S.K.M.

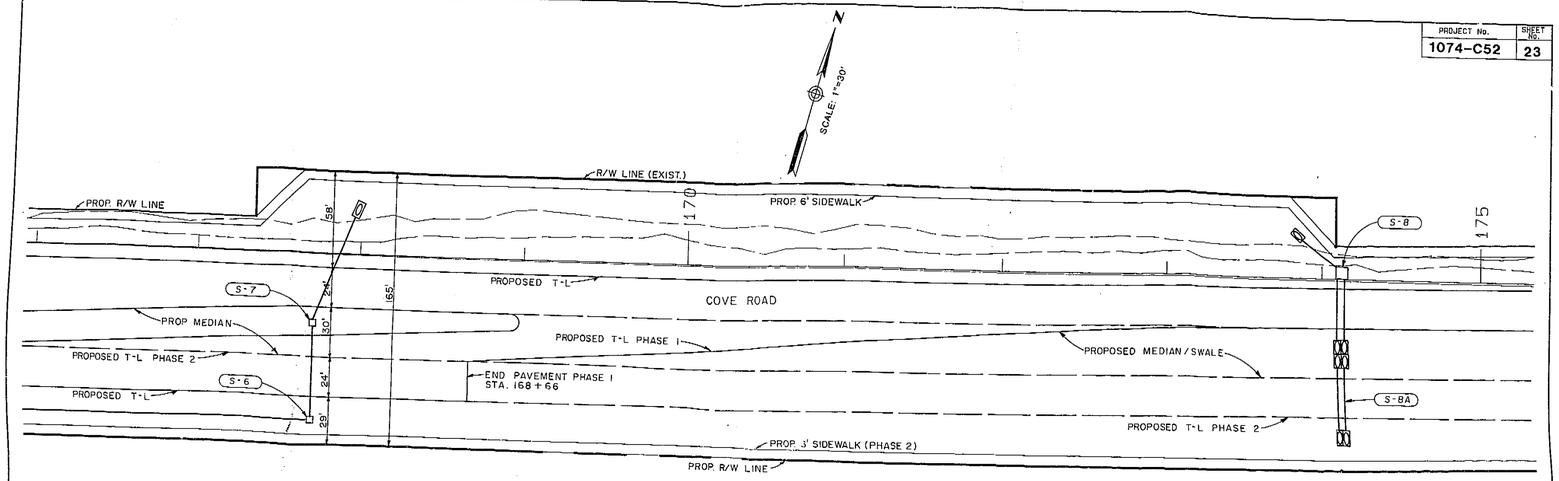
COVE ROAD

SPECIAL DETAILS

SHEET NO. 22
OF 63 SHEETS
DRAWING NO. 1074-C51

93-00642-S

PROJECT No.	SHEET No.
1074-C52	23



S-6

STA. 167 + 71 100' RT.
CONST. DITCH BOTTOM INLET
TYPE H
GRATE EL. = 9.75
FL. EL. = 6.68 (N)
3.84 (W)

S-7

STA. 167 + 71 43' RT.
CONST. DITCH BOTTOM INLET
TYPE H
GRATE EL. = 10.00
FL. EL. 6.84 (N & S)
N. FLARED END INV. = 7.00

S-8

STA 174 + 14 3' LT.
CONST. DITCH BOTTOM INLET
TYPE H
GRATE EL. = 10.26
FL. EL. = 7.86 (S)
FL. EL. = 7.41 (N.W.)
S. FLARED END INV. = 10.00
N.W. FLARED END INV. = 7.00

S-8A

STA. 174 + 14 45' RT.
CONST. 40 L.F. OF DUAL OVAL 14" x 23" R.C.P.
WITH FLARED ENDS
N. INV. = 10.00
S. INV. = 10.26

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Feith & Schnars, Inc.
ENGINEERS-PLANNERS-SURVEYORS
STUART DIVISION

	NAME	DATE		NAME	DATE
DESIGN BY:	E. ZEISS	8-90	DRAWN BY:	K. PERSINGER	8-90
CHECKED BY:	S. MATTHES	8-90	CHECKED BY:	S. MATTHES	8-90
SUPERVISED BY:					

MARTIN COUNTY
APPROVED BY:
DATE:

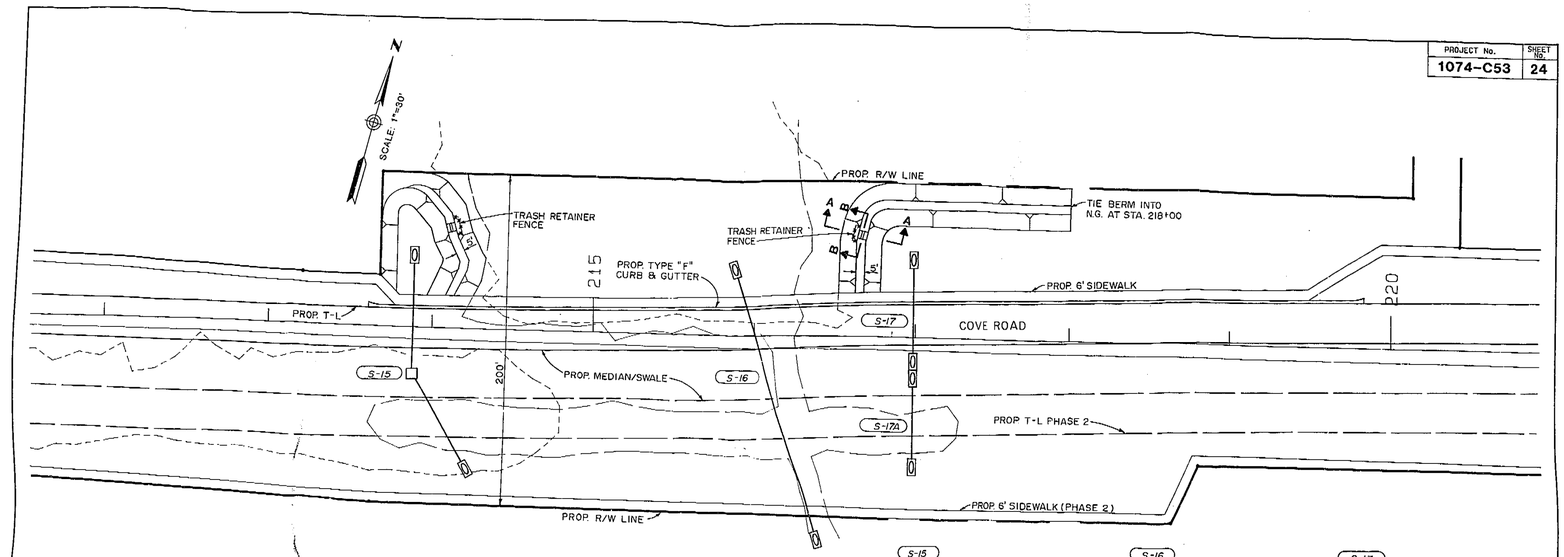
DETENTION AREA NO. 1

Scott R. Matthes
8/28/90

FOR PERMITTING ONLY

08/28/90
43-00642-S

PROJECT No.	SHEET NO.
1074-C53	24

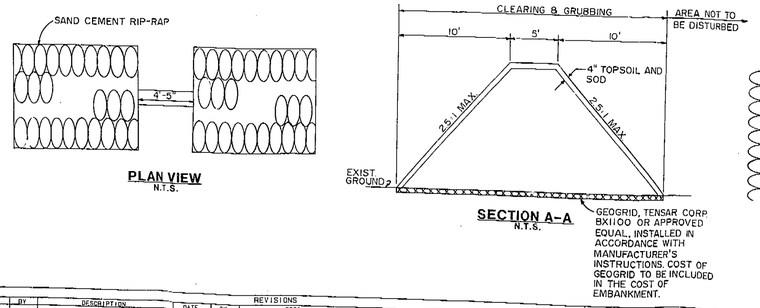


S-15
STA. 213+88 28' RT.
CONST. DITCH BOTTOM INLET
TYPE C
GRATE = 14.17
FL. EL. = 11.64 (N & S.E.)
N. FLARED END INV. = 11.26
S.E. FLARED END INV. = 12.00

S-16
STA. 216+15 36' RT.
CONST. 140 L.F. OF 29"x45" OVAL R.C.P.
WITH FLARED ENDS
N. INV. = 12.00
S. INV. = 12.00

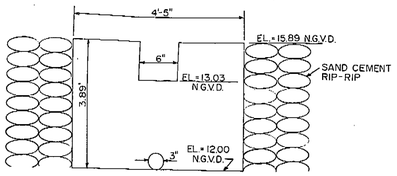
S-17
STA. 217+00 23' LT.
CONST. 64 L.F. OF 18" R.C.P.
WITH FLARED ENDS
N. INV. = 12.00
S. INV. = 14.17

S-17A
STA. 217+00 45' RT.
CONST. 44 L.F. OF 18" R.C.P.
WITH FLARED ENDS
N. INV. = 14.17
S. INV. = 14.17



PLAN VIEW
N.T.S.

SECTION A-A
N.T.S.



SECTION B-B
N.T.S.

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Keith & Schnars, Inc.
ENGINEERS-PLANNERS-SURVEYORS
STUART DIVISION

	NAME	DATE		NAME	DATE
DESIGN BY:	E. ZEISS	8-90	DRAWN BY:	K. PERSINGER	8-90
CHECKED BY:	S. MATTHEWS	8-90	CHECKED BY:	S. MATTHEWS	8-90
SUPERVISED BY:					

MARTIN COUNTY
APPROVED BY:
DATE:

DETENTION AREA NO. 2

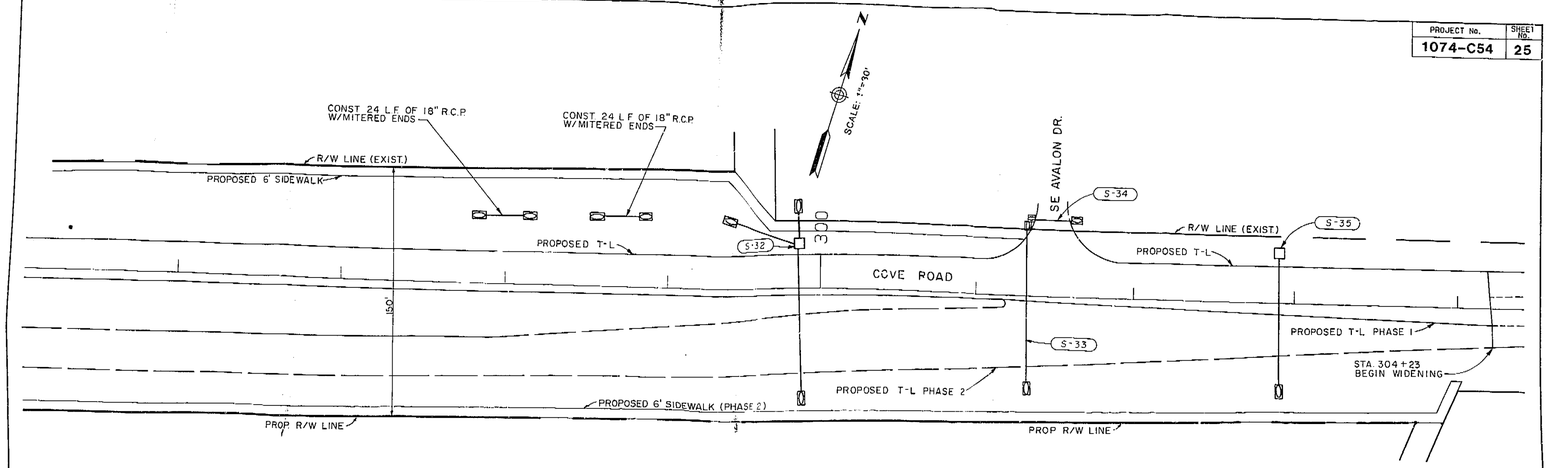
8/28/90

FOR PERMITTING ONLY

08/28/90

45-00642-S

PROJECT No.	SHEET NO.
1074-C54	25



S-32

STA. 299+86 26' LT
CONST. DITCH BOTTOM INLET
TYPE D (MODIFIED SEE DETAIL
RIM EL. = 18.54
FL. EL. = 13.93 (S)
13.69 (W)
14.31 (N)
N. FLARED END INV. = 14.31
S. FLARED END INV. = 14.12
W. FLARED END INV. = 14.00

S-33

STA. 301+35
CONST. 96 L.F. OF 18" RCP
WITH FLARED ENDS
N. INV. = 16.20
S. INV. = 14.71

S-34

STA. 301+50
CONST 24 L.F. OF 15" R.C.P.
WITH FLARED ENDS
E. INV = 16.20
W. INV = 16.20

S-35

STA. 302+90
CONST. DITCH BOTTOM INLET
TYPE C
GRATE EL. = 18.20
FL. EL. = 15.61 (S)
S. FLARED END INV. = 15.59

REVISIONS								
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

Keith & Schnars, Inc.
ENGINEERS-PLANNERS-SURVEYORS
STUART DIVISION

	NAME	DATE		NAME	DATE
DESIGN BY:	E. ZEISS	8-90	DRAWN BY:	K. PERSINGER	8-90
CHECKED BY:	S. MATTHES	8-90	CHECKED BY:	S. MATTHES	8-90
SUPERVISED BY:					

MARTIN COUNTY
APPROVED BY:
DATE:

DETENTION AREA NO. 3

8/28/90

FOR PERMITTING ONLY

08/28/90
43-00642-S

AF 53200B

STANDARD ENGINEERING NOTES

GENERAL

1. The Contractor shall have available at the job site, at all time, one copy of the Martin County Utilities Minimum Design and Construction Standards, one copy of the Contract Documents including Plans, Specifications and Special Provisions, and copies of any required construction permits.

2. Contractor is responsible for checking actual site conditions before starting construction and bidding of project.

3. Any discrepancies on the drawings shall be brought to the attention of the Engineer before commencing work.

4. Contractor shall obtain all required permits before commencing work.

5. The Contractor shall contact all concerned utilities at least 48 hours in advance of construction operations.

6. No field changes or deviations from design to be made without prior approval of the Engineer.

7. The location and size of all existing utilities shown on the plans are approximate and are based on the best available information. Additional utilities may exist which are not shown on the plans. The Contractor shall be responsible for the location of all existing utilities. The Contractor shall verify all utilities, by electronic methods and by hand excavation in coordination with all utility companies, prior to beginning any construction operations. Any and all conflicts of existing utilities with proposed improvements shall be resolved by the Engineer and the Owner prior to beginning any construction operations. This work by the Contractor shall be considered incidental to the contract and no additional compensation shall be allowed.

8. During construction of new water and sanitary sewer lines, existing areas not to be replaced with proposed sidewalks, roadways etc., shall be restored to their origional condition.

9. Shop drawings are required on all construction items. The Engineer requires 5 days prior notice to review shop drawings.

MARTIN COUNTY, FLORIDA
PUBLIC WORKS DEPARTMENT

CONSTRUCTION FIELD OBSERVATIONS

I. DRAINAGE

A. Laying of pipe (before backfill)
B. All drainage structures and pipe laying completed.
C. Construction and stabilization of retention areas and swales.
D. Seeding, mulch and sodding in areas where erosion is evident.

II. UTILITIES (U-2 PERMITS OR DEVELOPMENT ORDER)

A. Pipe laying within City rights-of-way
B. Jack and boring in City rights-of-way
C. Restoration of rights-of-way

III. CONCRETE

A. Construction of curbing, sidewalk and retaining walls before placement of concrete.

IV. PAVEMENT

A. Line and grade (certification)
B. Subbase (prior to adding base material)
C. Base (prior to priming and sand seal)
D. Base (after priming, sand seal and before placing of asphalt)
E. Asphalt or concrete (while paving is in progress)
F. Turn out construction onto City road (above inspections apply)
G. Test results on subbase, base and asphalt
H. Final project observation

PROJECT CERTIFICATION REQUIREMENTS

I. TESTING

A. Florida bearing value test results
B. Compaction test
C. Base material test results
D. Asphalt test results
E. Compaction test required beneath all manholes.

III. CERTIFICATION AND RECORD DRAWINGS

A. Sealed certification by the engineer of record for compliance with approved plans and specifications along with record drawings for the project.

NOTE: THE ABOVE TEST AND FIELD OBSERVATIONS SHALL TAKE PLACE PRIOR TO FINAL APPROVAL.

Storm Sewer System

1. Installation

Sewer shall be laid accurately to both line and grade. Martin County will generally not accept any line laid with a slope varying by more than 10% of its design slope especially for lines laid at minimum gradients. For specific instance, the minimum acceptable slope on an 8 inch line shall be 36%, if the design called for .40%. The Department reserves the right to independently verify questionable survey results. Visible leakage, deflections, horizontal misalignment, significant bowing, non-constant slopes between manholes and sagging joints shall each be grounds for rejection of lines.

Trenches and excavations should be kept dry while work is in progress. Excavated materials, such as boulders and logs, that is not suitable for backfill should be removed from the site. The pipe barrel shall be uniformly supported along its entire length on undisturbed soil or bedding material. Proper bedding shall be supplied if the existing material incudes rock, organic material or other sharp or unstable material.

2. Manholes & Inlets

Manholes & inlets shall be set according to construction plans and shall be cast in accordance with approved shop drawings and specification detail drawings accompanying this text. All concrete irregularities shall be plastered with cement mortar in such a manner as to give a neat and water-tight job.

Manhole & inlet rim elevation shall be set at .25 feet above finished grade in unpaved areas and flush with pavement in paved areas. Where conflict exists, between elevations on plans, Contractor to notify Engineer.

Manholes & inlets shall be core-drilled to provide pipe opening when precast hole is not available.

3. Inspection and Testing

Lamping of the completed sewer system will be performed after complete backfilling and the laying of the roadway base. The lamping will determine that the lines have been laid to accurate line and grade. At time of lamping, the line shall be clean and dry. A final inspection will be held after the roadway is completed to verify that the system has not been damaged. All lines and appurtenances not meeting specifications or reasonable standards shall be repaired or replaced.

4. Compaction to 98% AASHTO T-180 is required under all inlets and manholes 12" min. depth. When an unstable foundation exists the area shall be dewatered and excavated and a bedding of 3/4" crushed rock shall be deposited and compacted to a minimum depth of 12" or until stable. The diameter of the foundation shall be a minimum of 24" greater than the base slab diameter.

5. Contractor to remove and replace exist. driveways within R/W (typ.) match exist. with minimum amount of asphalt.

6. All proposed driveway culverts shall have mitered ends.

7. All storm sewer pipe shall be RCP. All driveway culverts shall be RCP.

8. All storm drainage structures shall be constructed as per the construction details as shown on the plan. Prior to construction, the contractor shall submit a shop drawing to the Engineer for approval of said construction. All concrete and steel for structures shall be in accordance with F.D.O.T. standards.

9. All disturbed outfall drainage area shall be hydromulched seeded upon completion of grading and approval by Engineer of grade elevations.

10. Prior to final payment of drainage ditch quantities, all slopes and swales shall be grassed to avoid erosion.

11. Backfill to be compacted in no greater than 1 foot lifts to the density of the undisturbed adjacent soils.

12. All excavated material shall be used on-site of Cove Road.

13. Seed & mulch as per F.D.O.T. requirements for roadway construction.

14. The contractor shall maintain access to all properties (incl. mailboxes) during construction. A maintenance of Traffic Plan will be required by the contractor prior to the preconstruction meeting and approval is required by the Martin County Engineering Dept. prior to commencement of construction.

15. All signage and pavement markings shall be in accordance with the MUTCD Standard F.D.O.T. Roadway and Traffic Design Standards Current Edition. (Construction and Final Project Completion.)

16. All work within F.D.O.T. U.S. No. 1 R/W shall meet the requirements of F.D.O.T. Permit. A copy of permit shall be on-site at all times.

17. All sod adjacent to roadways to be placed 2" below pavement elevations. A minimum two rows of sod shall be placed adjacent to all roadway edge of pavement (minimum width of 32 inches, unless otherwise specified in these plans).

GENERAL NOTES

1. The contractor shall adjust all existing water valves, fire hydrants, gate valves, water meters an appurtenances affected by construction. Said work will be incidental to the contract and no additional compensation shall be allowed.

2. Should conflicts with existing water or sewer service leads occur, their replacement with same shall be considered incidental to the cost of construction.

3. The contractor is responsible for verifying the location of all existing utilities and their appurtenances prior to construction.

4. The contractor shall maintain all water supply and sanitary sewer services throughout construction of this project.

5. Contractor to regrade all RW's and Retention Areas as per plans. All fill to remain on site and is the property of Martin County to be stockpiled within Martin County Parcels at Cove Road. Upon completion of the total project, fill to be handled by contractor at the direction of Martin County Engineering Dept. to a sight within a 5-mile radius, at no extra cost (Incidental item.

6. The contractor shall be responsible for providing adequate environmental containment measures such as turbidity screen, earthen berms, etc. during construction phases thereby prohibiting any adverse impacts from on-site discharges to adjacent receiving waters. The contractor is responsible to provide adequate drainage of the Cove Road project to meet the existing level of service during all construction phases.

NOTE: **The construction and completion of all storm drainage structures shall meet the requirements of F.D.O.T. Standard Specifications.**

SPACING OF REQUIRED ROADWAY/PARKING AREA TESTS

	F.B.V.		DENSITY		L.B.R.		THICKNESS	
	MAX SPACING		MAX. SPACING		MAX. SPACING		MAX. SPACING	
	LIN. FT.	SQ. FT.	LIN. FT.	SQ. FT.	LIN. FT.	SQ. FT.	LIN. FT.	SQ. FT.
COMPACTED OR STABILIZED SUBGRADE	300	10,000	300	10,000	500	---	300	10,000
LIMEROCK BASE	---	---	300	10,000	500	---	300	10,000
SHELLROCK BASE	---	---	300	10,000	---	---	300	10,000
ASPHALT	---	---	---	---	---	---		

ALL TESTING SHALL BE TAKEN IN A STAGGERED ZIGZAG PATTERN FROM A POINT 12" INSIDE THE LEFT EDGE OF THE ITEM TESTED, TO THE CENTER, TO A POINT 12" INSIDE OF THE RIGHT EDGE.

48 HOURS BEFORE DIGGING
BROWARD • PALM BEACH • INDIAN RIVER • ST LUCIE • MARTIN COUNTIES
CALL TOLL FREE
1-800-432-4770
U N C L E UNDERGROUND UTILITIES NOTIFICATION CENTER

FOR PERMITTING ONLY

08/28/90

MARTIN COUNTY ENGINEERING DEPARTMENT TO NOTIFY ALL UTILITY COMPANIES (FPL, SOUTHERN BELL, ADELPHIA CABLE, AT&T) FOR PRECONSTRUCTION MEETING.

FOR FPL CABLE LOCATION CALL 286-6900, EXTENTION 3300, PRIOR TO CONSTRUCTION.

Keith and Schnars
ENGINEERS · PLANNERS · SURVEYORS
141 S.W. Flagler Avenue • (407) 287-2626 • Stuart, Florida 34994

DATE	REVISIONS

DATE 7/11/89
SCALE N/A
FIELD BK. N/A
DWNG. BY K.D.P.
CHECKED BY S.K.M.

COVE ROAD

GENERAL NOTES

SHEET NO. 27 OF 63 SHEETS
DRAWING NO. 1074-C56

93-00642-S

ENGINEERING SUPPLY CO. OF FL

SOUTH FLORIDA WATER MANAGEMENT DISTRICT
ENVIRONMENTAL RESOURCE
STANDARD GENERAL PERMIT NO. 43-01923-P
DATE ISSUED: August 14, 2006

Form #0941
08/95

PERMITTEE: COVE ROAD LAND TRUST
3601 S E OCEAN BLVD STE 005
STUART, FL 34996

PROJECT DESCRIPTION: Construction and operation of a 10.50 acre wetland restoration project known as Cove Road Land Trust Wetland Restoration.

PROJECT LOCATION: MARTIN COUNTY, HANSON GRANT TWP 38S RGE 41E

PERMIT DURATION: See Special Condition No:1. See attached 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. 051103-5, dated November 3, 2005. 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 6) ,
3. the attached 19 Special Conditions (See Pages : 5 - 6 of 6) and
4. the attached 5 Exhibit(s)

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 14th day of August, 2006, in accordance with Section 120.60(3), Florida Statutes.

BY: _____
Anthony M. Waterhouse, P.E.
Director - Surface Water Management
Palm Beach Service Center

Certified mail number 7005 0390 0005 9815 0853

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 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

GENERAL CONDITIONS

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 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.

GENERAL CONDITIONS

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.

SPECIAL CONDITIONS

1. The construction phase of this permit shall expire on August 14, 2006.

2. Operation of the surface water management system shall be the responsibility of the permittee. Prior to transfer of title for any portion of the project to a third party modification of the permit will be required.

3. Discharge Facilities:

   1-1' W X 2' H RECTANGULAR NOTCH with invert at elev. 14' NGVD.
   1-3' Wide X 6.58' Long Type "H" drop inlet with crest at elev. 16' NGVD.

   Receiving body : Coral Gardens Ditch
   Control elev : 14 feet NGVD.

4. 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.

5. Measures shall be taken during construction to insure that sedimentation and/or turbidity violations do not occur in the receiving water.

6. 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.

7. Facilities other than those stated herein shall not be constructed without an approved modification of this permit.

8. 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.

9. 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.

10. This permit is issued based on the applicant's submitted information which reasonably demonstrates that adverse water resource related impacts will not be caused by the completed permit activity. Should any adverse impacts caused by the completed surface water management system occur, the District will require the permittee to provide appropriate mitigation to the District or other impacted party. The District will require the permittee to modify the surface water management system, if necessary, to eliminate the cause of the adverse impacts.

11. Permanent physical markers designating the preserve status of the wetland preservation areas and buffer zones shall be placed at the edge of the upland buffer at the time of application for construction on the uplands of the proposed project. The markers shall be maintained in perpetuity.

12. The wetland restoration areas and upland buffer zones shown on Exhibit No. 2 may in no way be altered from their natural or permitted state. Activities prohibited within the conservation areas include, but are not limited to: construction or placing of buildings on or above the ground; dumping or placing soil or other substances such as trash; removal or destruction of trees, shrubs, or other vegetation - with the exception of exotic vegetation removal; excavation, dredging, or removal of soil materials, with the exception of regrading for restoration activities shown on Exhibit 2; diking or fencing; and any other activities detrimental to drainage, flood control, water conservation, erosion control, or fish and wildlife habitat conservation or preservation.

13. An average 25' wide, minimum 15', buffer of undisturbed upland vegetation shall be maintained between the wetland restoration area and any future proposed development. Buffers shall be staked and roped and

SPECIAL CONDITIONS

District environmental staff notified for inspection prior to clearing.

14. A monitoring program shall be implemented in accordance with Exhibit No. 3. The monitoring program shall extend for a period of 5 years with annual reports submitted to District staff. At the end of the first monitoring period the mitigation area shall contain an 80% survival of planted vegetation. The 80% survival rate shall be maintained throughout the remainder of the monitoring program, with replanting as necessary. If native wetland, transitional, and upland species do not achieve an 80% coverage within the initial two years of the monitoring program, native species shall be planted in accordance with the maintenance program. At the end of the 5 year monitoring program the entire mitigation area shall contain an 80% survival of planted vegetation and an 80% coverage of desirable obligate and facultative wetland species.

15. A maintenance program shall be implemented in accordance with Exhibit No. 3 for the restored wetland and upland buffer areas on a regular basis to ensure the integrity and viability of those areas as permitted. Maintenance shall be conducted in perpetuity to ensure that the conservation areas are maintained free from Category 1 exotic vegetation (as defined by the Florida Exotic Pest Plant Council at the time of permit issuance) immediately following a maintenance activity. Maintenance in perpetuity shall also insure that conservation areas, including buffers, maintain the species and coverage of native, desirable vegetation specified in the permit. Coverage of exotic and nuisance plant species shall not exceed 5% of total cover between maintenance activities. In addition, the permittee shall manage the conservation areas such that exotic/nuisance plant species do not dominate any one section of those areas.

16. The District reserves the right to require remedial measures to be taken by the permittee if monitoring or other information demonstrates that adverse impacts to onsite or offsite wetlands, upland conservation areas or buffers, or other surface waters have occurred due to project related activities.

17. Silt screens, hay bales, turbidity screens/barriers or other such sediment control measures shall be utilized during construction. The selected sediment control measure shall be installed landward of the upland buffer zones around all protected wetlands and shall be properly "trenched" etc, in accordance with Exhibit No. 2. All areas shall be stabilized and vegetated immediately after construction to prevent erosion into the wetlands and upland buffer zones.

18. Activities associated with the implementation of the restoration, monitoring and maintenance plan(s) shall be completed in accordance with the work schedule attached as Exhibit No. 4. Any deviation from these time frames will require prior approval from the District's Environmental Resource Compliance staff. Such requests must be made in writing and shall include (1) reason for the change, (2) proposed start/finish and/or completion dates; and (3) progress report on the status of the project development or mitigation effort.

19. Upon application for construction on the upland portions of the proposed project site, the applicant will submit an executed draft conservation easement (over the wetland restoration area and associated upland buffers) in substantial conformance with Exhibit No. 5, and will record said conservation easement in favor of the District within 60 days of issuance of that permit modification.

40E-4.321 Duration of Permits.

(1) Unless revoked or otherwise modified the duration of an environmental resource permit issued under this chapter or Chapter 40E-40, F.A.C., is as follows:

(a) For a conceptual approval, two years from the date of issuance or the date specified as a condition of the permit, unless within that period an application for an individual or standard general permit is filed for any portion of the project. If an application for an environmental resource permit is filed, then the conceptual approval remains valid until final action is taken on the environmental resource permit application. If the application is granted, then the conceptual approval is valid for an additional two years from the date of issuance of the permit. Conceptual approvals which have no individual or standard general environmental resource permit applications filed for a period of two years shall expire automatically at the end of the two year period.

(b) For a conceptual approval filed concurrently with a development of regional impact (DRI) application for development approval (ADA) and a local government comprehensive plan amendment, the duration of the conceptual approval shall be two years from whichever one of the following occurs at the latest date:

1. The effective date of the local government's comprehensive plan amendment,

2. The effective date of the local government development order,

3. The date on which the District issues the conceptual approval, or

4. The date on which the District issues a final order pertaining to the resolution of any Section 120.57, F.S., administrative proceeding or other legal appeals.

(c) For an individual or standard general environmental resource permit, the construction phase authorizing construction, removal, alteration or abandonment of a system shall expire five years from the date of issuance or such amount of time as made a condition of the permit.

(d) For an individual or standard general environmental resource permit, the operational phase of the permit is perpetual for operation and maintenance.

(e) For a noticed general permit issued pursuant to Chapter 40E-400, F.A.C., five years from the date the notice of intent to use the permit is provided to the District.

(2)(a) Unless prescribed by special permit condition, permits expire automatically according to the timeframes indicated in this rule. If application for extension is made in writing pursuant to subsection (3), the permit shall remain in full force and effect until:

1. The Governing Board takes action on an application for extension of an individual permit, or

2. Staff takes action on an application for extension of a standard general permit.

(b) Installation of the project outfall structure shall not constitute a vesting of the permit.

(3) The permit extension shall be issued provided that a permittee files a written request with the District showing good cause prior to the expiration of the permit. For the purpose of this rule, good cause shall mean a set of extenuating circumstances outside of the control of the permittee. Requests for extensions, which shall include documentation of the extenuating circumstances and how they have delayed this project, will not be accepted more than 180 days prior to the expiration date.

(4) Substantial modifications to Conceptual Approvals will extend the duration of the Conceptual Approval for two years from the date of issuance of the modification. For the purposes of this section, the term "substantial modification" shall mean a modification which is reasonably expected to lead to substantially different water resource or environmental impacts which require a detailed review.

(5) Substantial modifications to individual or standard general environmental resource permits issued pursuant to a permit application extend the duration of the permit for three years from the date of issuance of the modification. Individual or standard general environmental resource permit modifications do not extend the duration of a conceptual approval.

(6) Permit modifications issued pursuant to paragraph 40E-4.331(2)(b), F.A.C. (letter modifications) do not extend the duration of the permit.

(7) Failure to complete construction or alteration of the surface water management system and obtain operation phase approval from the District within the permit duration shall require a new permit authorization in order to continue construction unless a permit extension is granted.

Specific Authority 373.044, 373.113 FS. Law Implemented 373.413, 373.416, 373.419, 373.426 FS. History–New 9-3-81, Amended 1-31-82, 12-1-82, Formerly 16K-4.07(4), Amended 7-1-86, 4-20-94, 10-3-95, 5-28-00.

NOTICE OF RIGHTS

Section 120.569(1), Fla. Stat. (1999), requires that "each notice shall inform the recipient of any administrative hearing or judicial review that is available under this section, s. 120.57, or s. 120.68; shall indicate the procedure which must be followed to obtain the hearing or judicial review, and shall state the time limits which apply." 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.

Petition for Administrative Proceedings

1. A person whose substantial interests are affected by the South Florida Water Management District's (SFWMD) action has the right to request an administrative hearing on that action. The affected person may request either a formal or an informal hearing, as set forth below. A point of entry into administrative proceedings is governed by Rules 28-106.111 and 40E-1.511, Fla. Admin. Code, (also published as an exception to the Uniform Rules of Procedure as Rule 40E-0.109), as set forth below. Petitions are deemed filed upon receipt of the original documents by the SFWMD Clerk.

a. Formal Administrative Hearing: If a genuine issue(s) of material fact is in dispute, the affected person seeking a formal hearing on a SFWMD decision which does or may determine their substantial interests shall file a petition for hearing pursuant to Sections 120.569 and 120.57(1), Fla. Stat. or for mediation pursuant to Section 120.573, Fla. Stat. within 21 days, except as provided in subsections c. and d. below, of either written notice through mail or posting or publication of notice that the SFWMD has or intends to take final agency action. Petitions must substantially comply with the requirements of Rule 28-106.201(2), Fla. Admin. Code, a copy of the which is attached to this Notice of Rights.

b. Informal Administrative Hearing: If there are no issues of material fact in dispute, the affected person seeking an informal hearing on a SFWMD decision which does or may determine their substantial interests shall file a petition for hearing pursuant to Sections 120.569 and 120.57(2), Fla. Stat. or for mediation pursuant to Section 120.573, Fla. Stat. within 21 days, except as provided in subsections c. and d. below, of either written notice through mail or posting or publication of notice that the SFWMD has or intends to take final agency action. Petitions must substantially comply with the requirements of Rule 28-106.301(2), Fla. Admin. Code, a copy of the which is attached to this Notice of Rights.

c. Administrative Complaint and Order: If a Respondent objects to a SFWMD Administrative Complaint and Order, pursuant to Section 373.119, Fla. Stat. (1997), the person named in the Administrative Complaint and Order may file a petition for a hearing no later than 14 days after the date such order is served. Petitions must substantially comply with the requirements of either subsection a. or b. above.

d. State Lands Environmental Resource Permit: Pursuant to Section 373.427, Fla. Stat., and Rule 40E-1.511(3), Fla. Admin. Code (also published as an exception to the Uniform Rules of Procedure as Rule 40E-0.109(2)(c)), a petition objecting to the SFWMD's agency action regarding consolidated applications for Environmental Resource Permits and Use of Sovereign Submerged Lands (SLERPs), must be filed within 14 days of the notice of consolidated intent to grant or deny the SLERP. Petitions must substantially comply with the requirements of either subsection a. or b. above.

e. Emergency Authorization and Order: A person whose substantial interests are affected by a SFWMD Emergency Authorization and Order, has a right to file a petition under Sections 120.569, 120.57(1), and 120.57(2), Fla. Stat., as provided in subsections a. and b. above. However, the person, or the agent of the person responsible for causing or contributing to the emergency conditions shall take whatever action necessary to cause immediate compliance with the terms of the Emergency Authorization and Order.

f. Order for Emergency Action: A person whose substantial interests are affected by a SFWMD Order for Emergency Action has a right to file a petition pursuant to Rules 28-107.005 and 40E-1.611, Fla. Admin. Code, copies of which are attached to this Notice of Rights, and Section 373.119(3), Fla. Stat., for a hearing on the Order. Any subsequent agency action or proposed agency action to initiate a formal revocation proceeding shall be separately noticed pursuant to section g. below.

g. Permit Suspension, Revocation, Annulment, and Withdrawal: If the SFWMD issues an administrative complaint to suspend, revoke, annul, or withdraw a permit, the permittee may request a hearing to be conducted in accordance with Sections 120.569 and 120.57, Fla. Stat., within 21 days of either written notice through mail or posting or publication of notice that the SFWMD has or intends to take final agency action. Petitions must substantially comply with the requirements of Rule 28-107.004(3), Fla. Admin. Code, a copy of the which is attached to this Notice of Rights.

2. Because the administrative hearing process is designed to formulate final agency action, the filing of a petition means that the SFWMD's final action may be different from the position taken by it previously. Persons whose substantial interests may be affected by

any such final decision of the SFWMD shall have, pursuant to Rule 40E-1.511(2), Fla. Admin. Code (also published as an exception to the Uniform Rules of Procedure as Rule 40E-0.109(2)(c)), an additional 21 days from the date of receipt of notice of said decision to request an administrative hearing. However, the scope of the administrative hearing shall be limited to the substantial deviation.

3. Pursuant to Rule 40E-1.511(4), Fla. Admin. Code, substantially affected persons entitled to a hearing pursuant to Section 120.57(1), Fla. Stat., may waive their right to such a hearing and request an informal hearing before the Governing Board pursuant to Section 120.57(2), Fla. Stat., which may be granted at the option of the Governing Board.

4. Pursuant to Rule 28-106.111(3), Fla. Admin. Code, persons may file with the SFWMD a request for extension of time for filing a petition. The SFWMD, for good cause shown, may grant the extension. The request for extension must contain a certificate that the petitioner has consulted with all other parties, if any, concerning the extension and that the SFWMD and all other parties agree to the extension.

CIRCUIT COURT

5. Pursuant to Section 373.617, Fla. Stat., any substantially affected person who claims that final agency action of the SFWMD relating to permit decisions constitutes an unconstitutional taking of property without just compensation may seek judicial review of the action in circuit court by filing a civil action in the circuit court in the judicial circuit in which the affected property is located within 90 days of the rendering of the SFWMD's final agency action.

6. Pursuant to Section 403.412, Fla. Stat., any citizen of Florida may bring an action for injunctive relief against the SFWMD to compel the SFWMD to enforce the laws of Chapter 373, Fla. Stat., and Title 40E, Fla. Admin. Code. The complaining party must file with the SFWMD Clerk a verified complaint setting forth the facts upon which the complaint is based and the manner in which the complaining party is affected. If the SFWMD does not take appropriate action on the complaint within 30 days of receipt, the complaining party may then file a civil suit for injunctive relief in the 15th Judicial Circuit in and for Palm Beach County or circuit court in the county where the cause of action allegedly occurred.

7. Pursuant to Section 373.433, Fla. Stat., a private citizen of Florida may file suit in circuit court to require the abatement of any stormwater management system, dam, impoundment, reservoir, appurtenant work or works that violate the provisions of Chapter 373, Fla. Stat.

DISTRICT COURT OF APPEAL

8. Pursuant to Section 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.

LAND AND WATER ADJUDICATORY COMMISSION

9. A party to a "proceeding below" may seek review by the Land and Water Adjudicatory Commission (FLAWAC) of SFWMD's final agency action to determine if such action is consistent with the provisions and purposes of Chapter 373, Fla. Stat. Pursuant to Section 373.114, Fla. Stat., and Rules 42-2.013 and 42-2.0132, Fla. Admin. Code, a request for review of (a) an order or rule of the SFWMD must be filed with FLAWAC within 20 days after rendition of the order or adoption of the rule sought to be reviewed; (b) an order of the Department of Environmental Protection (DEP) requiring amendment or repeal of a SFWMD rule must be filed with FLAWAC within 30 days of rendition of the DEP's order, and (c) a SFWMD order entered pursuant to a formal administrative hearing under Section 120.57(1), Fla. Stat., must be filed no later than 20 days after rendition of the SFWMD's final order. Simultaneous with filing, a copy of the request for review must be served on the DEP Secretary, any person named in the SFWMD or DEP final order, and all parties to the proceeding below. A copy of Rule 42-2.013, Fla. Admin. Code is attached to this Notice of Rights.

PRIVATE PROPERTY RIGHTS PROTECTION ACT

10. A property owner who alleges a specific action of the SFWMD has inordinately burdened an existing use of the real property, or a vested right to a specific use of the real property, may file a claim in the circuit court where the real property is located within 1 year of the SFWMD action pursuant to the procedures set forth in Subsection 70.001(4)(a), Fla. Stat.

LAND USE AND ENVIRONMENTAL DISPUTE RESOLUTION

11. A property owner who alleges that a SFWMD development order (as that term is defined in Section 70.51(2)(a), Fla. Stat. to include permits) or SFWMD enforcement action is unreasonable, or unfairly burdens the use of the real property, may file a request for relief with the SFWMD within 30 days of receipt of the SFWMD's order or notice of agency action pursuant to the procedures set forth in Subsections 70.51(4) and (6), Fla. Stat.

MEDIATION

12. A person whose substantial interests are, or may be, affected by the SFWMD's action may choose mediation as an alternative remedy under Section 120.573, Fla. Stat. Pursuant to Rule 28-106.111(2), Fla. Admin. Code, the petition for mediation shall be filed within 21 days of either written notice through mail or posting or

publication of notice that the SFWMD has or intends to take final agency action. Choosing mediation will not affect the right to an administrative hearing if mediation does not result in settlement.

Pursuant to Rule 28-106.402, Fla. Admin. Code, the contents of the petition for mediation shall contain the following information:

(1) the name, address, and telephone number of the person requesting mediation and that person's representative, if any;

(2) a statement of the preliminary agency action;

(3) an explanation of how the person's substantial interests will be affected by the agency determination; and

(4) a statement of relief sought.

As provided in Section 120.573, Fla. Stat. (1997), the timely agreement of all the parties to mediate will toll the time limitations imposed by Sections 120.569 and 120.57, Fla. Stat., for requesting and holding an administrative hearing. Unless otherwise agreed by the parties, the mediation must be concluded within 60 days of the execution of the agreement. If mediation results in settlement of the dispute, the SFWMD must enter a final order incorporating the agreement of the parties. Persons whose substantial interest will be affected by such a modified agency decision have a right to petition for hearing within 21 days of receipt of the final order in accordance with the requirements of Sections 120.569 and 120.57, Fla. Stat., and SFWMD Rule 28-106.201(2), Fla. Admin. Code. If mediation terminates without settlement of the dispute, the SFWMD shall notify all parties in writing that the administrative hearing process under Sections 120.569 and 120.57, Fla. Stat., remain available for disposition of the dispute, and the notice will specify the deadlines that then will apply for challenging the agency action.

VARIANCES AND WAIVERS

13. A person who is subject to regulation pursuant to a SFWMD rule and believes the application of that rule will create a substantial hardship or will violate principles of fairness (as those terms are defined in Subsection 120.542(2), Fla. Stat.) and can demonstrate that the purpose of the underlying statute will be or has been achieved by other means, may file a petition with the SFWMD Clerk requesting a variance from or waiver of the SFWMD rule. Applying for a variance or waiver does not substitute or extend the time for filing a petition for an administrative hearing or exercising any other right that a person may have concerning the SFWMD's action. Pursuant to Rule 28-104.002(2), Fla. Admin. Code, the petition must include the following information:

(a) the caption shall read:
Petition for (Variance from) or (Waiver of) Rule (Citation)

(b) The name, address, telephone number and any facsimile number of the petitioner;

(c) The name, address telephone number and any facsimile number of the attorney or qualified representative of the petitioner, (if any);

(d) the applicable rule or portion of the rule;

(e) the citation to the statue the rule is implementing;

(f) the type of action requested;

(g) the specific facts that demonstrate a substantial hardship or violation of principals of fairness that would justify a waiver or variance for the petitioner;

(h) the reason why the variance or the waiver requested would serve the purposes of the underlying statute; and

(i) a statement of whether the variance or waiver is permanent or temporary, If the variance or waiver is temporary, the petition shall include the dates indicating the duration of the requested variance or waiver.

A person requesting an emergency variance from or waiver of a SFWMD rule must clearly so state in the caption of the petition. In addition to the requirements of Section 120.542(5), Fla. Stat. pursuant to Rule 28-104.004(2), Fla. Admin. Code, the petition must also include:

a) the specific facts that make the situation an emergency; and

b) the specific facts to show that the petitioner will suffer immediate adverse effect unless the variance or waiver is issued by the SFWMD more expeditiously than the applicable timeframes set forth in Section 120.542, Fla. Stat.

WAIVER OF RIGHTS

14. Failure to observe the relevant time frames prescribed above will constitute a waiver of such right.

28-106.201 INITIATION OF PROCEEDINGS
(INVOLVING DISPUTED ISSUES OF MATERIAL FACT)

(2) All petitions filed under these rules shall contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding, and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of when and how the petitioner received notice of the agency decision;

(d) A statement of all disputed issues of material fact. If there are none, the petition must so indicate;

(e) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and

(f) A demand for relief.

28-106.301 INITIATION OF PROCEEDINGS
(NOT INVOLVING DISPUTED ISSUES OF MATERIAL FACT)

(2) All petitions filed under these rules shall contain:

(a) The name and address of each agency affected and each agency's file or identification number, if known;

(b) The name, address, and telephone number of the petitioner; the name, address, and telephone number of the petitioner's representative, if any, which shall be the address for service purposes during the course of the proceeding, and an explanation of how the petitioner's substantial interests will be affected by the agency determination;

(c) A statement of when and how the petitioner received notice of the agency decision;

(d) A concise statement of the ultimate facts alleged, as well as the rules and statutes which entitle the petitioner to relief; and

(e) A demand for relief.

28-107.004 SUSPENSION, REVOCATION, ANNULMENT, OR WITHDRAWAL

(3) Requests for hearing filed in accordance with this rule shall include:

(a) The name and address of the party making the request, for purposes of service;

(b) A statement that the party is requesting a hearing involving disputed issues of material fact, or a hearing not involving disputed issues of material fact; and

(c) A reference to the notice, order to show cause, administrative complaint, or other communication that the party has received from the agency.

42-2.013 REQUEST FOR REVIEW PURSUANT TO SECTION 373.114 OR 373.217

(1) In any proceeding arising under Chapter 373, F.S., review by the Florida Land and Water Adjudicatory Commission may be initiated by the Department or a party by filing a request for such review with the Secretary of the Commission and serving a copy on any person named in the rule or order, and on all parties to the proceeding which resulted in the order sought to be reviewed. A certificate of service showing completion of service as required by this subsection shall be a requirement for a determination of sufficiency under Rule 42-2.0132. Failure to file the request with the Commission within the time period provided in Rule 42-2.0132 shall result in dismissal of the request for review.

(2) The request for review shall identify the rule or order requested to be reviewed, the proceeding in which the rule or order was entered and the nature of the rule or order. A copy of the rule or order sought to be reviewed shall be attached. The request for review shall state with particularity:

(a) How the order or rule conflicts with the requirements, provisions and purposes of Chapter 373, F.S., or rules duly adopted thereunder;

(b) How the rule or order sought to be reviewed affects the interests of the party seeking review;

(c) The oral or written statement, sworn or unsworn, which was submitted to the agency concerning the matter to be reviewed and the date and location of the statement, if the individual or entity requesting the review has not participated in a proceeding previously instituted pursuant to Chapter 120, F.S., on the order for which review is sought;

(d) If review of an order is being sought, whether and how the activity authorized by the order would substantially affect natural resources of statewide or regional significance, or whether the order raises issues of policy, statutory interpretation, or rule interpretation that have regional or statewide significance from a standpoint of agency precedent, and all the factual bases in the record which the petitioner claims support such determination(s); and

(e) The action requested to be taken by the Commission as a result of the review, whether to rescind or modify the order, or remand the proceeding to the water management district for further action, or to require the water management district to initiate rulemaking to adopt, amend or repeal a rule.

28-107.005 EMERGENCY ACTION

(1) If the agency finds that immediate serious danger to the public health, safety, or welfare requires emergency action, the agency shall summarily suspend, limit, or restrict a license.

(2) the 14-day notice requirement of Section 120.569(2)(b), F. S., does not apply and shall not be construed to prevent a hearing at the earliest time practicable upon request of an aggrieved party.

(3) Unless otherwise provided by law, within 20 days after emergency action taken pursuant to paragraph (1) of this rule, the agency shall initiate a formal suspension or revocation proceeding in compliance with Sections 120.569, 120.57. and 120.60, F.S.

40E-1.611 EMERGENCY ACTION

(1) An emergency exists when immediate action is necessary to protect public health, safety or welfare; the health of animals, fish or aquatic life; the works of the District; a public water supply, or recreational, commercial, industrial, agricultural or other reasonable uses of land and water resources.

(2) The Executive Director may employ the resources of the District to take whatever remedial action necessary to alleviate the emergency condition without the issuance of an emergency order, or in the event an emergency order has been issued, after the expiration of the requisite time for compliance with that order.

Last Date For Agency Action: 14-AUG-2006

GENERAL ENVIRONMENTAL RESOURCE PERMIT STAFF REPORT

Project Name: Cove Road Land Trust (Crlt) Wetlands Restoration

Permit No.: 43-01923-P

Application No.: 051103-5

Application Type: Environmental Resource (New General Permit)

Location: Martin County, HANSON GRANT T38S/R41E

Permittee : Cove Road Land Trust

Operating Entity : Permittee

Project Area: 10.5 acres

Project Land Use: Environmentally Sensitive
Residential
Commercial

Drainage Basin: TIDAL ST LUCIE

Receiving Body: Coral Gardens Ditch **Class:** CLASS III

Special Drainage District: NA

Total Acres Wetland Onsite: 10.50
Total Acres Wetland Preserved Onsite: 10.50

Total Acres Presv/Mit Compensation Onsite: 10.50

Conservation Easement To District : No
Sovereign Submerged Lands: No

PROJECT PURPOSE:

This application is a request for an Environmental Resource Permit to authorize wetland enhancement activities over 10.50 acres of existing wetlands.

PROJECT EVALUATION:

PROJECT SITE DESCRIPTION:

The site is located on the northeast corner of the intersection of Cove Road and Willoughby Boulevard in Martin County (Exhibit No. 1). The site contains 35.20 acres of undeveloped, naturally vegetated land. There are no permitted surface water management facilities within the proposed project area. The site contains a total of 9.87 acres of freshwater wetlands with varying degrees of exotic and nuisance species infestation and one 0.63 acre ditch that is adjacent to Wetland A and is classified as an other surface water. The proposed project will restore all wetland and other surface water areas onsite.

PROPOSED PROJECT:

Authorization has been requested for enhancement and restoration activities over 10.50 acres of wetlands and other surface waters on the proposed project site known as Cove Road Land Trust (CRLT) Wetland Restoration. The proposed restoration consists of re-grading all 10.50 acres of existing onsite wetlands and other surface water and re-planting with desirable native wetland vegetation. Additionally, the applicant proposes to install a control structure at the north end of the property that will maintain the hydrology within the restored wetland area (Exhibit No. 2).

The control structure consists of a FDOT "H" inlet with a rim elevation of 16' NGVD connected at the south end of the existing twin 19" by 30" RCP culverts under the roadway dividing the site from Martin Memorial Hospital. The inlet will have a 1' wide weir cut in the upstream face with a crest elevation of 14' NGVD. The existing wetland will be lowered from the center grade of approximately 15' NGVD to a design center grade of 12' NGVD. This will increase the basin storage by approximately 1' over the wetland area. The wetland was modeled to include inflows from Summerfield basins B and B-1 from the south as well as Cove Road and a future development portion of the CRLT site.

WATER QUANTITY :

The applicants engineer evaluated the 3 year-1 day, 25 year and 100 year - 3 day storm events for the site and adjacent hydraulically connected basins. The Summerfield Golf Club - Drainage Redirect (Application no. 000320-1) indicates a design flow (25-3) to the north from Basin B North of 3.42 cfs with a design stage of 17.51' NGVD. The analysis prepared with this application for the pre-CRLT weir scenario indicates a peak stage of 17.78' NGVD within Summerfield Basin B and a peak discharge of 6.1 cfs. The flood routing was adjusted for post development conditions reflecting; 1) excavation of the 10 acre CRLT wetland approximately 2' deeper than the existing condition, 2) addition of the FDOT "H" inlet control structure on the north side of the CRLT wetland, and 3) separation of CRLT into an assumed developed basin and wetland basin. The post development results as compared to the pre-wetland enhancement weir indicated that weir would not obstruct flows from the upstream Summerfield Basin B.

Design peak stages within the CRLT wetland were calculated to slightly rise from 16.18' in the present condition to 16.34' at the completion of the proposed enhancement. The peak discharge in the existing condition case is 29 cfs which will be reduced to 14.6 cfs as a result of the project. The 14.6 cfs compares favorably to the engineering studies of the Coral Gardens Ditch.

Off-site inflows into the CRLT site were identified as; 8.52 cfs from the low flow portion of the 182-acre Summerfield Basin B, 19.5 cfs from the 22.1-acre Summerfield Basin B-1, 4.4 cfs from the 15.82-acre Cove Road Future, and 28.3 cfs from the 20.93-acre CRLT assumed (future) development area. The CRLT wetland attenuates these peak flows to the above mentioned 14.6 cfs.

Discharge Rate :

The proposed project includes a water level control structure for wetland enhancement and will result in a reduction of downstream discharge. A control structure will be constructed on the south ends of the existing twin 19" by 30" RCP culverts located adjacent to the midpoint of the north property line of the

project.

Discharge Storm Frequency : 25 YEAR-3 DAY Design Rainfall : 10.9 inches

Basin	Allow Disch (cfs)	Method Of Determination	Peak Disch (cfs)	Peak Stage (ft, NGVD)
CRLT wetland	14.6	Pre Vs Post	14.6	16.34

Finished Floors :

Basin	Peak Stage (ft, NGVD)	Proposed Min. Finished Floors (ft, NGVD)	FEMA Elevation (ft, NGVD)
CRLT wetland	16.72	N/A	N/A

Control Elevation :

Basin	Area (Acres)	Ctrl Elev (ft, NGVD)	WSWT Ctrl Elev (ft, NGVD)	Method Of Determination
CRLT wetland	10.00	14	14.00	Wetland Indicator Elevation

Receiving Body :

Basin	Str.#	Receiving Body
Crlt Wetland	CS 1	Coral Gardens Ditch

Other Structures: Note: The units for all the elevation values of structures are (ft, NGVD)

Bleeders:

Basin	Str#	Count	Type	Width	Height	Length	Dia.	Invert Angle	Invert Elev.
CRLT wetland	CS 1	1	Rectangular Notch	1'	2'				14

Inlets:

Basin	Str#	Count	Type	Width	Length	Dia.	Crest Elev.
CRLT wetland	CS 1	1	Inlet	3'	6.58'		16

WATER QUALITY :

No adverse water quality impacts are anticipated as a result of the proposed project.

Best management practices will be utilized during construction. Silt screens, hay bales, turbidity screens/barriers or other such sediment control measures shall be utilized during construction. The selected sediment control measure shall be installed landward of the upland buffer zones around all protected wetlands and shall be properly "trenched" etc, in accordance with Exhibit No. 2. All areas shall be stabilized and vegetated immediately after construction to prevent erosion into the wetlands and upland buffer zones.

WETLANDS:

There are 9.87 acres of wetlands on the proposed project site. Wetland A is 9.71 acres in size and is dominated by exotic and nuisance species such as Brazilian pepper, melaleuca, and extensive coverage of old world climbing fern. Wetlands B (0.13 acre) and C (0.03 acre) have significantly less coverage of exotic species and consist of small amounts of old world climbing fern, as well as native wetland species such as broomgrass, wax myrtle, and beakrush. There is also a ditch running north/south along the western edge of Wetland A. This ditch is classified as an other surface water and is 0.63 acre in size.

The proposed project consists of restoration activities within all 10.50 acres of wetlands and other surface waters. The proposed plan will regrade the wetland areas to promote a hydrologic regime that will support desirable native wetland species (Exhibit No. 2). Once grading activities are completed, the applicant proposes to plant the wetland areas with desirable native wetland plant species in accordance with the planting plan shown on Exhibit No. 2. Additionally, the applicant will install a control structure at the north end of the proposed wetland restoration to ensure that the wetland restoration area maintains adequate hydrology. The applicant will monitor the proposed restoration area to ensure success of the restored wetlands in accordance with the monitoring plan and monitoring stations in Exhibit Nos. 2 and 3, and the work schedule in Exhibit No. 4. The applicant will be responsible for the maintenance of the wetland restoration area in perpetuity (see Special Conditions). The wetland restoration activities described in this permit are being performed by the applicant and are not proposed, and cannot be used, as mitigation for any other project involving wetland impacts.

Wetland Inventory :

CONSTRUCTION NEW -COVE ROAD LAND TRUST WETLAND RESTORATION

Site Id	Site Type	Pre-Development				Post-Development						
		Pre Fluc cs	AA Type	Acreage (Acres)	Current Wo Pres	With Project	Time Lag (Yrs)	Risk Factor	Pres. Adj. Factor	Post Fluccs	Adj Delta	Functional Gain / Loss
R1	ON	619	Restoration/Creation	10.50						641		
			Total:	10.50								

Fluccs Code	Description
619	Melaleuca - Brazilian Pepper - Exotics Hardwoods
641	Freshwater Marshes

LEGAL ISSUES:

There is no construction proposed on the uplands of the proposed project site at this time; however, the applicant has indicated that construction plans will be submitted in the future. At the time of any modification for construction on the uplands of the proposed project site, the applicant will provide an upland buffer of a minimum 15 feet, average 25' wide to avoid secondary impacts (see Special Conditions). Additionally, the applicant will record a conservation easement in favor of the District over the onsite wetlands and wetland buffer areas prior to the commencement of any type of construction on the uplands of the proposed project site (see Special Conditions). The conservation easement will be in substantial conformance with the District's Standard Conservation Easement, shown in Exhibit No. 5.

The project relates to a Settlement Agreement between Martin County and Cove Road Land Trust, L.L.C.

(CRLT) executed February 1, 2006. Limitations of discharge rates and storage volume within the CRLT site, set forth within the Settlement Agreement, appear to be exceeded in favor of Martin County (more inflows into the CRLT site that specified).

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-4361(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 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.

RELATED CONCERNS:

Water Use Permit Status:

The applicant has indicated that neither irrigation nor dewatering is required for construction of 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, unless the work qualifies for a No-Notice Short-Term Dewatering permit pursuant to Chapter 40E-20.302(3) or is exempt pursuant to Section 40E-2.051, FAC.

Right-Of-Way Permit Status:

A Right-of-Way Permit is not required for this project.

DRI Status:

This project is not a DRI.

Historical/Archeological Resources:

No information has been received that indicates the presence of archaeological or historical resources or that the proposed activities could cause adverse impacts to archaeological or historical resources.

DCA/CZM Consistency Review:

The District has not received a finding of inconsistency from the Florida Department of Environmental Protection or other commenting agencies regarding the provisions of the federal Coastal Zone Management Plan.

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:

DIVISION APPROVAL:

NATURAL RESOURCE MANAGEMENT:

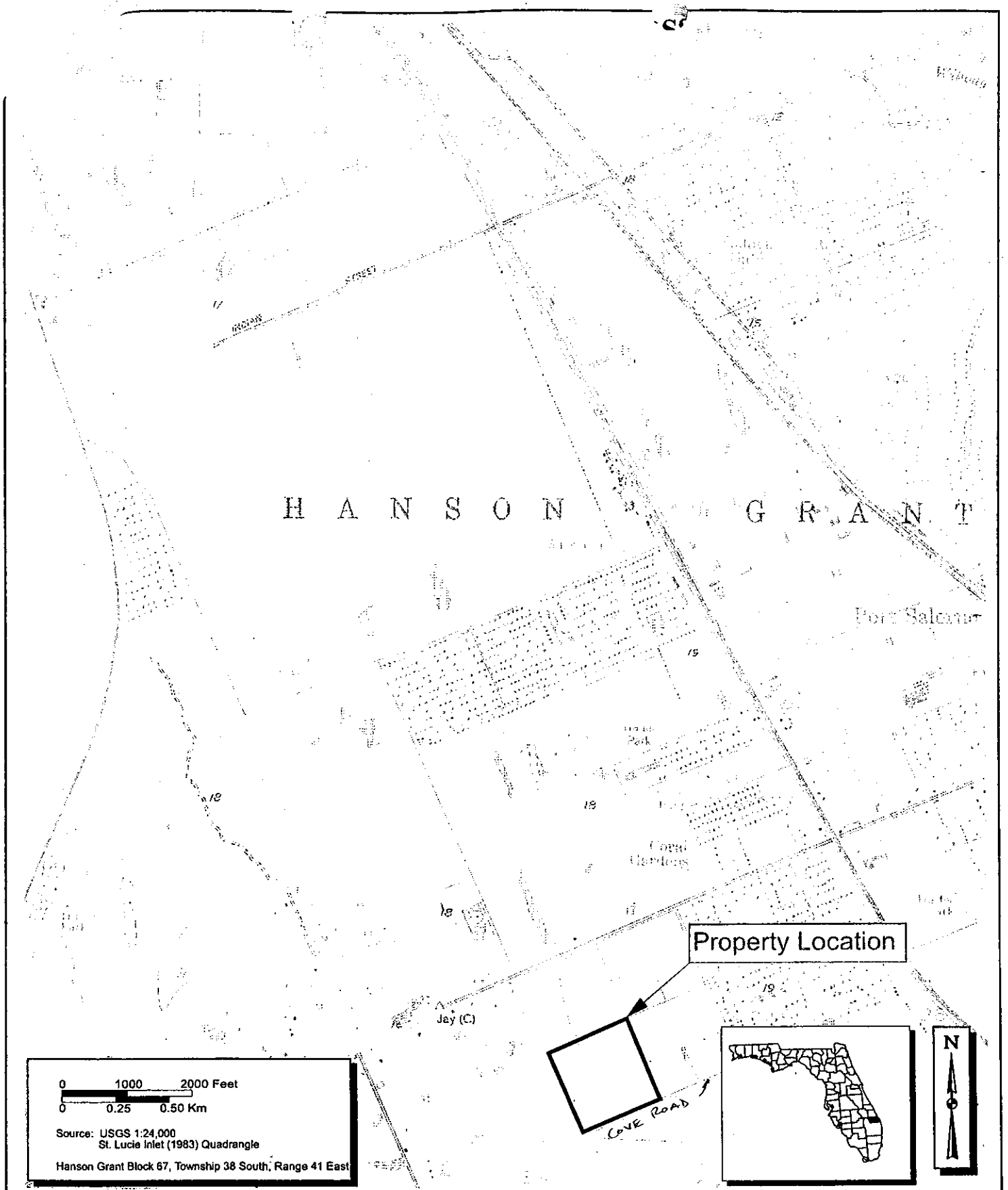
John A. Meyer

DATE: 8/14/06

SURFACE WATER MANAGEMENT:

Hugo A. Carter, P.E.

DATE: 14 Aug 06

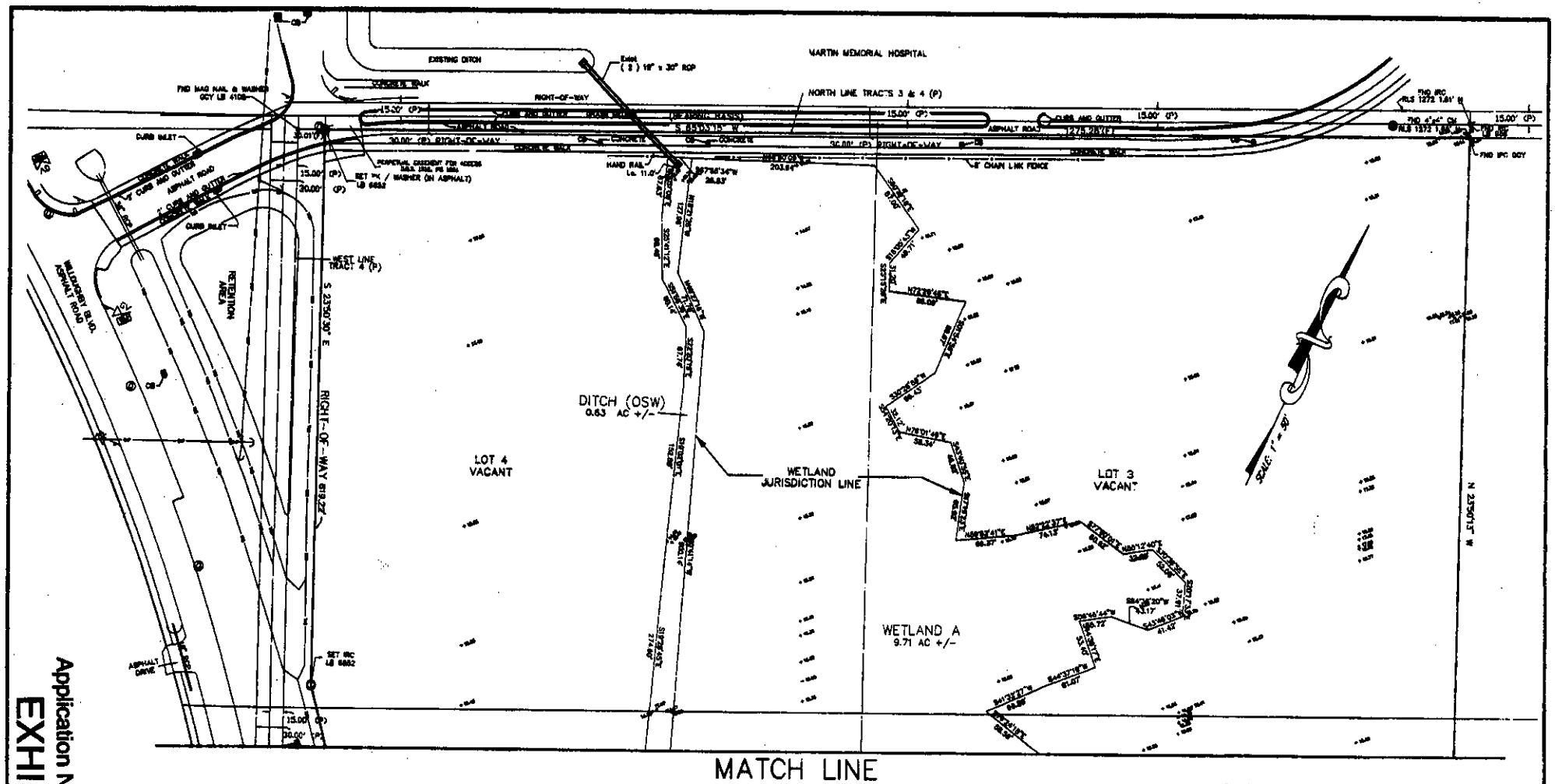


ENVIRONMENTAL SERVICES, INC.

Location/Topographic Map
Cove Road Wetland Delineation
Martin County, Florida

Figure:	1
Project:	EP04001
Date:	Jan. 2004

Exhibit 1



General Notes

1. This base map is a combination of a 2/04/97 Boundary Survey with topography prepared by Keith and Schnars, P.A. and a 3/02/98 Boundary Survey with wetlands jurisdiction prepared by Betsey Lindsay Inc. Both documents were prepared for Cove Road Land Trust. Evergreen Engineering, Inc assembled the composite base map, and added salient information to the south from Cove Road record drawings and to subsurfaces information to the north from W Dingeldey Boulevard record drawings.

2. The wetlands jurisdiction line is reported by Betsey Lindsay Inc as flagged by Environmental Services, Inc on February 10, 2005. Environmental Services, Inc reports areas reviewed in the field with SFWMD staff prior to being surveyed.

3. The 50' upland buffer line on the west side of the wetland is added to compliance wetland protection requirements of Martin County land development code. The east side buffer will be provided in the future in association with a development permit.

4. All elevations N.G.V.D.

ADD/REVISED SUBMITTAL

JUN 1 8 2008

#051103 5#

Application No. 051103-5

EXHIBIT 2-A

CRLT WETLAND RESTORATION

MARTIN COUNTY FLORIDA

EVERGREEN ENGINEERING, INC.
300 North Colorado Avenue, Stuart, FL 34994
Phone (772) 223-1005 Fax (772) 781-0519

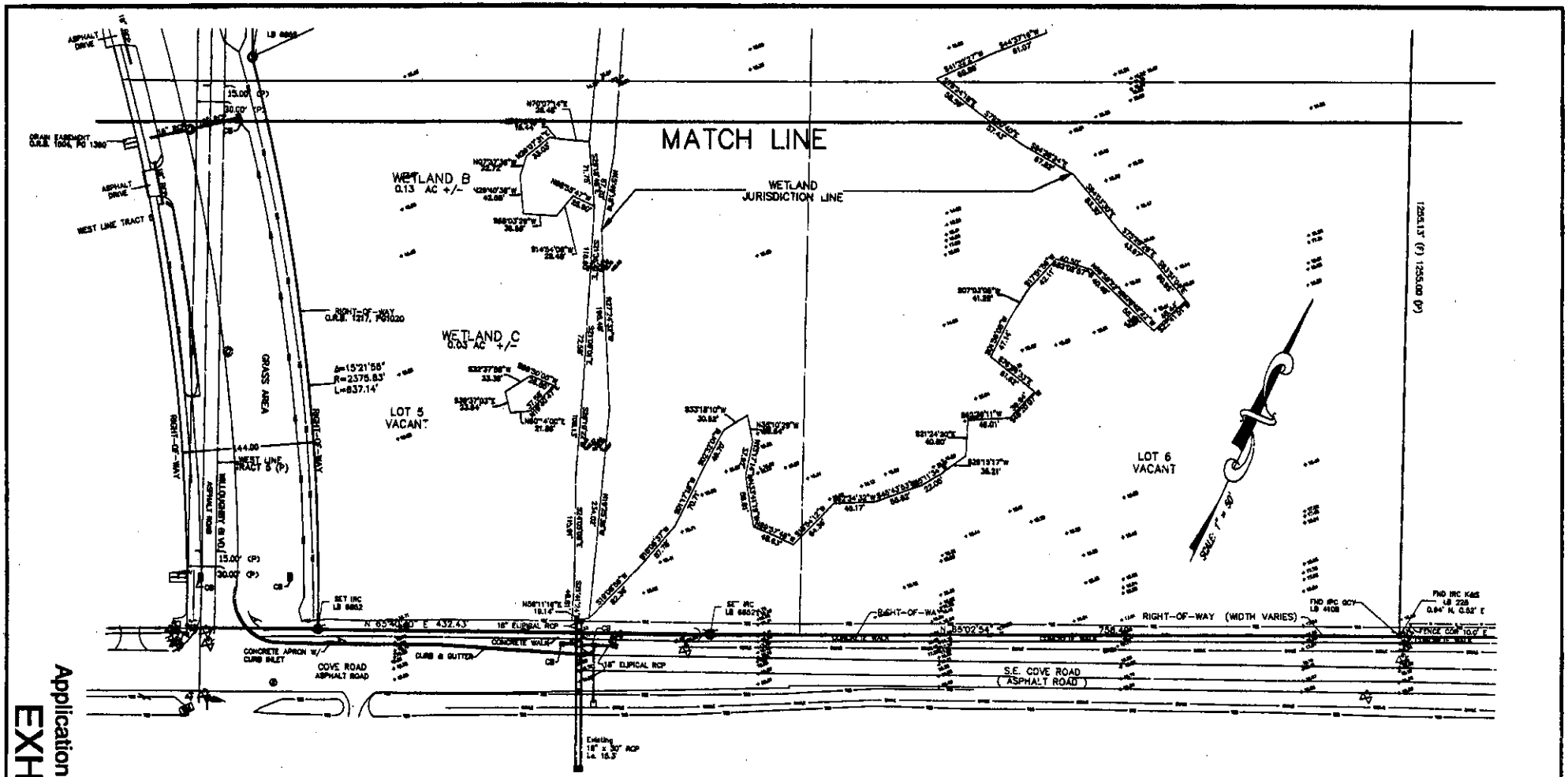
SEAL

NO.	DATE	REVISION	BY

BASE MAP (NORTH)

SCALE	DATE
1" = 50'	01-04-06
DRAWN BY DSA	DESIGN BY JKH
JOB NUMBER	

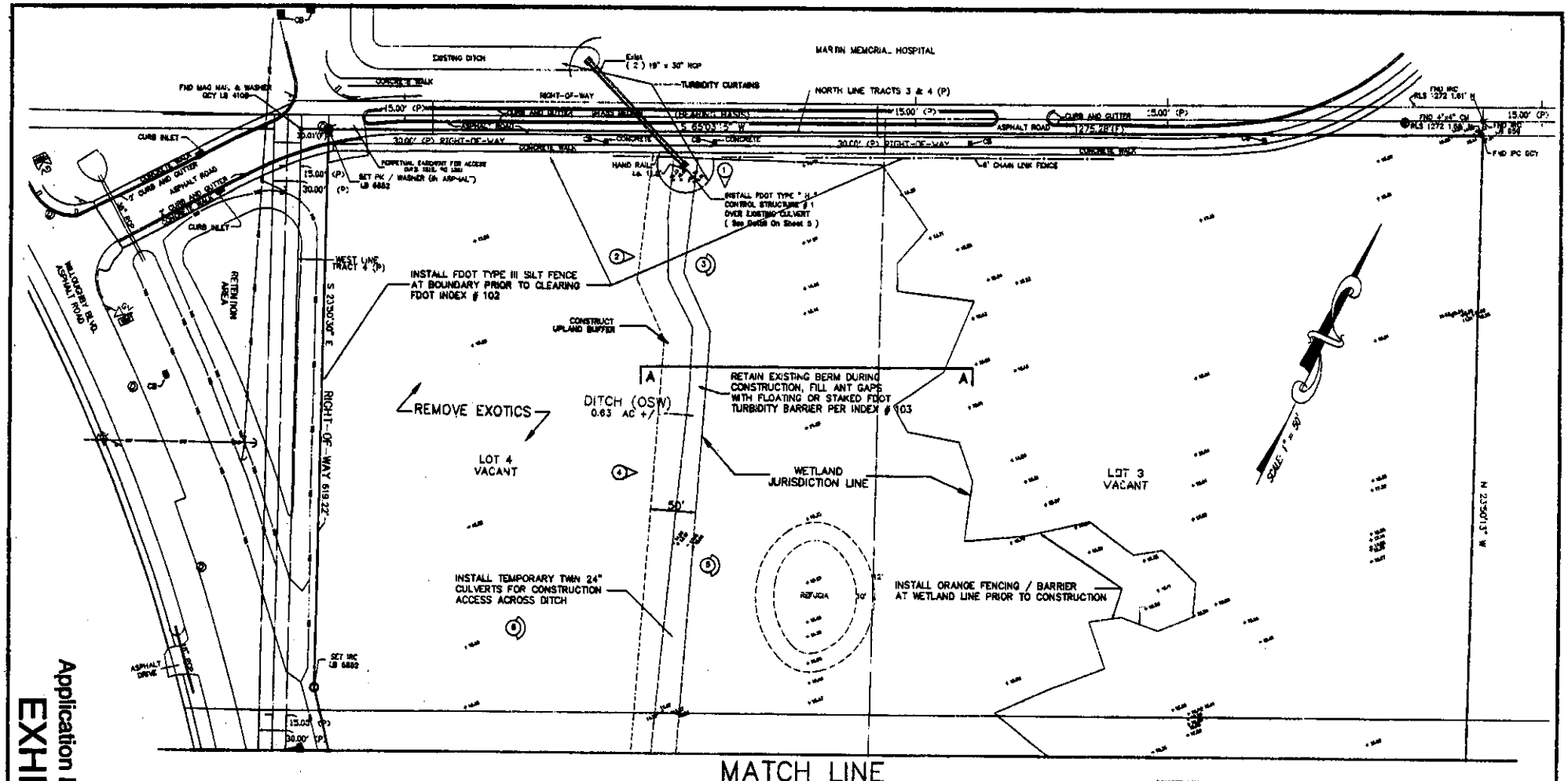
SHEET NO. 1 OF 5



Application No. 051103-5

EXHIBIT 2-B

CRLT WETLAND RESTORATION MARTIN COUNTY FLORIDA	EVERGREEN ENGINEERING, INC. 300 North Colorado Avenue, Stuart, FL 34994 Phone (772) 223-1005 Fax (772) 781-0519	SEAL 7/7/06	NO. / DATE / REVISION / BY	BASE MAP (SOUTH) SCALE 1" = 50' DATE 01-04-06 DRAWN BY CSA DESIGN BY JEH JOB NUMBER	SHEET NO. 2 of 5



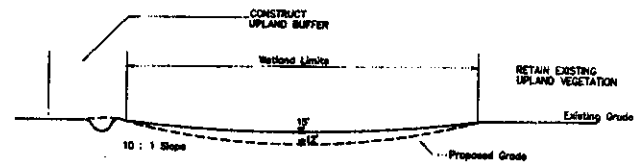
TURBIDITY AND EROSION CONTROLS

Silt screens are required surrounding the top of the bank of excavations for installing control structures, and turbidity curtains are required across both up stream and downstream conveyance for some.

PHOTO LEGEND

Single Photo Monitoring Location

Panoramic Photo Monitoring Location



SECTION A - A
NTS

Application No. 051103-5

EXHIBIT 2-C

CRLT WETLAND RESTORATION

MARTIN COUNTY FLORIDA

EVERGREEN ENGINEERING, INC.
300 NORTH COLORADO AVENUE, STUART, FL 34994
PHONE (772) 223-1005 FAX (772) 781-0519

SEAL

NO.	DATE	REVISION	BY
1	4/21/06	Turbidity & Erosion Controls	JGH
2	7/7/06	Remove South Control Structure	JGH

WETLAND RESTORATION PLAN (NORTH)

SCALE 1" = 50' | DATE 01-04-06 | DRAWN BY DSA | DESIGN BY JGH | JOB NUMBER | SHEET NO. 3 OF 5

MATCH LINE

WETLAND JURISDICTION LINE

CONSTRUCT UPLAND BUFFER

REMOVE EXOTICS

RETAIN EXISTING BERM DURING CONSTRUCTION, FILL ANT GAPS WITH FLOATING OR STAKED FDOT TURBIDITY BARRIER PER INDEX # 103

INSTALL ORANGE FENCING / BARRIER AT WETLAND LINE PRIOR TO CONSTRUCTION

INSTALL FDOT TYPE III SILT FENCE AT BOUNDARY PRIOR TO CLEARING FDOT INDEX # 102

RETAIN + 30 EXISTING DITCH FOR CONVEYANCE TO RESTORED WETLANDS

LOT 5 VACANT

LOT 6 VACANT

REFUGIA

GRASS AREA

RIGHT-OF-WAY (WIDTH VARIES)

S.E. COVE ROAD (ASPHALT ROAD)

COVE ROAD ASPHALT ROAD

CONCRETE APRON W/ CURB INLET

CURB & GUTTER

TURBIDITY CURTAINS

Existing 79" x 32" RCP

SCALE: 1" = 50'

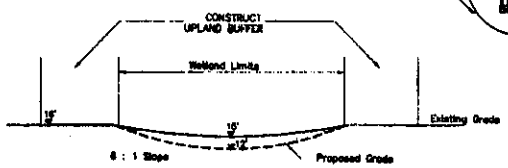
TURBIDITY AND EROSION CONTROLS

Silt screens are required surrounding the top of the bank of excavations for installing control structures, and turbidity curtains are required across both up stream and downstream conveyance for same.

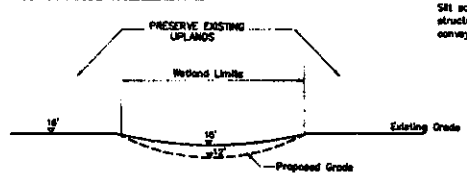
PHOTO LEGEND

Single Photo Monitoring Location

Panoramic Photo Monitoring Location



SECTION B - B
NTS



SECTION C - C
NTS

Application No. 051103-5

EXHIBIT 2-D

CRLT WETLAND RESTORATION

MARTIN COUNTY FLORIDA

EVERGREEN ENGINEERING, INC.
300 North Colorado Avenue, Stuart, FL 34994
Phone (772) 223-1005 Fax (772) 781-0519

SEAL

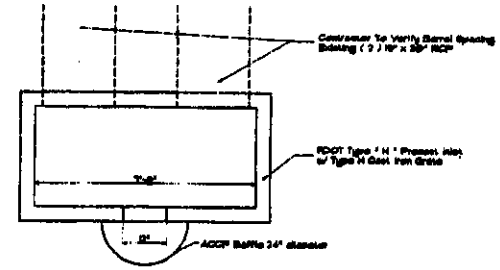
NO.	DATE	REVISION	BY
1	4/21/06	Turbidity & Erosion Controls	JGH
2	7/7/06	Remove South Control Structure	JGH

WETLAND RESTORATION PLAN (SOUTH)

SCALE 1" = 50' | DATE 01-04-06 | SHEET NO. 4 OF 5

DRAWN BY DSA | DESIGN BY JGH

JOB NUMBER



③ CONTROL STRUCTURE 1 PLAN VIEW

Not To Scale

④ CONTROL STRUCTURE 1 ELEVATION VIEW

Not To Scale

Plant List - Restoration Summary

Species	Common Name	Size	Spacing	Planting Elevation (NGVD)	Total Units
Wetlands					
Scirpus validus	Bulrush	Bareroot	2 O.C.	Below Elev. 13.5	2000
Spartina bakeri	Cord grass	Bareroot	18" O.C.	Elev. 15.0 to 13.5	6000
Pontederia cordata	Pickerel weed	Bareroot	2 O.C.	Below Elev. 14.0	15,000
Sagittaria lancifolia	Duck Potato	Bareroot	2 O.C.	Below Elev. 14.0	2000
Nymphaea odorata	White Water lily	rhizomes	6 O.C.	Below Elev. 13.0	500
Juncus effusus	Soft rush	Bareroot	18" O.C.	Elev. 15.0 to 13.5	3700
Eleocharis interstincta	Spike rush	Bareroot	2 O.C.	Below Elev. 13.5	27,000
Thalia geniculata	Fireflag	Bareroot	3' O.C.	Below Elev. 13.5	7000
Cephalanthus occidentalis	Buttonbush	1 gallon	6 O.C.	Elev. 15.0 to 14.0	300
Upland Buffer					
Pinus elliotti 'densa'	South Slash Pine	3 gallon	7 O.C.	Above Elev. 15.5	180
Pinus elliotti 'densa'	South Slash Pine	7 gallon	7 O.C.	Above Elev. 15.5	210
Quercus virginiana	Live Oak	7 gallon	9 O.C.	Above Elev. 15.5	93
Chrysobalanus icaco	Cocoplum	3 gallon	6 O.C.	Above Elev. 15.5	1350
Callicarpa americana	Beauty Berry	1 gallon	4 O.C.	Above Elev. 15.5	450
Eragrostis spectabilis	Love grass	Liner	18" O.C.	Elev. 15.0 to 16.0	1,000
Amphicarpum muhlenbergia	Blue Maidencane	Liner	18" O.C.	Elev. 15.0 to 16.5	2,500
Sporobolus virginicus	Finleand Dropseed	Liner	18" O.C.	Above Elev. 15.5	1,000
Muhlenbergia capillaris	Muhly grass	1 gallon	2 O.C.	Above Elev. 15.5	600
Spartina bakeri	Cord grass	Bareroot	18" O.C.	Elev. 15.0 to 15.5	5,000

Application No. 051103-5

EXHIBIT 2-E

CRLT WETLAND RESTORATION

MARTIN COUNTY FLORIDA

EVERGREEN ENGINEERING, INC.
300 NORTH COLORADO AVENUE, STUART, FL 34994
PHONE (772) 223-1005 FAX (772) 781-0519

SEAL

NO.	DATE	REVISION	BY
1	4/21/06	Turbidity & Erosion Controls	JKH
2	7/7/06	Remove South Control Structure	JKH

DETAIL SHEET

SCALE 1" = 5'-0" | DATE 01-04-06 | DRAWN BY DBA | DESIGN BY JKH | JOB NUMBER | DEL NO.

RECEIVED
JUN 15 2006

Stormwater System Maintenance and Monitoring Plan

Cove Road Land Trust Wetlands Restoration

May 2006

The site construction plans are designed to remove exotic vegetation, adjust wetlands grading to assure permanent inundation, plant an emergent marsh, and plant a 50' upland buffer along the west side of the wetlands. Two control structures will increase detention time in wetlands south of Cove Road and in the restored wetlands north of Cove Road. The area of uplands west of the wetlands from which exotics are removed will be graded and hydroseeded for cover.

A construction schedule is shown below. Baseline monitoring will take place within 30 days of construction completion. The baseline monitoring report date will become the annual report date for subsequent monitoring reports.

Regular maintenance will be done in accordance with the attached work schedule. Exotic vegetation will be removed, and the upland buffer and wetlands maintained exotic free. No more than 5% exotic and nuisance plant coverage will be allowed between maintenance events.

Monthly maintenance consists of visual inspection of all planted areas for erosion. If erosion is discovered it must be immediately corrected and fresh sod or mulch as appropriate placed over the repairs. Maintenance of the upland buffers and restored wetlands will be conducted in perpetuity to maintain these areas free of exotic and nuisance vegetation as defined by the Florida Exotic Pest Plant Council.

Monitoring will be conducted annually for six years, or longer if necessary to achieve success of wetland and upland buffer restoration. A baseline monitoring report will be prepared upon construction completion and prior to turning the SFWMD permit to operations phase. Annual monitoring reports will be submitted to the District ERC staff in accordance with the work schedule.

The plans show 10 photo-monitoring stations covering upland buffer plantings and wetland plantings, half single frames and half panoramic shots with combined frames. The baseline monitoring report will provide DGPS locations of each station with photographs. It will also provide a narrative describing all aspects of habitat including vegetation patterns and species as well as wildlife usage of the area.

EXHIBIT 3.01

Subsequent reports will be conducted annually during the same month as the baseline report and will include evaluation of exotic species and recommendations for treatment where required.

RECEIVED
JUN 15 2006
MSLSC

Construction Schedule

SFWMD ERP Permit	July 2006
USACE Dredge and Fill Permit	August 2006
Martin County Excavation and Fill Permit	October 2006
Bid Plans	November 2006
Construction start	February 2007
Construction Completion	May 2007
First Monitoring Report	June 2007
Subsequent Monitoring Reports	June for next 6 years

Submitted by:

Kevin Henderson, P.E.
Evergreen Engineering, Inc.

EXHIBIT 3.02

South Florida Water Management District

Work Schedule Requirements

Application No : 051103-5

Mitigation Plan ID: COVE ROAD LAND TRUST

Activity	Due Date
EXCAVATION AND GRADING MITIGATION AREA	01-MAY-2007
TIME ZERO MONITORING REPORT	01-JUN-2007
FIRST MONITORING REPORT	01-JUN-2008
SECOND MONITORING REPORT	01-JUN-2009
THIRD MONITORING REPORT	01-JUN-2010
FOURTH MONITORING REPORT	01-JUN-2011
FIFTH MONITORING REPORT	01-JUN-2012

Exhibit No : 4

Document prepared by:

Return recorded document to:
South Florida Water Management District
3301 Gun Club Road, MSC _____
West Palm Beach, FL 33406

DEED OF CONSERVATION EASEMENT

THIS DEED OF CONSERVATION EASEMENT is given this _____ day of _____, 20____, by _____ ("Grantor") whose mailing address is _____
_____
to the South Florida Water Management District ("Grantee"). As used herein, the term Grantor shall include any and all heirs, successors or assigns of the Grantor, and all subsequent owners of the "Property" (as hereinafter defined) and the term "Grantee" shall include any successor or assignee of Grantee.

WITNESSETH

WHEREAS, the Grantor is the owner of certain lands situated in _____ County, Florida, and more specifically described in Exhibit "A" attached hereto and incorporated herein ("Property"); and

WHEREAS, the Grantor desires to construct _____
Name of project
_____ ("Project") at a site in _____ County, which is subject to the regulatory jurisdiction of South Florida Water Management District ("District"); and

WHEREAS, District Permit No. _____ ("Permit") authorizes certain activities which affect waters in or of the State of Florida; and

WHEREAS, this Permit requires that the Grantor preserve, enhance, restore and/or mitigate wetlands and/or uplands under the District's jurisdiction; and

WHEREAS, the Grantor, in consideration of the consent granted by the Permit, is agreeable to granting and securing to the Grantee a perpetual Conservation Easement as defined in Section 704.06, Florida Statutes, over the area described on Exhibit "B" ("Conservation Easement").

NOW, THEREFORE, in consideration of the issuance of the Permit to construct and operate the permitted activity, and as an inducement to Grantee in issuing the Permit, together with other good and valuable consideration, the adequacy and receipt of which are hereby

EXHIBIT 5.01

acknowledged, Grantor hereby grants, creates, and establishes a perpetual Conservation Easement for and in favor of the Grantee upon the property described on Exhibit "B" which shall run with the land and be binding upon the Grantor, and shall remain in full force and effect forever.

The scope, nature, and character of this Conservation Easement shall be as follows:

1. Recitals. The recitals hereinabove set forth are true and correct and are hereby incorporated into and made a part of this Conservation Easement.

2. Purpose. It is the purpose of this Conservation Easement to retain land or water areas in their natural, vegetative, hydrologic, scenic, open, agricultural or wooded condition and to retain such areas as suitable habitat for fish, plants or wildlife. Those wetland and/or upland areas included in this Conservation Easement which are to be enhanced or created pursuant to the Permit shall be retained and maintained in the enhanced or created conditions required by the Permit.

To carry out this purpose, the following rights are conveyed to Grantee by this easement:

a. To enter upon the Property at reasonable times with any necessary equipment or vehicles to enforce the rights herein granted in a manner that will not unreasonably interfere with the use and quiet enjoyment of the Property by Grantor at the time of such entry; and

b. To enjoin any activity on or use of the Property that is inconsistent with this Conservation Easement and to enforce the restoration of such areas or features of the Conservation Easement that may be damaged by any inconsistent activity or use.

3. Prohibited Uses. Except for restoration, creation, enhancement, maintenance and monitoring activities, or surface water management improvements, or other activities described herein that are permitted or required by the Permit, the following activities are prohibited in or on the Conservation Easement:

a. Construction or placing of buildings, roads, signs, billboards or other advertising, utilities, or other structures on or above the ground;

b. Dumping or placing of soil or other substance or material as landfill, or dumping or placing of trash, waste, or unsightly or offensive materials;

c. Removal or destruction of trees, shrubs, or other vegetation, except for the removal of exotic or nuisance vegetation in accordance with a District approved maintenance plan;

d. Excavation, dredging, or removal of loam, peat, gravel, soil, rock, or other material substance in such manner as to affect the surface;

e. Surface use except for purposes that permit the land or water area to remain in its natural or enhanced condition;

EXHIBIT 5.02

f. Activities detrimental to drainage, flood control, water conservation, erosion control, soil conservation, or fish and wildlife habitat preservation including, but not limited to, ditching, diking and fencing;

g. Acts or uses detrimental to such aforementioned retention of land or water areas;

h. Acts or uses which are detrimental to the preservation of the structural integrity or physical appearance of sites or properties having historical, archaeological, or cultural significance.

4. Grantor's Reserved Rights. Grantor reserves all rights as owner of the Property, including the right to engage in uses of the Property that are not prohibited herein and which are not inconsistent with any District rule, criteria, permit and the intent and purposes of this Conservation Easement.

5. No Dedication. No right of access by the general public to any portion of the Property is conveyed by this Conservation Easement.

6. Grantee's Liability. Grantee shall not be responsible for any costs or liabilities related to the operation, upkeep or maintenance of the Property.

7. Property Taxes. Grantor shall keep the payment of taxes and assessments on the Easement Parcel current and shall not allow any lien on the Easement Parcel superior to this Easement. In the event Grantor fails to extinguish or obtain a subordination of such lien, in addition to any other remedy, the Grantee may, but shall not be obligated to, elect to pay the lien on behalf of the Grantor and Grantor shall reimburse Grantee for the amount paid by the Grantee, together with Grantee's reasonable attorney's fees and costs, with interest at the maximum rate allowed by law, no later than thirty days after such payment. In the event the Grantor does not so reimburse the Grantee, the debt owed to Grantee shall constitute a lien against the Easement Parcel which shall automatically relate back to the recording date of this Easement. Grantee may foreclose this lien on the Easement Parcel in the manner provided for mortgages on real property.

8. Enforcement. Enforcement of the terms, provisions and restrictions of this Conservation Easement shall be at the reasonable discretion of Grantee, and any forbearance on behalf of Grantee to exercise its rights hereunder in the event of any breach hereof by Grantor, shall not be deemed or construed to be a waiver of Grantee's rights hereunder.

9. Assignment. Grantee will hold this Conservation Easement exclusively for conservation purposes. Grantee will not assign its rights and obligations under this Conservation Easement except to another organization or entity qualified to hold such interests under the applicable state laws.

10. Severability. If any provision of this Conservation Easement or the application

EXHIBIT 5.03

thereof to any person or circumstances is found to be invalid, the remainder of the provisions of this Conservation Easement shall not be affected thereby, as long as the purpose of the Conservation Easement is preserved.

11. Terms and Restrictions. Grantor shall insert the terms and restrictions of this Conservation Easement in any subsequent deed or other legal instrument by which Grantor divests itself of any interest in the Property.

12. Written Notice. All notices, consents, approvals or other communications hereunder shall be in writing and shall be deemed properly given if sent by United States certified mail, return receipt requested, addressed to the appropriate party or successor-in-interest.

13. Modifications. This Conservation Easement may be amended, altered, released or revoked only by written agreement between the parties hereto or their heirs, assigns or successors-in-interest, which shall be filed in the public records in _____ County.

TO HAVE AND TO HOLD unto Grantee forever. The covenants, terms, conditions, restrictions and purposes imposed with this Conservation Easement shall be binding upon Grantor, and shall continue as a servitude running in perpetuity with the Property.

Grantor hereby covenants with said Grantee that Grantor is lawfully seized of said Property in fee simple; that the Conservation Easement is free and clear of all encumbrances that are inconsistent with the terms of this Conservation Easement area; and all mortgages and liens on the Conservation Easement, if any, have been subordinated to this Conservation Easement; and that Grantor has good right and lawful authority to convey this Conservation Easement; and that it hereby fully warrants and defends the title to the Conservation Easement hereby conveyed against the lawful claims of all persons whomsoever.

EXHIBIT 5.04

IN WITNESS WHEREOF, _____ (Grantor) has hereunto set its authorized hand this _____day of _____, 20_____.

_____
a Florida corporation

By: _____

Print Name: _____

Title: _____

Signed, sealed and delivered
in our presence as witnesses:

By:_____

Print Name: _____

By:_____

Print Name: _____

STATE OF FLORIDA
) ss:
COUNTY OF_____

On this _____ day of _____, 20_____ before me, the undersigned notary public, personally appeared _____, the person who subscribed to the foregoing instrument, as the _____(title), of _____(Corporation), a Florida corporation, and acknowledged that he/she executed the same on behalf of said corporation and that he/she was duly authorized to do so. He/She is personally know to me or has produced a _____ (state) driver's license as identification.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

NOTARY PUBLIC, STATE OF FLORIDA

_____
Print Name:

My Commission Expires:

EXHIBIT 5.05

MORTGAGEE JOINDER, CONSENT AND SUBORDINATION

For Ten Dollars ($10.00) and other good and valuable consideration, the adequacy and receipt of which are hereby acknowledged, _____, the owner and holder of a mortgage dated _____, in the original principal amount of $_____, given by _____ ("Grantor") to _____ ("Mortgagee"), encumbering the real property described on Exhibit "A" attached hereto ("Property"), which is recorded in Official Records Book _____, at Page _____, (together with that certain Assignment of Leases and Rents recorded in Official Records Book _____, at Page _____ and those certain UCC-1 Financing Statement(s) recorded in Official Records Book _____, at Page _____), all of the Public Records of _____ County, Florida (said mortgage, assignment of leases and rents, and UCC-1 Financing Statements, as modified, are hereinafter referred to as the "Mortgage"), hereby joins in, consents to and subordinates the lien of its Mortgage, as it has been, and as it may be, modified, amended and assigned from time to time, to the foregoing Conservation Easement, executed by _____, in favor of the South Florida Water Management District applicable to the Conservation Easement, as said Conservation Easement may be modified, amended and assigned from time to time, with the intent that the Mortgage shall be subject and subordinate to the Conservation Easement.

IN WITNESS WHEREOF, this Mortgagee Joinder, Consent and Subordination is made this ___ day of _____, 20_____.

(Mortgagee) _____

By: _____

Print Name: _____

Title: _____

WITNESSES:

By: _____

Print Name: _____

By: _____

Print Name: _____

EXHIBIT 5.06

STATE OF FLORIDA
COUNTY OF _____

The foregoing instrument was acknowledged before me this _____ day of _____, 20_____, by _____ (print name), as _____ (title) of_____ (Grantor of Mortgage), on behalf of the _____ (Mortgagee, Grantor of the Conservation Easement). He/She is personally known to me or has produced a _____ (state) driver's license as identification.

IN WITNESS WHEREOF, I hereunto set my hand and official seal.

NOTARY PUBLIC, STATE OF FLORIDA

_____

Print Name: _____

My Commission Expires:

EXHIBIT 5.07

EXHIBIT A

[DESCRIPTION OF PROPERTY]

EXHIBIT 5-08

STAFF REPORT DISTRIBUTION LIST

COVE ROAD LAND TRUST (CRLT) WETLANDS RESTORATION

Application No: 051103-5

Permit No: 43-01923-P

INTERNAL DISTRIBUTION

X Carolyn H. Farmer - 4250
X P.E."Rett" Thompson, P.E. - 4220
X Hugo A. Carter, P.E. - 4220
X John A. Meyer - 4250
X ERC Martin/St. Lucie - 6880
X Permit File

EXTERNAL DISTRIBUTION

X Permittee - Cove Road Land Trust
X Adj Owner - Summerfield Hoa
X Engr Consultant - Evergreen Engineering Inc

GOVERNMENT AGENCIES

X Div of Recreation and Park - District 7 - FDEP
X Florida Fish & Wildlife Conservation Commission - Imperiled Species Mgmt Section
X Martin County - Community Development Director
X Martin County - County Administrator
X Martin County Board of County Commissioners
X Martin County Engineer

OTHER INTERESTED PARTIES

X Water Management Institute - Michael N. Vanatta

South Florida Water Management District

3301 Gun Club Road, West Palm Beach, Florida 33406 • (407) 686-8800 • FL WATS 1-800-432-2045

CON 24-06

Regulation Department
Application No.: 941110-14

FINAL APPROVED

JUL 24 1995

WPB

July 24, 1995

Martin County
2401 Southeast Monterey Road
Stuart, FL 33497

Dear Permittee:

SUBJECT: Notice of Intent to Construct Works
Modification to Highway Permit and
Stormwater Discharge Certification No.: 88-43S
Permittee: MARTIN COUNTY
Project: WILLOUGHBY BOULEVARD FROM COVE ROAD TO SALERNO ROAD
Location: MARTIN COUNTY, SHANSON GRANT/T38S/R41E

This letter is to notify you of the District's agency action concerning your request of November 10, 1994, to modify the above referenced Highway Permit and Stormwater Discharge Certification. This action is taken pursuant to Rule 40E-1.606 and Chapter 40E-40, Florida Administrative Code.

Based on the information provided, District rules have been adhered to and a modification to the above referenced Highway Permit and Stormwater Discharge Certification is in effect for this project subject to:

1. Not receiving a filed request for a Chapter 120, Florida Statutes, administrative hearing, and

2. the attached 19 Standard Limiting Conditions, and

3. 11 Special Conditions, and

4. 26 Exhibit(s).

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.

Governing Board:
Valerie Boyd, Chairman
Frank Williamson, Jr., Vice Chairman
William E. Graham
William Hammond
Betsy Krant
Richard A. Machek
Eugene K. Pettis
Nathaniel P. Reed
Miriam Singer
Samuel E. Poole III, Executive Director
Michael Slayton, Deputy Executive Director

Mailing Address: P.O. Box 24680, West Palm Beach, FL 33416-4680

CERTIFICATE OF SERVICE

I HEREBY CERTIFY that a "Notice of Rights" has been mailed to the addressee (and the persons listed in the attached distribution list) no later than 5:00 p.m. this 24th day of July, 1995, in accordance with Section 120.60(3), Florida Statutes.

Sincerely,

Kenneth S. Todd, Jr.

Kenneth S. Todd, Jr., P.E.
Supv Prof - Civil Engineer
West Palm Beach Service Center

KT/dm/ld

CERTIFIED MAIL NO. Z 028 128 196
Enclosures

SCANNED

South Florida Water Management District
GENERAL PERMIT
NOTICE OF RIGHTS

This Notice of Rights is intended to inform the recipient of the administrative and judicial review which may be a mandated by section 120.60(3), Florida Statutes. Be advised that although this notice is intended to be comprehensive, procedures set forth herein have been the subject of judicial construction and interpretation which may affect the admin judicial review available. Recipients are therefore advised to become familiar with Chapters 120 and 373, Florida Statute judicial interpretation of the provisions of these chapters.

1. If a substantially affected person objects to the staff's recommendation, that person has the right to request an adm hearing on the proposed agency action. The substantially affected person may request either a formal or an informa as set forth below. Failure to comply with the prescribed time periods shall constitute a waiver of the right to a hea

2. If a substantially affected person believes a genuine issue of material fact is in dispute, that person may request a form pursuant to section 120.57(1), Florida Statutes, by filing a petition not later than:
   a. IF NOTICE OF THE APPLICATION WAS PUBLISHED BY THE APPLICANT, within fourteen (14) days afte mailing of the proposed agency action or
   b. IF NOTICE OF THE APPLICATION WAS NOT PUBLISHED, within fourteen days after receipt of actua notice.

   The request for a section 120.57(1), F.S., formal hearing must comply with the requirements of Rule 40E-1.52 Administrative Code, a copy of which is attached. Petitions are deemed filed upon receipt by the District. F substantially comply with the provisions of Rule 40E-1.521, Florida Administrative Code, shall constitute a waiver of th a 120.57(1) hearing. If a petition for administrative hearing is not timely filed, the staff's proposed agency will auto mature into final agency action.

3. If a substantially affected person believes that no issues of material fact are in dispute, that person may request an hearing pursuant to section 120.57(2), F.S., by filing a petition for hearing not later than:
   a. IF NOTICE OF THE APPLICATION WAS PUBLISHED BY THE APPLICANT, within fourteen (14) days after mailing of the proposed agency action or
   b. IF NOTICE OF THE APPLICATION WAS NOT PUBLISHED, within fourteen days after receipt of actual notice.

   A request for informal hearing shall be considered as a waiver of the right to request a formal section 120.57(1), F.S., he request for a section 120.57(1), F.S., formal hearing not in substantial compliance with the provisions of rule 40E-1.521 may be considered by the District as a request for informal hearing. If a petition for administrative hearing is not timely fi staff's proposed agency action will automatically mature into final agency action.

4. Pursuant to section 373.114, Florida Statutes, a party to the proceeding below may seek review of a Final Order rendered permit application before the Land and Water Adjudicatory Commission, as provided therein. Review under this se initiated by filing a request for review with the Land and Water Adjudicatory Commission and serving a copy on the Dep of Environmental Regulation and any person named in the Order within 20 days after rendering of the District's However, when the order to be reviewed has statewide or regional significance, as determined by the Land and Adjudicatory Commission within 60 days after receipt of a request for review, the commission may accept a request for from any affected person within 30 days after the rendering of the order. Review under section 373.114, Florida Stat limited solely to a determination of consistency with the provisions and purposes of Chapter 373, Florida Statutes. This is appellate in nature and limited to the record below.

5. A party who is adversely affected by final agency action on the permit application is entitled to judicial review in the D Court of Appeal pursuant to section 120.68, Florida Statutes, as provided therein. Review under section 120.68, Florida St in the District Court of Appeal is initiated by filing a petition in the appropriate District Court of Appeal in accordance Florida rule of appellate Procedure 9.110. The Notice of Appeal must be filed within 30 days of the final agency action.

6. Section 373.617(2), Florida Statutes, provides:

   Any person substantially affected by a final action of any agency with respect to a permit may seek review within 90 days of the rendering of such decision and request monetary damages and other relief in the circuit court in the judicial circuit in which the affected property is located; however, circuit court review shall be confined solely to determining whether final agency action is an unreasonable exercise of the state's police power constituting a taking without just compensation. Review of final agency action for the purpose of determining whether the action is in accordance with existing statutes or rules and based on component substantial evidence shall proceed in accordance with Chapter 120.

Please be advised that exhaustion of administrative remedies is generally a prerequisite to appeal in the District C

40E-1.521 Initiation of Formal Proceedings.

(1) Initiation of formal proceedings shall be made by petition to the District. The term petition as used herein includes any application or other document which expresses a request for formal proceedings. Each petition should be printed, typewritten or other duplicated in legible form on white paper or standard legal size. Unless printed, the impression shall be on one side of the paper only and lines shall be double-spaced and indented.

(2) All petitions filed under these rules shall contain:

(a) The name and address of the District and the District's file or identification number, if known;

(b) The name and address of the petitioner or petitioners;

(c) An explanation of how each petitioner's substantial interests will be affected by the District's determination;

(d) A statement of when and how petitioner received notice of the District's decision or intent to render a decision;

(e) A statement of all disputed issues of material fact. If there are none, the petition must so indicate.

(f) A concise statement of the ultimate facts which petitioner believes entitle petitioner to the relief sought as well as the rules and statutes which support petitioner's claim for relief.

(g) A demand for the relief to which the petitioner deems himself entitled; and

(h) Other information which the petitioner contends is material.

(3) Upon receipt of a petition for formal proceedings, the Office of Counsel shall review the petition for compliance with subsection (2). The Board shall accept those petitions in substantial compliance therewith, which have been timely filed, which establish that the petitioner is a substantially affected party, and which state a dispute which is within the jurisdiction of the District to resolve. If accepted, the Board shall designate the presiding officer of the administrative hearing. The District shall promptly give written notice to all parties of the actin taken on the petition, and shall sate with particularity its reasons therefor.

(4) If a petition is filed that does not substantially comply with the requirement of subsection (2) of this section, the District shall issue an order dismissing the petition with leave to fine an amended petition complying with the requirements of this rule within the time period designated in the order. If an amended petition complying with this rule is not filed with the District Clerk within the designated time period, the petitioner's right to a processing under Section 120.57, Florida Statutes, is waived.

(5) If a valid petition is filed, with the consent of all parties and upon a showing of good cause, Board action on the petition pursuant to Section 120.57(1)(b) shall be waived. "Good cause" shall mean a set of circumstances unforeseen and outside of the control of the person requesting the waiver.

(6) When a valid petition for administrative hearing has been filed, the Board action shall defer consideration of the matter pending the completion of the administrative hearing and the submittal of a recommended order, and any exceptions to that order.

(7) If the Board designates a Hearing Officer assigned by the Division of Administrative Hearings as the presiding officer, the District Clerk shall forward the petition and all relevant materials filed with the District to the Division of Administrative Hearings, and shall notify all parties of its action.

Specific Authority 120.53, 373.044, 373.113 F.S. Law Implemented 120.53(1), 120.57, 373.113 F.S. History -- New 9-3-81. Formerly 16K-1.09(1), 16K-1.112(1)--(3), 16K-1.12. Amended 5-11-93.

EXHIBIT 1

LIMITING CONDITIONS

1 . THE PERMITTEE SHALL IMPLEMENT THE WORK AUTHORIZED IN A MANNER SO AS TO MINIMIZE ANY ADVERSE IMPACT OF THE WORKS ON FISH, WILDLIFE, NATURAL ENVIRONMENTAL VALUES, AND WATER QUALITY. THE PERMITTEE SHALL INSTITUTE NECESSARY MEASURES DURING THE CONSTRUCTION PERIOD, INCLUDING FULL COMPACTION OF ANY FILL MATERIAL PLACED AROUND NEWLY INSTALLED STRUCTURES, TO REDUCE EROSION, TURBIDITY, NUTRIENT LOADING AND SEDIMENTATION IN THE RECEIVING WATERS.

2 . WATER QUALITY DATA FOR THE WATER DISCHARGED FROM THE PERMITTEE'S PROPERTY OR INTO SURFACE WATERS OF THE STATE WILL BE SUBMITTED TO THE DISTRICT AS REQUIRED BY SECTION 5.9, "BASIS OF REVIEW FOR SURFACE WATER MANAGEMENT PERMIT APPLICATIONS WITHIN SOUTH FLORIDA WATER MANAGEMENT DISTRICT - MARCH, 1994." PARAMETERS TO BE MONITORED MAY INCLUDE THOSE LISTED IN CHAPTER 62-302, F.A.C. IF WATER QUALITY DATA IS REQUIRED, THE PERMITTEE SHALL PROVIDE DATA ON VOLUMES OF WATER DISCHARGED, INCLUDING TOTAL VOLUME DISCHARGED DURING THE DAYS OF SAMPLING AND TOTAL MONTHLY DISCHARGES FROM THE PROPERTY OR INTO SURFACE WATERS OF THE STATE.

3 . THIS PERMIT SHALL NOT RELIEVE THE PERMITTEE OF ANY OBLIGATION TO OBTAIN NECESSARY FEDERAL, STATE, LOCAL OR SPECIAL DISTRICT APPROVALS.

4 . THE OPERATION PHASE OF THIS PERMIT WILL NOT BECOME EFFECTIVE UNTIL THE DISTRICT'S ACCEPTANCE OF CERTIFICATION OF THE COMPLETED SURFACE WATER WATER MANAGEMENT SYSTEM. THE PERMITTEE SHALL REQUEST TRANSFER OF THE PERMIT TO THE RESPONSIBLE OPERATIONAL ENTITY ACCEPTED BY THE DISTRICT, IF DIFFERENT FROM THE PERMITTEE. THE TRANSFER REQUEST CAN BE SUBMITTED CONCURRENTLY WITH THE CONSTRUCTION COMPLETION CERTIFICATION.

5 . ALL ROAD ELEVATIONS SHALL BE SET IN ACCORDANCE WITH THE CRITERIA SET FORTH IN SECTION 6.5, "BASIS OF REVIEW FOR SURFACE WATER MANAGEMENT PERMIT APPLICATIONS WITHIN SOUTH FLORIDA WATER MANAGEMENT DISTRICT - MARCH, 1994."

6 . ALL BUILDING FLOOR ELEVATIONS SHALL BE SET IN ACCORDANCE WITH THE CRITERIA SET FORTH IN SECTION 6.4, "BASIS OF REVIEW FOR SURFACE WATER MANAGEMENT PERMIT APPLICATIONS WITHIN SOUTH FLORIDA WATER MANAGEMENT DISTRICT - MARCH, 1994."

7 . OFF-SITE DISCHARGES DURING CONSTRUCTION AND DEVELOPMENT WILL BE MADE ONLY THROUGH THE FACILITIES AUTHORIZED BY THIS PERMIT.

8 . A PERMIT TRANSFER TO THE OPERATION PHASE SHALL NOT OCCUR UNTIL A RESPONSIBLE ENTITY MEETING THE REQUIREMENT IN SECTION 9.0, "BASIS OF REVIEW FOR SURFACE WATER MANAGEMENT PERMIT APPLICATIONS WITHIN SOUTH FLORIDA WATER MANAGEMENT DISTRICT - MARCH, 1994," HAS BEEN ESTABLISHED TO OPERATE AND MAINTAIN THE SYSTEM. THE ENTITY MUST BE PROVIDED WITH SUFFICIENT OWNERSHIP OR LEGAL INTEREST SO THAT IT HAS CONTROL OVER ALL WATER MANAGEMENT FACILITIES AUTHORIZED HEREIN.

9 . THE PERMIT DOES NOT CONVEY TO THE PERMITTEE ANY PROPERTY RIGHT NOR ANY RIGHTS OR PRIVILEGES OTHER THAN THOSE SPECIFIED IN THE PERMIT AND CHAPTER 40E-4, FAC.

10. THE PERMITTEE SHALL HOLD AND SAVE THE DISTRICT HARMLESS FROM ANY AND ALL DAMAGES, CLAIMS, OR LIABILITIES WHICH MAY ARISE BY REASON OF THE CONSTRUCTION, OPERATION, MAINTENANCE OR USE OF ANY FACILITY AUTHORIZED BY THE PERMIT.

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11. THIS PERMIT IS ISSUED BASED ON THE APPLICANT'S SUBMITTED INFORMATION WHICH REASONABLY DEMONSTRATES THAT ADVERSE WATER RESOURCE RELATED IMPACTS WILL NOT BE CAUSED BY THE COMPLETED PERMIT ACTIVITY. SHOULD ANY ADVERSE IMPACTS CAUSED BY THE COMPLETED SURFACE WATER MANAGEMENT SYSTEM OCCUR, THE DISTRICT WILL REQUIRE THE PERMITTEE TO PROVIDE APPROPRIATE MITIGATION TO THE DISTRICT OR OTHER IMPACTED PARTY. THE DISTRICT WILL REQUIRE THE PERMITTEE TO MODIFY THE SURFACE WATER MANAGEMENT SYSTEM, IF NECESSARY, TO ELIMINATE THE CAUSE OF THE ADVERSE IMPACTS.

12. WITHIN 30 DAYS OF ISSUANCE OF THIS PERMIT, THE PERMITTEE OR AUTHORIZED AGENT SHALL NOTIFY THE DISTRICT (VIA THE SUPPLIED CONSTRUCTION COMMENCEMENT NOTICE OR EQUIVALENT) OF THE ACTUAL OR ANTICIPATED CONSTRUCTION START DATE AND THE EXPECTED COMPLETION DATE.

13. WHEN THE DURATION OF CONSTRUCTION EXCEEDS ONE YEAR, THE PERMITTEE OR AUTHORIZED AGENT SHALL SUBMIT CONSTRUCTION STATUS REPORTS ON AN ANNUAL BASIS (VIA THE SUPPLIED ANNUAL STATUS REPORT OR EQUIVALENT) BEGINNING ONE YEAR AFTER THE INITIAL COMMENCEMENT OF CONSTRUCTION.

14. WITHIN 30 DAYS AFTER COMPLETION OF CONSTRUCTION OF THE SURFACE WATER MANAGEMENT SYSTEM, THE PERMITTEE OR AUTHORIZED AGENT SHALL FILE A WRITTEN STATEMENT OF COMPLETION AND CERTIFICATION BY A FLORIDA REGISTERED PROFESSIONAL ENGINEER. THESE STATEMENTS MUST SPECIFY THE ACTUAL DATE OF CONSTRUCTION COMPLETION AND MUST CERTIFY THAT ALL FACILITIES HAVE BEEN CONSTRUCTED IN SUBSTANTIAL CONFORMANCE WITH THE PLANS AND SPECIFICATIONS APPROVED BY THE DISTRICT (VIA THE SUPPLIED CONSTRUCTION COMPLETION/ CONSTRUCTION CERTIFICATION OR EQUIVALENT). THE CONSTRUCTION COMPLETION CERTIFICATION MUST INCLUDE, AT A MINIMUM, EXISTING ELEVATIONS, LOCATIONS AND DIMENSIONS OF THE COMPONENTS OF THE WATER MANAGEMENT FACILITIES. ADDITIONALLY, IF DEVIATIONS FROM THE APPROVED DRAWING ARE DISCOVERED DURING THE CERTIFICATION PROCESS, THE CERTIFICATION MUST BE ACCOMPANIED BY A COPY OF THE APPROVED PERMIT DRAWINGS WITH DEVIATIONS NOTED.

15. WITHIN 30 DAYS OF ANY SALE, CONVEYANCE OR OTHER TRANSFER OF ANY OF THE LAND WHICH IS PROPOSED FOR DEVELOPMENT UNDER THE AUTHORIZATION OF THIS PERMIT, THE PERMITTEE SHALL NOTIFY THE DISTRICT OF SUCH TRANSFER IN WRITING VIA EITHER FORM 0483, REQUEST FOR PERMIT TRANSFER; OR FORM 0920, REQUEST FOR TRANSFER OF SURFACE WATER MANAGEMENT CONSTRUCTION PHASE TO OPERATION PHASE (TO BE COMPLETED AND SUBMITTED BY THE OPERATING ENTITY), IN ACCORDANCE WITH SECTIONS 40E-1.6105 AND 40E-4.351, F.A.C.

16. A PRORATED SHARE OF SURFACE WATER MANAGEMENT RETENTION/DETENTION AREAS, SUFFICIENT TO PROVIDE THE REQUIRED FLOOD PROTECTION AND WATER QUALITY TREATMENT, MUST BE PROVIDED PRIOR TO OCCUPANCY OF ANY BUILDING OR RESIDENCE.

17. 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.

18. IT IS THE RESPONSIBILITY OF THE PERMITTEE TO INSURE THAT ADVERSE OFF-SITE WATER RESOURCE RELATED IMPACTS DO NOT OCCUR DURING CONSTRUCTION.

19. 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(4), F.A.C.

CERTIFIED

SPECIAL CONDITIONS

1 . MINIMUM ROAD CROWN ELEVATION: 18 FEET NGVD.

2 . DISCHARGE FACILITIES:

1-4' WIDE SHARP CRESTED WEIR WITH CREST AT ELEV. 18.88' NGVD.
1-.25' DIA. CIRCULAR ORIFICE WITH INVERT AT ELEV. 15' NGVD.
53 LF OF 2' DIA. RCP CULVERT.

RECEIVING BODY : CORAL GARDENS CANAL SYSTEM

CONTROL ELEV : 15 FEET NGVD.

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 PROBLEMS ARE NOT CREATED 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 . LAKE SIDE SLOPES SHALL BE NO STEEPER THAN 4:1 (HORIZONTAL:VERTICAL) TO A DEPTH OF TWO FEET BELOW THE CONTROL ELEVATION. SIDE SLOPES SHALL BE NURTURED OR PLANTED FROM 2 FEET BELOW TO 1 FOOT ABOVE CONTROL ELEVATION TO INSURE VEGETATIVE GROWTH.

7 . FACILITIES OTHER THAN THOSE STATED HEREIN SHALL NOT BE CONSTRUCTED WITHOUT AN APPROVED MODIFICATION OF THIS PERMIT.

8 . ALL SPECIAL CONDITIONS PREVIOUSLY STIPULATED BY PERMIT NUMBER 88-43S REMAIN IN EFFECT UNLESS OTHERWISE REVISED AND SHALL APPLY TO THIS MODIFICATION.

9 . PRIOR TO THE COMMENCEMENT OF CONSTRUCTION OF FUTURE PHASES, PAVING, GRADING, AND DRAINAGE PLANS SHALL BE SUBMITTED TO THE DISTRICT FOR PERMIT MODIFICATIONS.

10. OPERATION OF THE SURFACE WATER MANAGEMENT SYSTEM SHALL BE THE RESPONSIBILITY OF MARTIN COUNTY.

11. EXHIBITS 9 THROUGH 22 CONSISTING OF PLAN AND PROFILE DRAWINGS FOR WILLOUGHBY BOULEVARD, SALERNO ROAD, TOWER ROAD AND COVE ROAD ARE INCORPORATED INTO THIS STAFF REPORT BY REFERENCE AND ARE INCLUDED WITHIN THE PERMIT FILE.

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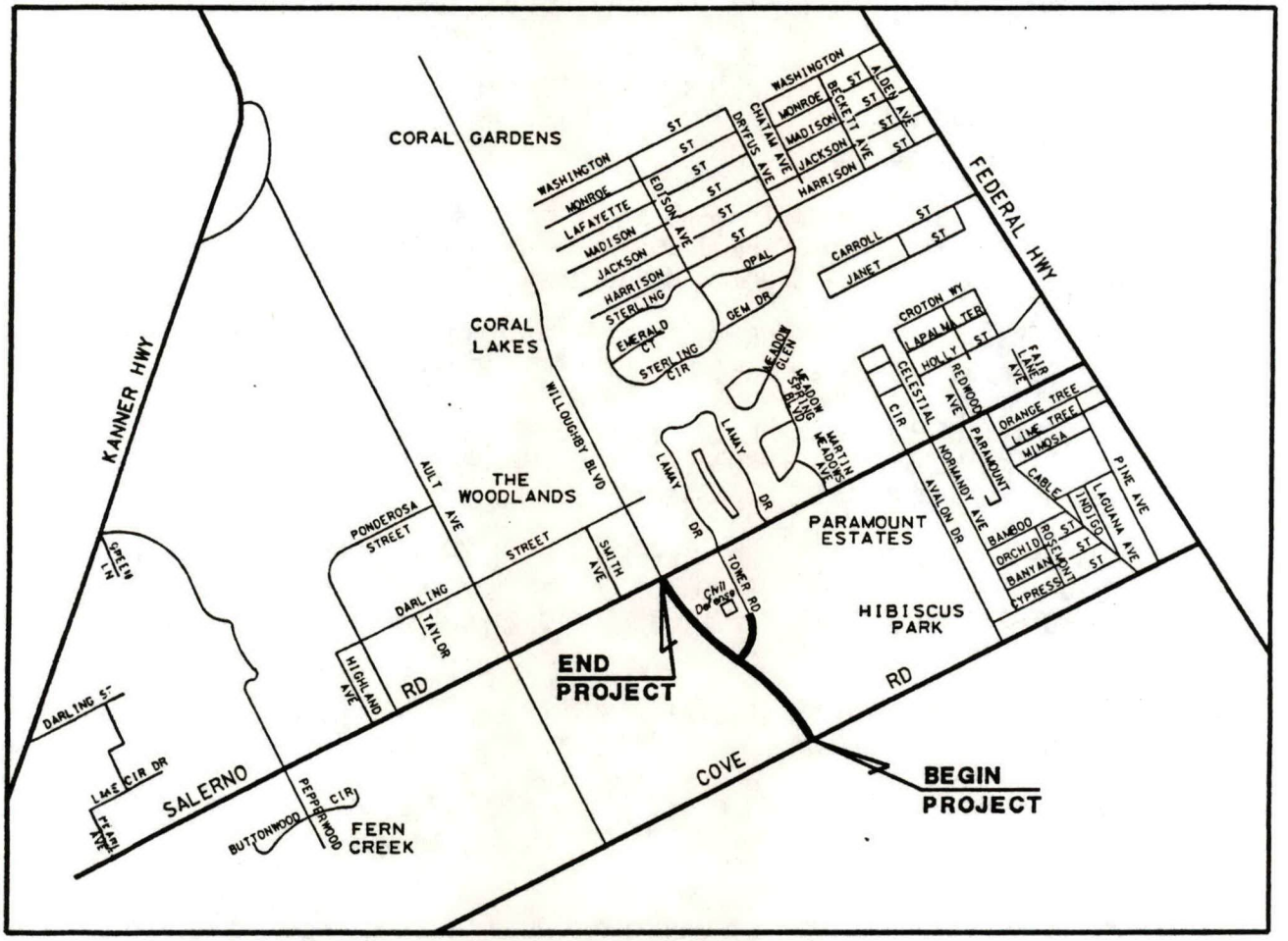


ORIGINAL SUBMITTAL

NOV 10 1994

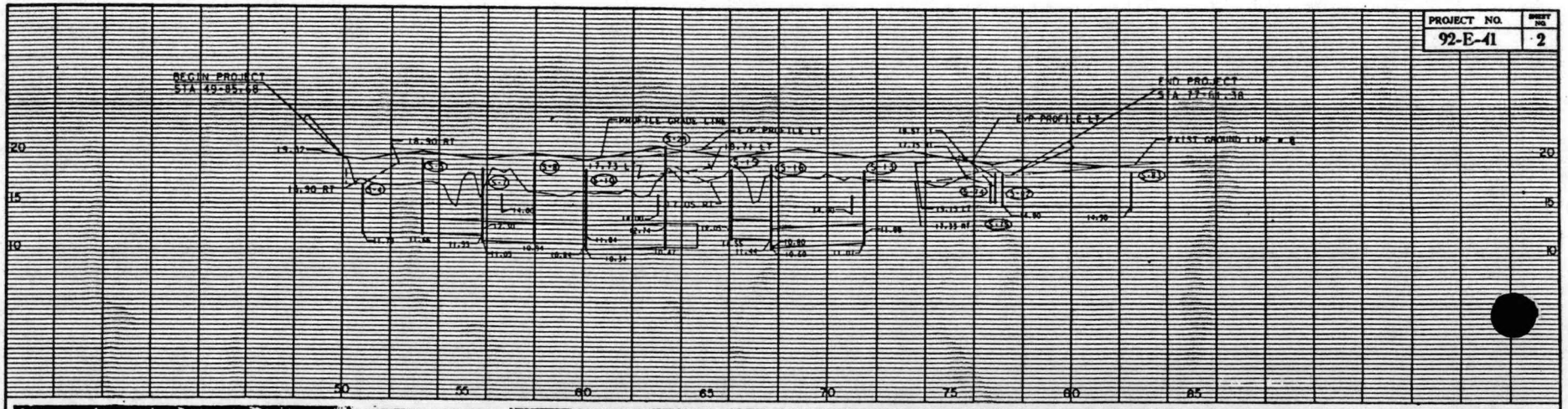
WPB

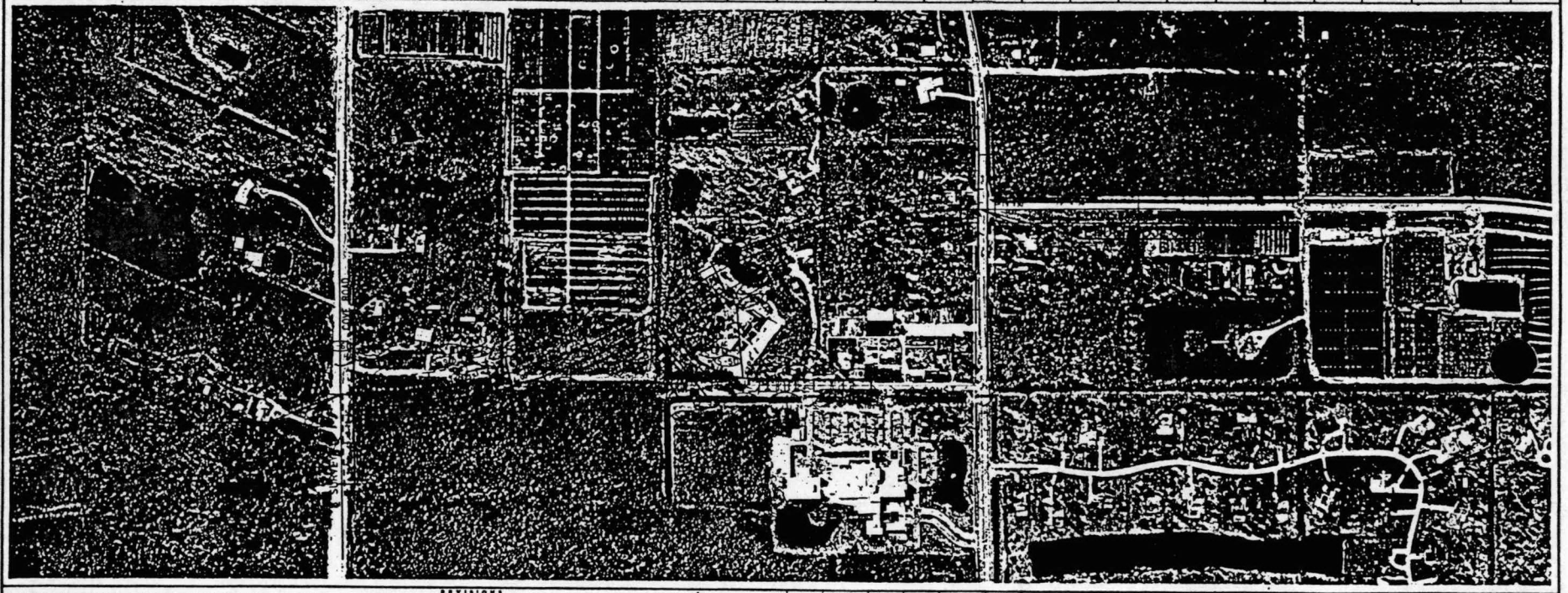
LOCATION MAP

ITEM I-1

EXHIBIT 1

PROJECT NO.	SHEET NO.
92-E-41	2





REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DRAWN BY	C.K.		DESIGN BY	K.B.	
CHECKED BY	G.C.		CHECKED BY	C.K.	

SUPERVISED BY: GINO Y. CHARLES, P.E.

APPROVED BY:

DATE:

LINDAHL, BROWNING, FREBARI & HELLSTROM, INC.

DRAINAGE MAP

EXHIBIT 2

scanned

5/4/95

PROJECT NO. 92-E-41 SHEET NO. 26

WILLOUGHBY BLVD.

TOWER ROAD

WET DETENTION POND

TOP OF BANK

MAINTENANCE ACCESS

SWALE SECTION

PROPOSED R/W LINE

R/W LINE

EXIST DITCH

PROPOSED CONTROL STRUCTURE

TRIPLE 24" RCP

ADD/REVISED SUBMITTAL JUN 02 1995

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	C.K.	6/24/94	DRAWN BY	D.C.	6/24/94
CHK'D BY	G.C.	6/24/94	CHK'D BY	C.K.	6/24/94
SUPERVISED BY: GINO Y. CHARLES, P.E.					

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

APPROVED BY:

DATE:

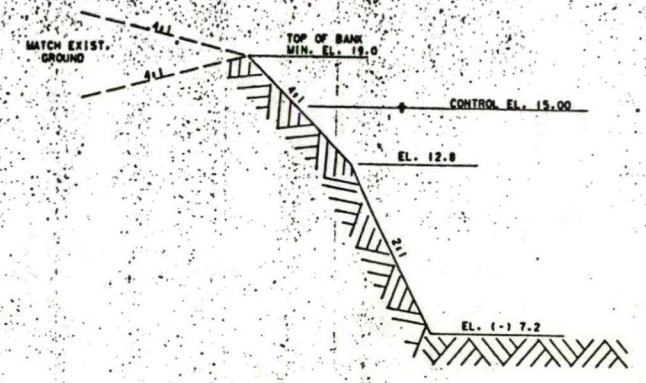
LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

DETENTION POND LOCATION

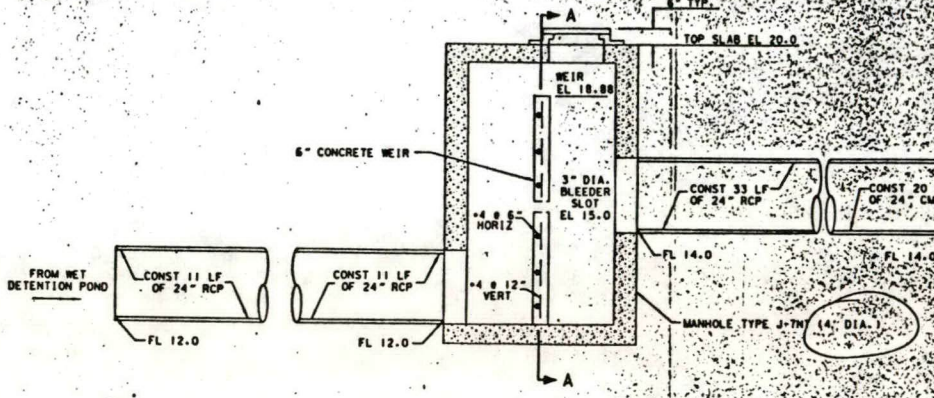
EXHIBIT 3

9/1/95

PROJECT NO.	SHEET NO.
92-E-41	27



WET DETENTION POND

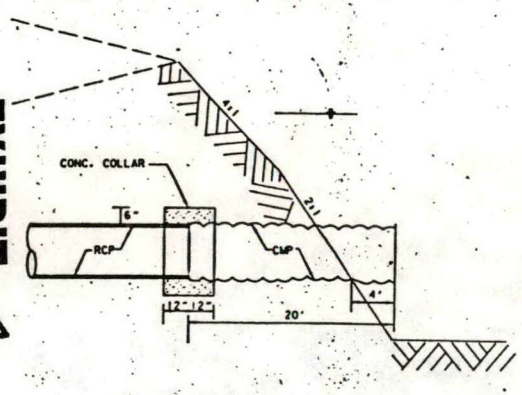


CONTROL STRUCTURE (S-28)

STA 102+62.94, 126.52' RT (℄ TOWER RD)

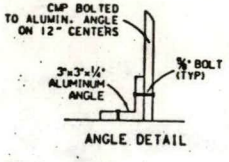
NOTE: SEE F.D.O.T. INDEX NOS. 200 & 201 FOR REBAR PLACEMENT AND ADDITIONAL DETAILS.

EXHIBIT 4

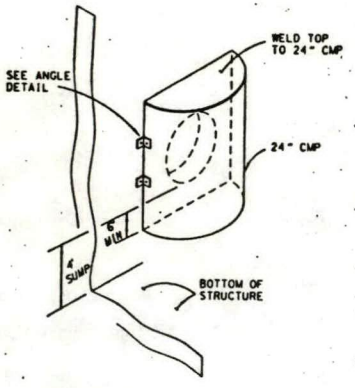


OUTFALL DETAIL

NOTE: SEE F.D.O.T. INDEX NO. 280 FOR ADDITIONAL NOTES AND DETAILS.

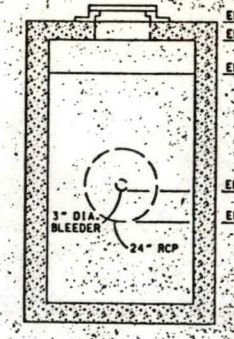


ANGLE DETAIL



CONTROL STRUCTURE (S-76)

STA. 204+69, 36' RT (℄SALERNO RD)



CONTROL STRUCTURE (S-28)

SECTION A-A

ADD/REVISED SUBMITTAL JUN 02 1995

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	C.K.	6/24/94	DRAWN BY	D.C.	6/24/94
CHK'D BY	G.C.	6/24/94	CHK'D BY	C.K.	6/24/94

SUPERVISED BY: GINO Y. CHARLES, P.E.

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

APPROVED BY:

DATE:

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

DRAINAGE DETAILS

JUN 01 1995

PROJECT NO.	SHEET NO.
92-E-41	11

S-3 STA 51+10
CONST INLET TYPE P-6
INDEX NO 200 & 211
FL 12.60 E & W

S-4 STA 51+10, 55' RT
CONST DB INLET TYPE G
INDEX NO 201 & 233
GRATE EL 16.79
FL 12.54 W
FL 11.79 N

S-5 STA 53+60, 55' RT
CONST MANHOLE TYPE P-7T
INDEX NO 200 & 201
TOP EL 19.20
FL 11.66 N & S
FL 12.15 E

S-6 STA 56+10, 46' LT
CONST DB INLET TYPE F
INDEX NO 201 & 233
GRATE EL 16.79
FL 12.40 E & W

S-7 STA 56+10, 55' RT
CONST DB INLET TYPE G
INDEX NO 201 & 233
GRATE EL 18.45
FL 11.55 S
FL 12.30 W
FL 11.05 N

S-8 STA 58+25, 55' RT
CONST MANHOLE TYPE P-7
INDEX NO 200 & 201
TOP EL 19.10
FL 10.94 N & S

S-9 STA 60+40, 46' LT
CONST DB INLET TYPE F
INDEX NO 201 & 233
GRATE EL 16.79
FL 11.94 E & W

S-10 STA 60+40, 55' RT
CONST DB INLET TYPE G
INDEX NO 201 & 233
GRATE EL. 18.45
FL 11.84 W
FL 10.84 S
FL 10.34 N & E

S-11 STA 60+40, 125' RT
FL 10.24

S-12 STA 71+80, 55' RT
CONST DB INLET TYPE F
INDEX NO 201 & 233
GRATE EL 16.79
FL 12.29 E & W

S-13 STA 71+80, 46' LT
CONST DB INLET TYPE G
INDEX NO 201 & 233
GRATE EL 18.45
FL 11.99 E & W
FL 11.07 S

S-14 STA 66+40, 55' RT
CONST DB INLET TYPE F
INDEX NO 201 & 233
GRATE EL 16.79
FL 12.29 E & W

S-15 STA 66+40, 46' LT
CONST DB INLET TYPE G
INDEX NO 201 & 233
GRATE EL 18.45
FL 12.05 E
FL 11.55 N

S-16 STA 68+00, 46' LT
CONST MANHOLE TYPE J-7 (5' DIA)
INDEX NO 200 & 201
TOP EL 18.93
FL 10.60 W & N
FL 11.44 S

S-17 STA. 68+00, 116' LT
FL. 10.54

S-18 STA 106+00
CONST INLET TYPE P-6
INDEX NO 200 & 211
FL 13.25

S-18A STA 110+20
CONST INLET TYPE P-5
INDEX NO 200 & 211
FL 14.00 E & W

S-18B STA 108+10
CONST MANHOLE TYPE P-7
INDEX NO 200 & 201
TOP EL 19.20
FL 13.65 N & S

S-19 STA 106+00
CONST INLET TYPE P-6
INDEX NO 200 & 211
FL 13.24 E & W
FL 13.00 S
FL 13.20 N

S-19A STA 110+20
CONST INLET TYPE P-5
INDEX NO 200 & 211
FL 14.05 E
FL 13.90 S

S-20 STA 104+44, 22' LT
CONST MANHOLE TYPE P-7
INDEX NO 200 & 201
TOP EL 19.38
FL 12.94 N & S & W

S-21 STA 103+00
CONST INLET TYPE P-5
INDEX NO 200 & 211
FL 12.89 N & S

S-22 STA 102+00, 22' LT
CONST MANHOLE TYPE P-7T
INDEX NO 200 & 201
TOP EL 20.50
FL 12.83 N & S

S-23 STA 100+95, RT
CONST INLET TYPE P-6
INDEX NO 200 & 211
FL 13.02

S-24 STA 100+95, LT
CONST INLET TYPE P-5
INDEX NO 200 & 211
FL 12.77 W
FL 12.78 E & S

S-25 STA 100+46.64, 23' LT
CONST MANHOLE TYPE J-7
INDEX NO 200 & 201
TOP EL 20.90
FL 10.47 S & W
FL 12.74 E

S-26 STA 65+16, 116' LT
FL 10.47

S-28 STA. 102+62.94,126.52' RT
CONST. CONTROL STRUCTURE
INDEX NO 200,201 & DETAIL
TOP EL 18.5
FL 14.0 S (FL 14.0 @ PIPE END)
FL 12.0 N (FL 12.0 @ PIPE END)

S-40 STA 51+10, 72' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
GRATE EL 16.90
FL 12.65

S-41 STA 56+10, 68' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 18.40
FL 12.45

S-42 STA 60+40, 72' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 16.50
FL 12.00

S-43 STA 71+80, 72' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 17.65
FL 12.05

S-44 STA 53+60, 99' RT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 16.60
FL 12.20

S-45 STA 66+40, 94' RT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 17.45
FL 12.35

S-46 STA 71+80, 94' RT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 17.35
FL 12.35

S-47 STA 56+90, 60' LT
CONST MITERED END SECTION
INDEX NO 272
TOP EL 14.00

S-48 STA 56+90, 70' RT
CONST MITERED END SECTION
INDEX NO 272
TOP EL 14.00

S-49 STA 64+15, 60' LT
CONST MITERED END SECTION
INDEX NO 272
TOP EL 14.00

S-50 STA 104+44, 32' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 17.40
FL 13.00

S-51 STA 106+00, 32' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
TOP EL 17.00
FL 13.30

S-52 STA 100+95, 41' RT
CONST MANHOLE TYPE P-7
INDEX NO 200 & 201
TOP EL 20.00
FL 14.00

S-53 STA 103+72, 82' RT
CONST MITERED END SECTION
INDEX NO 272
FL 14.00

S-54 STA 71+33, 60' LT
CONST MITERED END SECTION
INDEX NO 272
FL 14.00

S-55 STA 71+09, 50' RT
CONST MITERED END SECTION
INDEX NO 272
FL 14.00

S-60 STA 8+42, 56' LT
CONST MITERED END SECTION
INDEX 273
FL 16.00

S-61 STA 11+00, 52' LT
CONST INLET TYPE P-6
INDEX NO 200 & 211
FL 16.00

S-70 STA 198+58, 36' RT
CONST DB INLET TYPE E
INDEX NO 201 & 232
GRATE EL 17.30
FL 15.30
STUB EXIST 12" X 18" CMP
INTO PROPOSED STRUCTURE

S-71 STA 199+73, 34' RT
REMOVE EXIST INLET GRATE
CONST MANHOLE TYPE P-7 (PARTIAL)
INDEX NO 201
TOP EL 18.30
FL 15.32 E & W

S-72 STA 76+80, 46' LT
CONST DB INLET TYPE E
INDEX NO 201 & 232
GRATE EL 17.72
FL 15.30

S-74 STA 76+80, 55' RT
CONST DB INLET TYPE E
INDEX NO 201 & 232
GRATE EL 17.72
FL 15.30

S-75 STA 77+52, 55' RT
CONST MANHOLE TYPE P-7T
INDEX NO 200 & 201
TOP EL 18.20
FL 15.30

S-76 STA 204+69, 36' RT
CONST MANHOLE TYPE P-7
INDEX NO 200 & 201, DETAIL
TOP EL 17.50
FL 15.30
STUB EXIST 12" X 18" CMP
INTO PROPOSED STRUCTURE
PROVIDE OIL SKIMMER BAFFLE
& 4" SUMP W/ 12" WEEP HOLE

S-80 STA 199+49, 24' LT
CONST MITERED END SECTION
INDEX NO 273
FL 14.90

S-81 STA 199+72, 24' LT
CONST MANHOLE TYPE P-7
INDEX NO 200 & 201
TOP EL 17.50
FL 14.90 E & W
STUB EXIST 12" X 18" CMP
INTO PROPOSED STRUCTURE

S-82 STA 78+21, 46' LT
CONST MANHOLE TYPE P-7T
INDEX NO 200 & 201
TOP EL 19.21
FL 14.90 S & W
STUB EXIST 19" X 30" CMP
INTO PROPOSED STRUCTURE

S-83 STA 82+77, 40' LT
CONST DB INLET TYPE E
INDEX NO 201 & 232
GRATE EL 17.00
FL 14.90 S & W

S-84 STA 82+38, 67.5' LT
CONST DB INLET TYPE C
INDEX NO 201 & 232
GRATE EL 17.00
FL 14.95

S-90 STA 55+30, 46' LT
CONST MITERED END SECTION
INDEX NO 273
FL 16.93

S-91 STA 55+90, 46' LT
CONST MITERED END SECTION
INDEX NO 273
FL 16.93

S-92 STA 62+70, 44' LT
CONST MITERED END SECTION
INDEX NO 273
FL 17.82

S-93 STA 62+90, 44' LT
CONST MITERED END SECTION
INDEX NO 273
FL 17.82

ADD/REVISED SUBMITTAL JUN 8 1995

EXHIBIT 5

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	C.K.	6/24/94	DRAWN BY	D.C.	6/24/94
CHECKED BY	D.C.	6/24/94	CHECKED BY	C.K.	6/24/94

SURVEYED BY: GINO Y. CHARLES, P.E.

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

APPROVED BY:

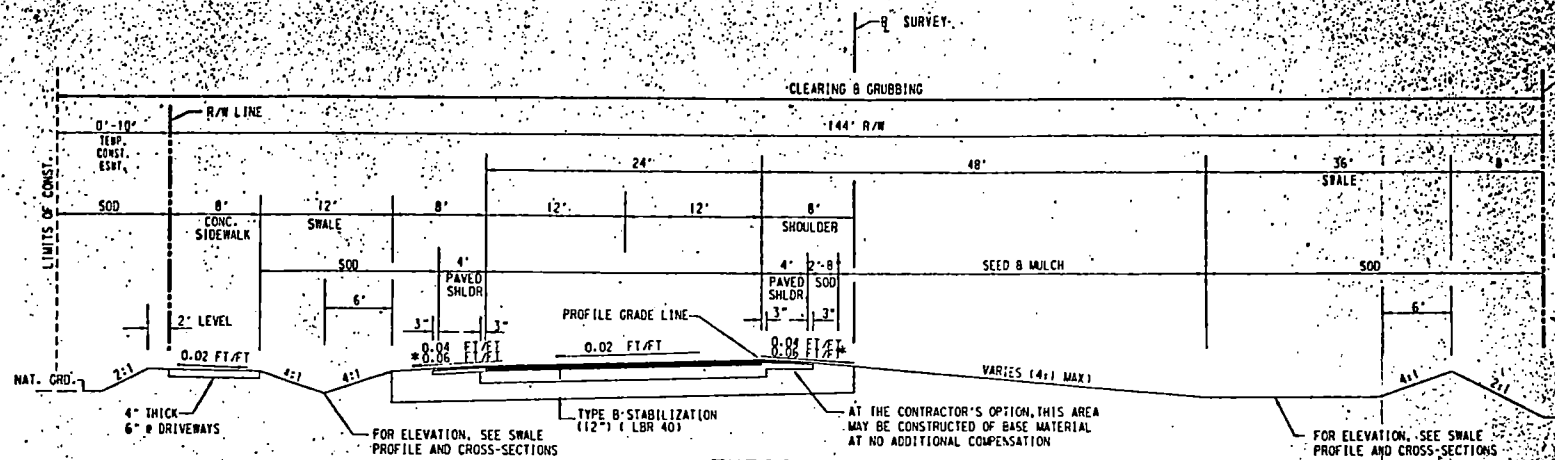
DATE:

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.
ENGINEERS • PLANNERS & SURVEYORS
JACKSONVILLE • FORT MYERS • WEST PALM BEACH

DRAINAGE STRUCTURE INFORMATION SHEET

JUN 1 1995

PROJECT NO.	SHEET NO.
92-E-41	3



TYPICAL SECTION
WILLOUGHBY BLVD.

STA. 50+28.53 TO STA. 77+61.38

DESIGN SPEED 40 M.P.H.

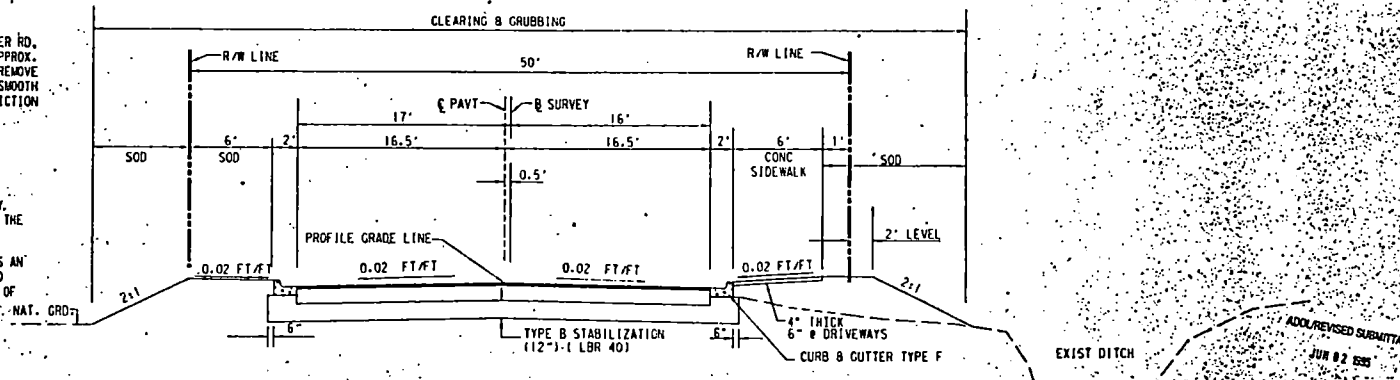
NEW CONSTRUCTION: LIMEROCK BASE COURSE (10" THICK) (PRIMED)(DOUBLE COURSE) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (2½" THICK) AND FRICTION COURSE FC-2 (5/8")

PAVED SHLDR: LIMEROCK BASE COURSE (4" THICK) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (1" THICK) AND FRICTION COURSE FC-2 (⅝" THICK)

TYPICAL SECTION NOTES

1. ALL PERMANENT GRASSING AREAS ARE TO RECEIVE A 4" TOPSOIL TREATMENT
2. THE SUBGRADE IN AREAS OF PROPOSED SIDEWALK SHALL BE FIRM, UNYIELDING AND IN SUCH CONDITION THAT NO UNDUE DISTORTION WILL OCCUR.
3. AT THE BEGINNING AND END OF RESURFACING ON SALERNO RD, COVE RD, WILLOUGHBY BLVD. AND TOWER RD, THE EXISTING PAVEMENT SHALL BE SAWCUT TO AN APPROX. DEPTH OF 5/8" TO MAKE A CLEAN BUTT JOINT AND REMOVE APPROXIMATELY 25' OF EXISTING PAVEMENT FOR A SMOOTH TIE-IN. THE COST SHALL BE INCLUDED IN THE FRICTION COURSE PAY ITEM.
4. A SHOULDER CROSS-SLOPE OF 0.04 FT/FT SHALL BE MAINTAINED WHEN SHOULDER IS ON HIGH SIDE AND 0.06 FT/FT WHEN SHOULDER IS ON LOW SIDE
5. ANY EXISTING LIMEROCK BASE THAT IS REMOVED MAY BE INCORPORATED IN THE STABILIZED PORTION OF THE SUBGRADE.
6. CEMENTED COQUINA (LBR 100) BASE MAY BE USED AS AN ALTERNATE TO LIMEROCK BASE. ONLY THE SELECTED ALTERNATE IS TO BE USED THROUGHOUT THE LIMITS OF THE PROJECT.

EXHIBIT 6



ADD/REVISED SUBMITTAL JUN 02 1995

TYPICAL SECTION
TOWER ROAD

STA. 100+00 TO STA. 110+40.00

DESIGN SPEED 40 M.P.H.

NEW CONSTRUCTION: SAME AS WILLOUGHBY BLVD. WITH THE EXCEPTION OF THE FRICTION COURSE

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	C.K.	6/24/94	DRAWN BY	D.C.	6/24/94
CHECKED BY	G.C.	6/24/94	CHECKED BY	C.K.	6/24/94

SUPERVISED BY: GINO Y. CHAPLES, P.E.

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

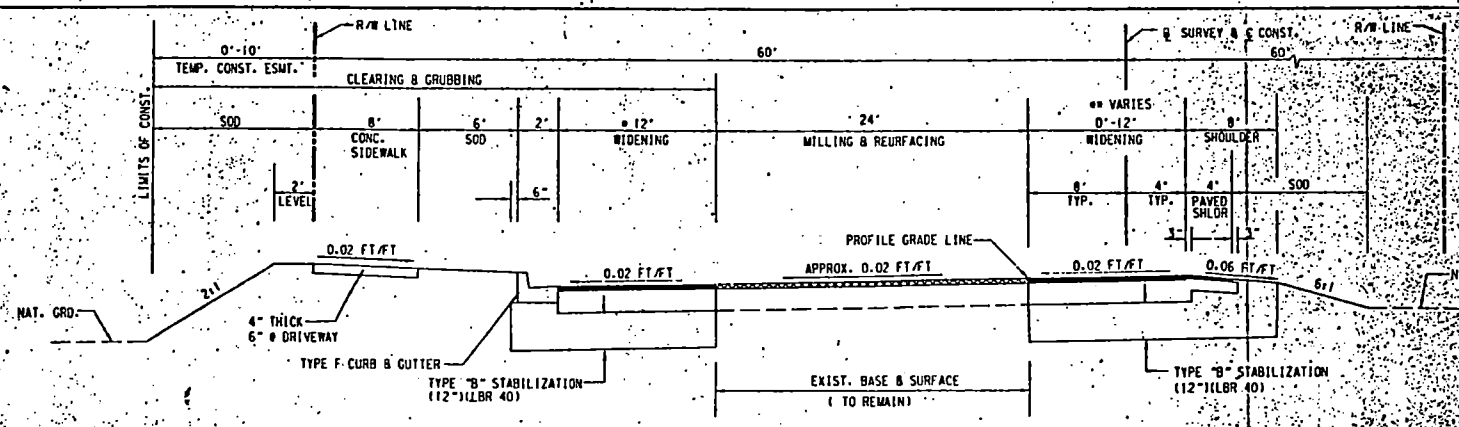
APPROVED BY:

DATE:

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

TYPICAL SECTIONS

PROJECT NO.	SHEET NO.
92-E-41	4



TYPICAL SECTION
WILLOUGHBY BLVD
STA. 78+51.74 TO STA. 85+37.08

* WIDENING FROM STA. 78+51.74 (LT) TO STA. 81+76.88 (LT)
** WIDENING FROM STA. 78+55.88 (RT) TO STA. 85+37.08 (RT)

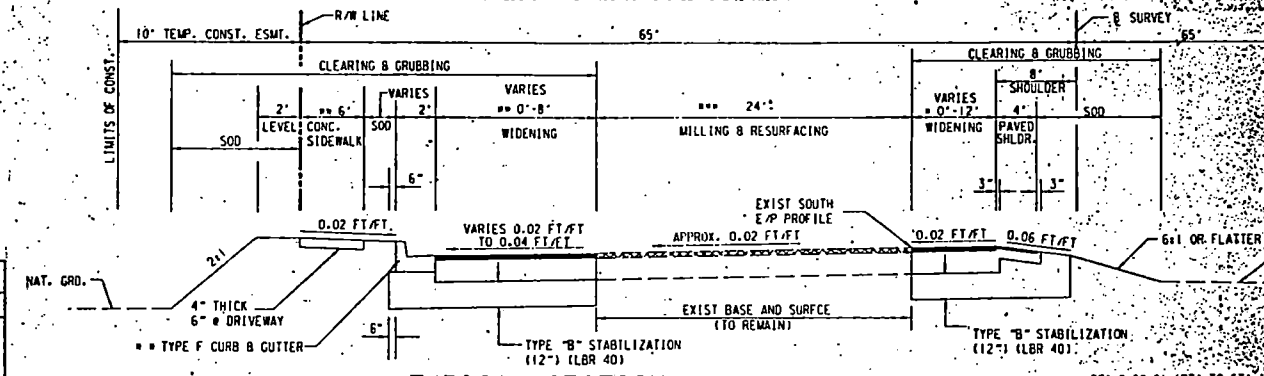
DESIGN SPEED 45 M.P.H.

SUMMARY OF OVERBUILD-WILLOUGHBY BLVD	
TYPE S-III OVERBUILD	
STA 78+07 - STA 79+01.6	1,150 LBS/SY AVG
STA 79+01.6 - STA 81+77	700 LBS/SY AVG

WIDENING: LIMEROCK BASE COURSE (10" THICK) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (250 LBS/SY) AND FRICTION COURSE FC-2 (5/8")

MILLING & RESURFACING: MILL EXIST ASPHALTIC CONC. PAVEMENT (1" AVG. DEPTH) AND CONSTRUCT TYPE S-III OVERBUILD COURSE (FOR THICKNESS, SEE SUMMARY OF OVERBUILD) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (125 LBS/SY) AND FRICTION COURSE FC-2 (5/8")

PAVED SHLDR: LIMEROCK BASE COURSE (4" THICK) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (100 LBS/SY) AND FRICTION COURSE FC-2 (5/8" THICK)



SUMMARY OF OVERBUILD-COVE RD	
TYPE S-III OVERBUILD	
STA 0+90.61 - STA 16+03.07	60 LBS/SY AVG

TYPICAL SECTION
COVE ROAD
STA. 0+90.61 TO STA. 16+03.07

* STA. 0+90.61 (RT) TO STA. 16+03.07 (RT)
** STA. 10+43.44 (LT) TO STA. 13+79.46 (LT)
STA. 0+90.61 (LT) TO STA. 9+00 (LT)
*** MILL & RESURFACE EXIST ROADWAY & PAVED SHOULDER FROM STA. 0+90.61 TO STA. 16+03.07

DESIGN SPEED 45 M.P.H.

WIDENING: SAME AS ABOVE

MILLING & RESURFACING: SAME AS ABOVE

PAVED SHLDR: SAME AS ABOVE

EXHIBIT 7

ADJUDICATED SUBMITTAL JUN 02 1995

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	C.E.	6/24/94	DRAWN BY	D.C.	6/24/94
CHECKED BY	G.C.	6/24/94	CHECKED BY	C.E.	6/24/94
SUPERVISED BY: GINO Y. CHARLES, P.E.					

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

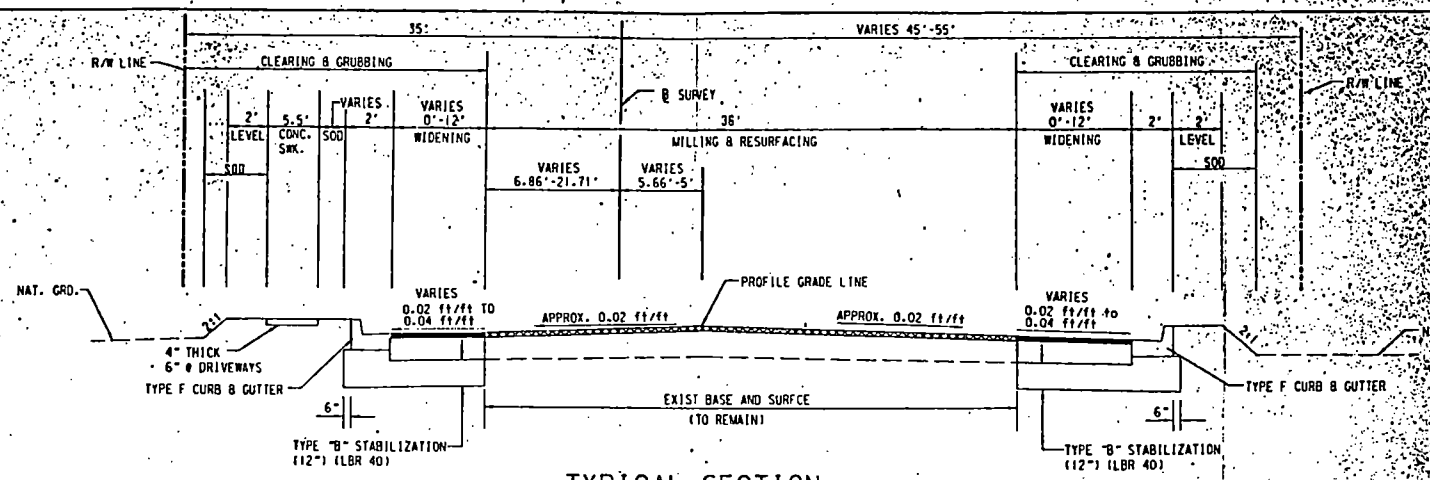
APPROVED BY: DATE:

LINDAHL, BROWNING, FERRARI & HELLSTROM, INC.

TYPICAL SECTIONS

JUN 01 1995

PROJECT NO.	SHEET NO.
92-E-41	5

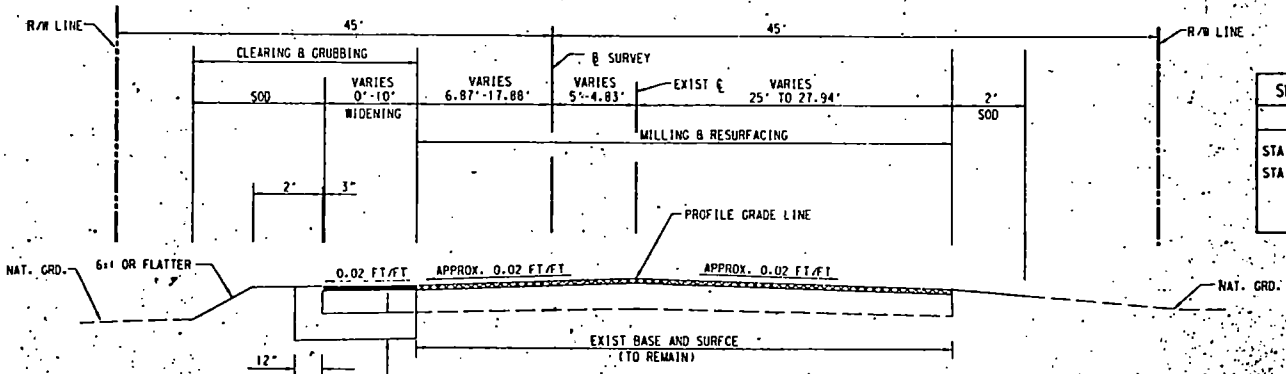


TYPICAL SECTION
SALERNO ROAD
STA. 199+10.44 TO STA. 201+00

WIDENING: LIMEROCK BASE COURSE (10" THICK) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (250 LBS/SY) AND FRICTION COURSE FC-2 (5/8")

MILLING & RESURFACING: MILL EXIST ASPHALTIC CONC. PAVEMENT(1" AVG. DEPTH) AND CONSTRUCT TYPE S-III OVERBUILD COURSE (FOR THICKNESS, SEE SUMMARY OF OVERBUILD) WITH TYPE S ASPHALTIC CONCRETE STRUCTURAL COURSE (125 LBS/SY) AND FRICTION COURSE FC-2 (5/8")

DESIGN SPEED 45 M.P.H.



SUMMARY OF OVERBUILD-SALERNO ROAD	
TYPE S-III OVERBUILD	
STA 199+10.44 TO STA 202+00	540 LBS/SY AVG
STA 202+00 TO STA 205+00	435 LBS/SY AVG

TYPICAL SECTION
SALERNO ROAD
STA. 203+00 TO STA. 208+00

WIDENING: SAME AS ABOVE

MILLING & RESURFACING: SAME AS ABOVE

DESIGN SPEED 45 M.P.H.

ADD/REVISED SUBMITTAL JUN 02 1995

EXHIBIT 8

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	C.R.	6/24/94	DRAWN BY	D.C.	6/24/94
CHECKED BY	G.C.	6/24/94	CHECKED BY	C.R.	6/24/94
SUPERVISED BY: GINO T. CHARLES, P.E.					

LINDAHL, BROWNING, FERRARI & KELLSTROM, INC.

APPROVED BY: DATE:

LINDAHL, BROWNING, FERRARI & KELLSTROM, INC.

TYPICAL SECTIONS

1-50

JUN 1995

WILLOUGHBY BOULEVARD FROM COVE ROAD TO SALERNO ROAD

PERMIT SUMMARY SHEET

APPLICATION NUMBER: 941110-14 **PERMIT MODIFICATION NO.** 88-43S

LOCATION: MARTIN COUNTY, SHANSON GRANT/T38S/R41E

OWNER: MARTIN COUNTY

ENGINEER: LINDAHL, BROWNING, FERRARI & HELLSTROM

PROJECT AREA: 15.5 ACRES **DRAINAGE AREA:** 15.5 ACRES

PROJECT USE: HIGHWAY

FACILITIES:

1. EXISTING: On June 2, 1988 General Permit No. 88-43S was issued for construction and operation of the Elementary School "A" access road which is now known as Willoughby Boulevard. On September 8, 1992 a modification to Permit No. 88-43S was issued for construction and operation of Willoughby Boulevard from the north end of the school "A" access road to the existing end of Willoughby Boulevard within the Willoughby development.

2. PROPOSED: Construction and operation authorization is requested for a surface water management system serving a 15.5 acre roadway project discharging to the Coral Gardens Canal system. This project is an extension of Willoughby Boulevard from Salerno Road to Cove Road (2,775 LF). Also, Tower Road will be extended to connect to the proposed Willoughby Boulevard (1,040 LF). Runoff from the proposed roadways will be directed via swales, inlets and culverts to two interconnected lakes which will discharge via a control structure to the Tower Road Ditch and then to the Coral Gardens Canal system. The Coral Gardens Canal system eventually discharges to the South Fork St. Lucie River. Three culverts will be placed within existing ditches to continue the flows in these ditches under the proposed roadway. These culverts will be located at Sta. 56+90, Sta. 63+35 and Sta. 71+30. Proposed structures S-72 and S-74 located at the intersection of Salerno Road and the Proposed Willoughby Boulevard will be raised inlets within grassed swales to provide water quality treatment for approximately 0.94 acres of the intersection that drains into the Salerno Road drainage system. The allowable discharge is based on a hydraulic study done for the Coral Gardens Canal System.

PROJECT LEVEL:

Exhibit 23

WILLOUGHBY BOULEVARD FROM COVE ROAD TO SALERNO ROAD

PERMIT SUMMARY SHEET

DRAINAGE BASIN: TIDAL ST LUCIE
RECEIVING BODY: CORAL GARDENS CANAL SYSTEM

WATER QUALITY:

Water quality treatment is being provided for 2.5 times the percent impervious within the wet detention areas (lakes).

Basin	Method	Vol Req'd. (ac-ft)	Vol Prov'd (ac-ft)
COVE TO SALERNO	1.54 acres WET DETENTION	1.50	6.00

DISCHARGE RATE:

Basin	Allow Disch (cfs)	Method of Determination	Design Disch (cfs)	Design Stage (ft, NGVD)
COVE TO SALERNO	.8	CONVEYANCE LIMITATION	.5	18.6

ENVIRONMENTAL ASSESSMENT:

PROJECT SITE DESCRIPTION

The alignment of the proposed right-of-way traverses through disturbed pine flatwood uplands and existing containerized nursery operations. No functional wetland areas were identified in the right-of-way for the southerly extension of Willoughby Boulevard.

EXISTING ON SITE UPLAND COMMUNITIES:

ID NO	TOTAL ACREAGE	BIOLOGICAL CONDITION	COMMUNITY TYPE	COMMUNITY ACREAGE
UPL	15.50	N/A	PINE FLATWOODS	1.50
			BRAZILIAN PEPPER	3.71
			DISTURBED LANDS	5.84
			INSTITUTIONAL	2.90
			BORROW AREAS	1.55

TOTAL ON SITE UPLAND ACREAGE: 15.50

Exhibit 24

WILLOUGHBY BOULEVARD FROM COVE ROAD TO SALERNO ROAD

PERMIT SUMMARY SHEET

ENDANGERED, THREATENED & SPECIES OF SPECIAL CONCERN SUMMARY:

No endangered/threatened or species of special concern were observed on site, and submitted information indicates that endangered/threatened or species of special concern use of the site is not an issue. This permit does not relieve the applicant from complying with all applicable rules and any other agencies' requirements if in the future, endangered/threatened or species of special concern are discovered on the site.

ENVIRONMENTAL SUMMARY

The proposed right-of-way for the extension of Willoughby Boulevard does not contain any wetland areas. Therefore, no adverse impacts to any wetland areas are anticipated as a result of the construction and operation of the surface water management system serving this project.

	TOTAL PROJECT	PREVIOUSLY PERMITTED	THIS PHASE	
TOTAL ACRES	47.65	32.15	15.50	acres
WTRM ACREAGE	4.99	3.45	1.54	acres
PAVEMENT	23.02	16.37	6.65	acres
PERVIOUS	19.64	12.33	7.31	acres

BASIN LEVEL BREAKDOWN AND FLOOD PROTECTION:

Basin Name: COVE TO SALERNO

FLOOD PROTECTION:

LOCAL ROAD CRITERIA
FLOOD CONTOUR 17.60 FEET NGVD
MINIMUM ROAD GRADE 18.00 FEET NGVD

Exhibit 25

STAFF REPORT DISTRIBUTION LIST

PROJECT: WILLOUGHBY BOULEVARD FROM COVE ROAD TO SALERNO ROAD
APPLICATION NUMBER: 941110-14
PERMIT MODIFICATION NUMBER: 88-43S

INTERNAL DISTRIBUTION
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DEPT. OF ENVIRONMENTAL PROTECTION
X Port St. Lucie

EXTERNAL DISTRIBUTION

X Applicant:
MARTIN COUNTY

X Applicant's Consultant:
LINDAHL, BROWNING, FERRARI & HELLSTROM

X Engineer, County of:
MARTIN

Engineer, City of:

Local Drainage District:

COUNTY
X Martin -Community Dev. Dir.

BUILDING AND ZONING

OTHER
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Div of Recreation and Park - District 7
F.G.F.W.F.C.
Port St. Lucie Planning Division
S.W.F.R.P.C. - Glenn Heath
Sierra Club - Central Florida Group

EXHIBIT 26

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