EXHIBIT F

SNC·LAVALIN

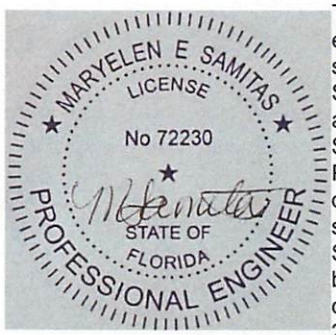
ATKINS
Member of the SNC-Lavalin Group

Ritch Grissom Memorial Wetlands Access Path

Feasibility Study

Task Order No. 10

June 6, 2022



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Document history

Document title: Feasibility Study

Document reference: 100076504

Revision	Purpose description	Originated	Checked	Reviewed	Authorized	Date
0	Draft Report	KC/MS	JW	FV	FV	11/19/2021
1	Final Report	KC/MS	JW	FV	FV	6/06/2022

Client signoff

Client	Task Order No. 10
Project	Grissom Wetlands Access Feasibility Study
Job number	100076504
Client signature/date	

Contents

EXECUTIVE SUMMARY

Brevard County has identified the need to evaluate the existing unpaved maintenance access that was constructed with the South-Central Regional Wastewater System (SCRWS) Constructed Wetlands in 1999/2000. The site is located at the west end of Wickham Road in Viera, in unincorporated Brevard County, adjacent to the existing SCRW Treatment Plant. This feasibility study evaluated the existing condition of the access road and recommends certain improvements to be made to the facilities so that the cell containment berms can be accessed by the general public for recreational use such as walking, cycling and viewing the wetland wildlife. Three separate options were considered:

- Constructing a paved one-way public access road with adjacent shared use path,
- Constructing a paved shared use path.
- Constructing an un-paved shared use path with a paved section for wheelchairs.
- All three options will include improving the existing parking area.

Our evaluation included the following tasks:

- Field observations and review of available data provided by the County.
- Geometric design requirements for vehicular roadways, shared use paths and accessible requirements,
- Evaluate factors that may limit the number of vehicles allowed on the paved access road.
- Preliminary environmental analysis to identify wetlands, surface waters and potential threatened and endangered species habitat that may be impacted by the proposed improvements.
- Research jurisdictional agency permitting requirements.
- Geotechnical investigation and structural stability review of the existing cell containment berms and evaluation of the existing subsurface soils.
- Recommendations for modifying the cell containment berms in the areas where the safety factors are too low to make the areas suitable for construction of the proposed improvements.

Findings of the evaluation are provided in this feasibility report and include separate concept plans and a cost estimate for each option based on existing publicly available aerial imagery.

Our analysis concludes that constructing an unpaved shared use path with a paved section for wheelchairs provides the best combination of accessibility while preserving the existing natural aesthetics of the facility and controlling upfront costs. Constructing a vehicular access road is the most expensive option, creates vehicle interaction risks with cyclist/pedestrians, requires significant environmental permitting, redesign and re-construction of the cell containment berms and a longer construction period.

Figure 1 Site Aerial

A. EXISTING SITE CONDITIONS

A.1. General Site Conditions

The project area is located at the west end of Wickham Road in Viera, in unincorporated Brevard County, adjacent to the existing South Central Regional Wastewater (SCRW) Treatment Plant Facility. The SCRW Treatment Plant first began operation in June 1990 with substantial modifications in 1994 and again in 1999 under FDEP permit DO05-197556 with the addition of the wetlands as part of the effluent disposal and reclaimed water reuse system. The 200-acre constructed wetland serves under current permit FL0102679 as a surface water discharge for treated effluent from the plant and storage for reuse water used by neighbouring golf courses and subdivisions. This wetland area has become a popular vantage point for use by the public to observe waterfowl and other wildlife using the wetland area as habitat. An existing unpaved maintenance access road is located along the top of the cell containment berm and an unpaved parking lot is located at the entrance to the facility in the northeast corner of the site with an unpaved ramp leading up to the top of the berm. Until recently a gate at the top of the ramp was left open to allow for vehicular access by the public to the maintenance access along the top of the berm. Currently the gate is closed but the public is still permitted to walk and bike along the maintenance access path.

The constructed wetland area is approximately 200 acres in size and consists of four 35-acre cells separated by an earthen berm. The center basin serves as a lake with a deeper water body and a maintained littoral zone. The Lake is also accessible via a perimeter berm, forming an inner loop named Heron Loop East & West. An earthen berm surrounds and contains the entire wetland area, forming the outer loop: Coot Lane to north, Limpkin EL to the south, Gator Trail to the east, and Otter EL to the west. A supply of reclaimed water from the treatment plant enters the flow control structure in the southeast corner where it is split to feed spreader pipes at Cells 1 and 2. This inflow is distributed through the remainder of the constructed wetland system via culverts and control structures. Under normal operating conditions, flow from Cells 1 and 2 will discharge through control structures into the lake. Bypass structures are provided to direct flow to Cells 3 and 4 if the Lake must be bypassed. The overflow from the entire wetland system is discharged to Four-Mile Canal via a control structure at the northwest corner of the site and ultimately released into the St Johns River.

A.2. Site Observations

A site visit was conducted by Atkins staff on 8/19/2021 to observe the existing condition of the cell containment berms, maintenance access road and parking lot. The berms appeared well vegetated with no signs of erosion. The maintenance access appeared to consist of a compacted crushed shell surface. Approximately 70% of the driving surface was stable with grass and other vegetative growth along the shoulders and to a lesser extent, within the driving surface itself. Thick, overgrown grass was encountered in some areas including the east side of the lake, however the road base still felt substantial to drive on even though visibility of the road surface was poor. The pull-off / parking area at the north side of the lake was stabilized and level with little sign of erosion. Several deep potholes capable of causing vehicle damage were noted along the north perimeter berm of Coot Lane. This may be due to the height of the shoulder vegetation being higher than the road, restricting drainage, causing standing water and road base degradation. There was a stockpile of sand/baserock located at the northwest junction of Coot Lane and Cattail Divide which did not have erosion protection and was partially blocking passage, however this was assumed to be a temporary condition. The parking lot outside of the gate is in poor condition with clear signs of erosion. The access drive from Charlie Corbeil Way to the parking lot and gate is severely rutted to the point where it has become hazardous to standard passenger vehicles. An interview with utility staff during the site visit revealed that the Brevard County Public Works Department would frequently mobilize on site to repair road damage after large storm events, especially when public vehicles were still allowed inside the gate. This further confirms the possibility that adjacent vegetation is restricting positive drainage from the road surface, saturating the base material.

An environmental / ecological study was conducted on 8/6/2021 by Atkins environmental scientists to identify the environmental resources present within the project boundaries including wetland and surface water limits, potential threatened and endangered species habitat, and other observed environmental constraints. Results of the study and site visit are summarized below:

- Within the Study Area, all wetland and surface water feature limits were confined to toe of slope of their original design when created under FDEP permit FL0102679

- If direct impacts to the wetlands and/or surface water are anticipated, then permitting through state/federal agencies may be required. Once project specifics have been determined, a pre-application meeting with the agencies is recommended.
- No documented (historic) bald eagle or crested caracara nests were observed in the Study Area or its vicinity.
- Although not directly observed, numerous listed species are known to utilize the Study Area.
- Every effort should be made to conduct planned construction activities outside of the nesting seasons of listed species; and if not possible, then consultation with FWC and USFWS is recommended to determine proper survey protocols. In addition, it is recommended that a clearance letter be submitted to FWC/USFWS to determine suggested avoidance measures.

Refer to Appendix C for full Environmental Assessment Memo.

A.3. Geotechnical Report

A subsurface geotechnical investigation was conducted in September/October 2021 by Ardaman and Associates, the project geotechnical engineer. The preliminary results of the investigation are located in Appendix D.1. The boring profiles include three 50 ft test holes, eleven 25 ft test holes, and eighteen 5 ft auger borings. The results indicate a mix of silt and clay with fine sands and traces of shell. A full geotechnical report and cell containment berm global stability analysis were conducted in January/February 2022 by Ardaman and Associates. Ten berm cross sections were analysed, and calculated factors of safety ranged from approximately 1.5 to 2.4. A minimum safety factor of 1.3 is typically used for this application, which was exceeded for the ten cross sections that were analysed. These results are provided in Appendix D.2. The results of the subsurface geotechnical investigations and the global stability analysis indicate that the existing soils on the site are suitable for the construction of the proposed berms, the asphalt roadways, and the asphalt parking area. Recommendations for the site preparation and construction were also provided and located in Appendix D.3.

B. PROPOSED IMPROVEMENTS

B.1. References:

The evaluation was based on the following information and reference materials:

- Client Provided Information,
- Historical permits and plans,
- Field Research & Observations,
- Brevard County GIS Data,
- St. John's Water Management District; Online Permit Search (ePermitting),
- FEMA Flood Mapping Online,
- FDEP Map Direct Gallery,
- USDA NRCS Web Soil Survey,
- USFWS National Wetland Inventory,
- USGS Quadrangle Topographic Map,
- Florida Greenbook,
- Florida Department of Transportation (FDOT) Design Manual,
- Brevard County Land Development Details
- National Fire Protection Association (NFPA)

B.2. Geometry Requirements:

The following design guidelines and requirements were used for all options to define the roadway and shared path geometry and typical section:

- Two-way vehicular entrance drive width 20 ft (two 10 ft lanes) with 6 ft stabilized shoulders based on the following:
  - FDOT Design Manual Table 210.2.1 – Minimum Travel and Auxiliary Lane Widths allows 10 ft wide lanes
  - FDOT Design Manual Section 210.4.1 - Shoulder Cross Slopes recommends 0.06 outside shoulder slope.
  - Brevard County Land Development Exhibit 2, Marginal Access and Local Streets Rural Section allows 6 ft wide stabilized shoulders at 6%.
  - 20 ft pavement width must closely match the existing width of Charlie Corbeil Way
- One-way vehicular drive width along berm based on the following:
  - FDOT Design Manual Table 210.2.1 – Minimum Travel and Auxiliary Lane Widths allows 10 ft wide lane.
  - FDOT Design Manual Section 210.4.1 - Shoulder Cross Slopes recommends 0.06 outside shoulder slope.
  - Brevard County Land Development Exhibit 2, Marginal Access and Local Streets Rural Section allows 6 ft wide stabilized shoulders at 6%.
  - Because the speed limit is under 15 mph and due to the corridor width constraints, a travel lane of 10 ft with 4 ft stabilized shoulders was deemed safe and acceptable.
  - NFPA 1 Chapter 18.2.3.4 Emergency Response access width of 20 ft; provided by the 10 ft vehicular drive, the 6 ft stabilized shoulder/clear zone and the 10 ft shared use path.
- Multiuse shared path width 10 ft based on:
  - FDOT Design Manual Section 224.4 which allows 10 ft wide where there is limited right-of-way.
- Multiuse shared path 4' clear area including 2' wide graded area with 1:6 slope adjacent to both sides of the path:
  - FDOT Design Manual Section 224.7 Horizontal Clearance
- Clear zone separation between vehicle travel lane and shared path 6 ft based on:
  - FDOT Design Manual Table 215.2.1 – Clear Zone Width Requirements which allows 6 ft for RRR projects.
- Paved roadway cross slope 2% based on:
  - Brevard County Land Development Exhibit 2, Marginal Access and Local Streets Rural Section recommends 2% cross slope across the travel lane.
- Paved shared use path cross slope 1.5% design, 2% max based on:
  - BC Lands Development Criteria, Exhibit 13 Pedway Construction Details
  - ADA Standards for Accessible Design
- Un-paved shared use path cross slope 4% based on:
  - Brevard County Land Development Exhibit 10, note 20 requires minimum slope of 2% on unpaved roads.
  - Gravel Roads Construction & Maintenance Guide published 2015 by Federal Highway Administration - recommends cross slope between 4% - 6% on unpaved roads, creating less potential for water to concentrate and scour the road surface or penetrate and weaken the road base.

- Berm side slopes of 4:1
  - Brevard County Land Development Exhibit 10, note 17 requires maximum slope of 4:1 on roadside swales.
- Paved parking:
  - Brevard County Code Section 62-3206 Parking & Loading requirements –
    - (c)(1)a. 9 ft wide by 20 ft long (or 18 ft long with front bumper overhang)
    - (c)(2)a. 24 ft two-way drive aisle
    - (d)(25) Parks and recreation areas: Parking spaces should be considered on the specific parks development plan and should be determined by its active or passive facilities. A parking study must be reviewed and approved by the county traffic section.

B.3. Proposed Improvement Options

B.3.1. Option A - Constructing a paved one-way public access road with adjacent shared use path

This option is for the construction of a paved 10 ft wide one-way public access road and a paved 10 ft wide accompanying shared use path separated by a 6 ft grassed clear zone and 4 ft shoulders for safety. Nearly all of the existing maintenance roads along the cell containment berms are one way and approximately 12 ft wide with 4 ft shoulders (top of berm width of 20 ft), therefore constructing this plan would require extensive modifications to the existing berm widths. To accommodate two 10 ft lanes, a 6 ft clear zone, and 4 ft shoulders, the top of berm would need to be widened to 34 ft. This requires a total expansion of approximately 14 ft or 7 ft on each side. Keeping the same berm side slopes would require the bottom width of the berm to increase by the same amount creating major impacts to the geometry of the cells, surface water storage capacity, and many piping components. Environmental permitting requirements would be triggered, both to provide treatment volume for the paved roadway and mitigation for the surface water and habitat impacts. This option is graphically depicted in Appendix A.1.

In addition to the challenges with the tight corridor geometry, the need for ample signage and striping to maintain safe operation of vehicles and pedestrians/bicyclists side by side would now become a critical component to consider with Option A. At every intersection, signage and striping would be required to direct motorists to stop and yield to pedestrians at cross walks. Each intersection is unique based on the direction of travel, number of turning movements and orientation of the shared use path in relation to the motorists. A few examples of the level of detail that may be required in the final design for these intersections are included with the concept plan. Albeit an improvement over the previous condition where the same unpaved road was shared by both vehicles and pedestrians, constructing a *dedicated* shared use path may draw more users to the site creating more opportunities for conflicts between motor vehicles and pedestrians/cyclists. If this option *is* desired, it is recommended to consider limiting public vehicular traffic to the outer and inner loops, using gates accessible only to maintenance traffic on Cattail Divide, Snail Cut, and Caracara Divide. This would eliminate a number of conflict points while still maintaining pedestrian and bicyclist accessibility to all areas via bollards or other physical barrier selective to vehicles. It is anticipated that the 10 ft wide shared use path would be blocked off from vehicle

use with bollards and appropriate pavement markings and signage conspicuous enough for motorists to not mistake the shared use path as a motor vehicle lane.

For all options including Option A, access to the wetlands would be at the existing entry gate via a new 20 ft wide, paved two-way drive where the unpaved entry is currently located. The parking lot outside the entry gate would be reconstructed with asphalt pavement and graded to drain to the perimeter retention. ADA parking and access isle will be denoted in the new parking lot plan as well as an ADA compliant connection between the parking lot and the paved, shared use path.

Permitting Requirements for Option A will require a modification to the original ERP and wetland mitigation through SJRWMD and FDEP

Advantages of Option A:

- Allows the public to access the wetlands without leaving their vehicle.
- Provides paved vehicular access to both public and maintenance personnel.
- Reduces erosion and frequency of future road maintenance.

Disadvantages of Option A:

- This option is the most costly concept.
- Requires adding fill to the cellular containment berm to create the required top width.
- Requires permitting through SJRWMD and FDEP.
- Requires reconstructing the spreader pipe system from the treatment plant effluent piping into the Cells 1 & 2.
- Requires lengthening culverts through the cell containment berms connecting internal control structures.
- Requires modification and design revision to the wetland treatment facility due to the loss of surface water storage volume needed to widen the base of the cell containment berms.
- May require hydraulic modelling calculations and modification of internal control structures.
- A longer design, permitting and construction schedule is anticipated due to the impacts to the existing features and the amount of fill required.
- The vehicular access through the wetland contributes noise and air pollution and detracts from the natural aesthetics of the wetland area.
- With paved roads, speeding could become an issue, encouraging vehicular accidents.
- The similar width and asphalt surface of the vehicular road and shared use path is likely to cause confusion to motorists, pedestrians and cyclists. Options to mitigate the risk of vehicles driving off the road would require a combination of fencing, bollards, signage, curbs and pavement markings that would further increase the project cost, detract from the natural aesthetics and reduce emergency response access.

B.3.2. Option B - Construct a paved shared use path

This option consists of the construction of a paved 12 ft wide shared use path connecting all cell containment berms. The path would not be accessible to public vehicles but only to pedestrians, bicyclists, and other recreational users. Since the existing width of berm is 12 ft plus shoulders and used by maintenance vehicles, it is recommended that the paved shared use path also be 12 ft wide, paved with asphalt or concrete. For the purpose of this exercise, the preferred pavement type was assumed to be asphalt. This will allow ample width for maintenance or emergency vehicles as required (12 ft paved width plus 4 ft stabilized shoulders on each side). Some signage will be required at intersections but unlike Option A, there is no risk of accidents with passenger cars. Access by maintenance staff will be provided by a locked gate with fencing. This option is graphically depicted in A.2.

Unlike Option A, the geometry of the existing cell containment berms will remain the same in Option B. Since the paved road will not be designed for public traffic, shoulder width can be reduced, resulting in a proposed section that closely matches the existing condition, greatly simplifying the design, permitting and construction process.

For all options including Option B, access to the wetlands would be at the existing entry gate via a new, 20 ft wide, paved, two-way drive where the unpaved entry is currently located. The parking lot outside the entry gate would be reconstructed with asphalt pavement and graded to drain to the perimeter retention. ADA parking and access isle will be denoted in the new parking lot plan as well as an ADA compliant connection between the parking lot and the paved, shared use path. Unique to Options B and C is the addition of a 2nd entry gate immediately west of the parking lot driveway. The 2-way paved drive between the parking lot and wetland entrance would therefore only be for maintenance use and special events. Otherwise, this portion of the drive will be for foot/bike traffic only. This will allow for a shorter ADA compliant connection and eliminate the vehicular dead end at the current entry gate, affording motorists the opportunity to turn around in the parking lot rather than backing up.

Permitting Requirements for Option B will be to file for an exemption under FAC 62-330.051 Exempt Activities; relevant sections noted below:

(e) Repair, stabilization, paving, or repaving of existing roads, and the repair or replacement of vehicular bridges that are part of the road, where:

1. They were in existence on or before January 1, 2002, and have:

a. Been publicly-used and under county or municipal ownership and maintenance thereafter, including when they have been presumed to be dedicated in accordance with Section 95.361, F.S.;

2. The work does not realign the road or expand the number of traffic lanes of the existing road, but may include safety shoulders, clearing vegetation, and other work reasonably necessary to repair, stabilize, pave, or repave the road, provided that the work is constructed using generally

accepted roadway design standards;

5. *Roadside swales or other effective means of stormwater treatment are incorporated as part of the work;*
6. *No more dredging or filling of wetlands or water of the state is performed than is reasonably necessary to perform the work in accordance with generally accepted roadway design standards;*
7. *Notice of intent to use this exemption is provided to the Agency 30 days before performing any work; and*
8. *All work is conducted in compliance with subsection 62-330.050(9), F.A.C.*

Advantages of Option B:

- Less costly than Option A
- The entire trail is paved to provide smooth wheelchair access.
- Provides paved vehicular access for maintenance personnel.
- Reduces erosion and frequency of road maintenance.
- The total paved and stabilized width is sufficient to allow for 20 ft wide emergency vehicle access.

Disadvantages of Option B:

- Extensive asphalt pavement may detract from the aesthetics of a nature trail.
- Additional paved asphalt surface to maintain.
- More costly than Option C

B.3.3. Option C - Constructing an un-paved shared use path with a paved section for wheelchairs

This option consists of the construction of a paved shared use path along the front loop only. The remainder of the cell containment berms will have a newly constructed, unpaved, shared use trail. Both the paved shared use path and the unpaved shared use trail will primarily be in the same footprint as the current existing maintenance roads but would be reconstructed and graded properly to provide stormwater drainage off the edge of the shared use surface, unimpeded by vegetative growth along the shoulder. Similar to Option B, Option C will not require geometry change to the berm width or significant earth work, surface water impacts, or import fill. This option is graphically depicted in A.3.

The advantage of having the paved shared use path along the front loop is combining ADA accessibility in proximity to the parking and minimizing cost with a reduced scope of overall paving. The proposed paved loop would be Gator Trail to Hog Cut, Heron Loop East along the Lake, and down Caracara Drive back to Gator Trail.

For all options including Option C, access to the wetlands would be at the existing entry gate via a new paved 20 ft wide two-way drive. The parking lot outside the entry gate would be reconstructed with asphalt pavement and graded to drain to the perimeter retention. ADA parking and access aisle will be denoted in the new parking lot plan as well as an ADA compliant connection between the parking lot and the paved, shared use path. Unique to Options B and C is the addition of a 2nd entry gate immediately west of the parking lot driveway. The 2-way

paved drive between the parking lot and the wetland entrance would provide access for maintenance and special events. Otherwise, this portion of the drive will be for foot/bicycle traffic only. This will allow for a shorter ADA compliant connection and eliminate the vehicular dead end at the current entry gate, affording motorists the opportunity to turn around in the parking lot rather than backing up.

Permitting Requirements for Option C will be to file for an exemption under FAC 62-330.051 Exempt Activities which includes *Repair, stabilization, paving or repaving of existing roads* as outlined in the previous section.

Advantages of Option C:

- Lowest cost option.
- Additional segments of the shared use path can easily be paved later if desired.
- Provides a balance between paved accessible path and un-paved trail, optimizing the natural aesthetics of the facility.

Disadvantages of Option C:

- The design cross section of the unpaved trail will require periodic maintenance; however, it is anticipated this will be less often because vehicular traffic will be limited to maintenance and emergency vehicles.
- ADA accessibility would be limited to the front loop only.

As previously noted, all options anticipate providing a paved parking lot at the entrance with a paved access drive and gated access control. The access control gate would accommodate vehicles and pedestrians/bikes/wheelchair access so that the facility can be completely closed if necessary. It is understood that the anticipated users will be pedestrians and cyclists and NOT equestrian or ATV enthusiasts. For Parks and recreation areas, the Brevard County code does not specify a number of parking spaces for the trail head. Instead, it instructs that the number of spaces be based on the specific park development plan and facilities. A parking study is recommended to determine current usage and forecast projected usage after improvements. The study will need to be reviewed and approved by the county traffic section. The concept plans enclosed depict the parking lot of equivalent size as existing, provides 15 parking spaces includes 2 dedicated ADA, and has the potential for overflow parking in the grass.

C. SUMMARY

Based on our evaluation and cost estimates for the three concept plans, we recommend Option C as the most cost-effective way to improve public access to the wetland observation path. This option provides a paved section for wheelchair access and an unpaved shared use path, offering the best combination of accessibility while preserving the existing natural aesthetics of the facility and controlling upfront costs. Rutting of the unpaved

surface will be significantly reduced by proper gravel material selection, cross slope grading, reduction of high shoulders and limiting vehicular traffic to maintenance vehicles only.

By comparison, constructing a vehicular access road is the most expensive option, creates vehicle interaction risks with cyclist/pedestrians, requires significant environmental permitting, redesign and re-construction of the cell containment berms and a longer construction period.

Option C also provides the future opportunity to easily extend the limits of the paved shared use path further west into the wetland site should this be desired based on public use and feedback.

APPENDICIES

Appendix A. Concept Plans

A.1. Option A – Paved One-way road with shared use path

A.2. Option B – Paved shared use path

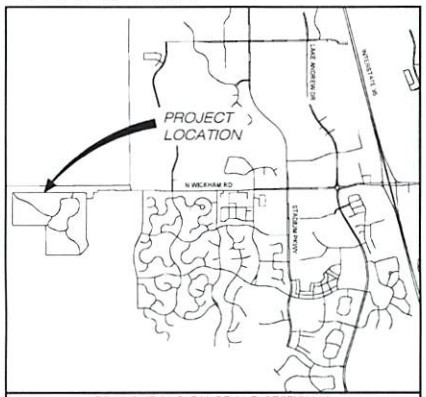
A.3. Option C – Partially paved shared use path

A.4. Paved Parking Area (all options)

RITCH GRISSOM MEMORIAL WETLANDS ACCESS IMPROVEMENTS

BREVARD COUNTY, FLORIDA

LOCATION MAP NTS



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JUNE 2022

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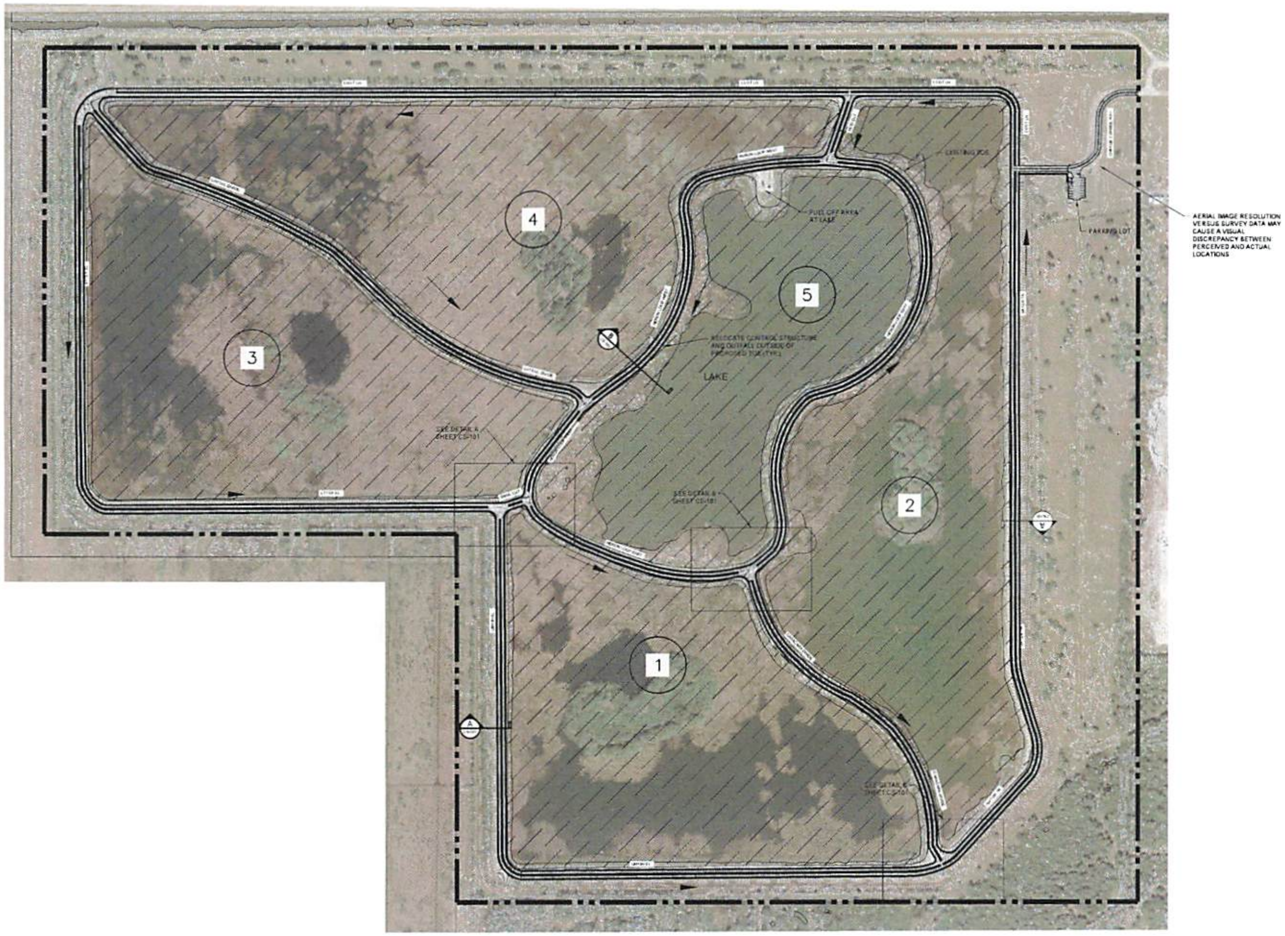

OPTION A - PAVED MULTI-USE TRAIL & SEPARATE ONE WAY VEHICULAR ACCESS DRIVE

NORTH

0 100 200 400

GRAPHIC SCALE
SCALE: 1" = 200'
HALF SIZE: 1" = 400'

LEGEND :

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER
- LIMITS OF CONSTRUCTION
- TRAFFIC DIRECTIONAL ARROW
- (1) CELL ID NUMBER

MARYELEN E. SAMITAS, P.E.
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Rev	Date	Description	By	Ch'kd	Auth

Drawing Status: CONCEPT PLAN | Suitability: CR

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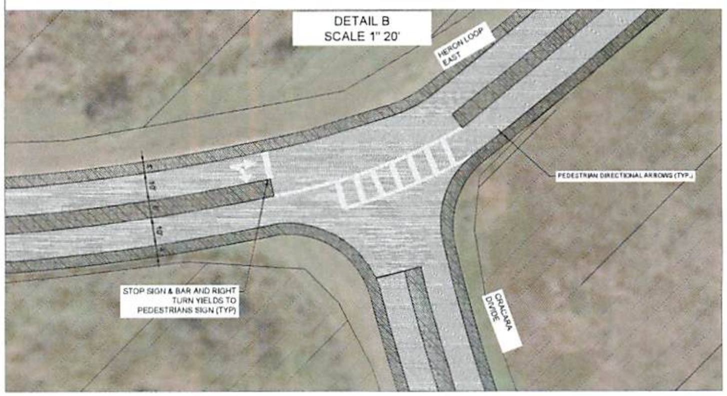
Client: BREVARD COUNTY UTILITIES SERVICES DEPARTMENT

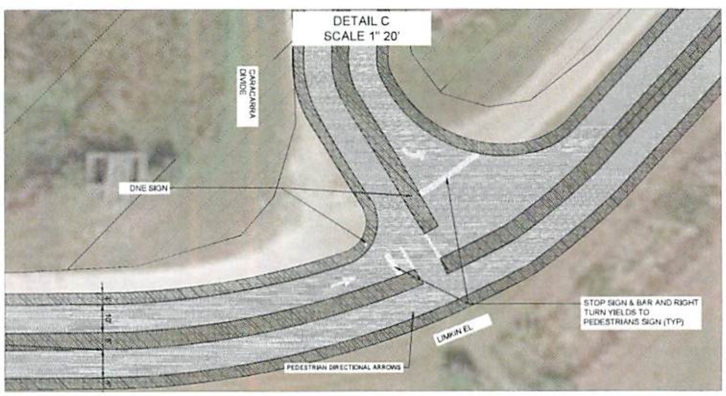
Project Title: RITCH GRISSOM MEMORIAL WETLANDS ACCESS IMPROVEMENTS

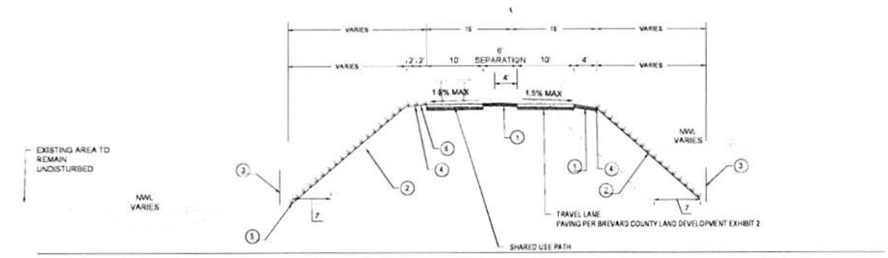
Drawing Title: OVERALL SITE PLAN OPTION A

Scale	Designed	Drawn	Checked	Authorized
AS SHOWN	KLC	KLC	JRR	MES
Original Size: ARCH D	Date: 9/01/21	Date: 9/01/21	Date:	Date:

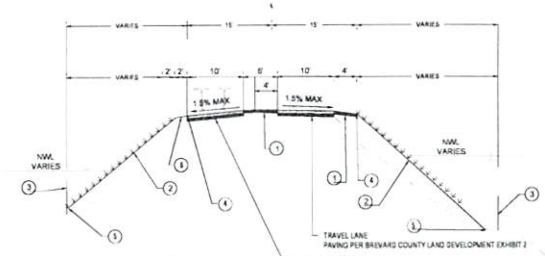
Drawing Number: CS-100 | Revision: 0





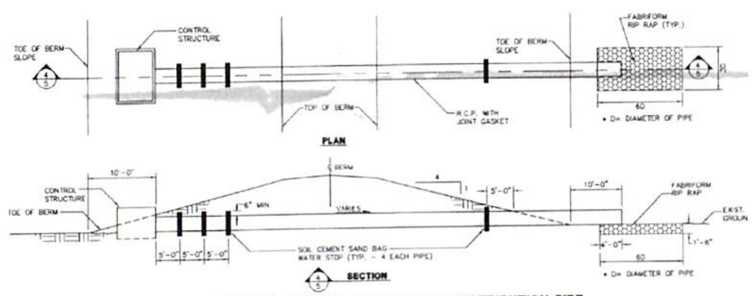


SECTION A TYPICAL EXTERIOR BERM AND STORMWATER CONVEYANCE DITCH DETAIL NTS



SECTION B TYPICAL INTERIOR BERM DETAIL NTS

1. TYPE B STABILIZED SHOULDER. 1:6 MAX SLOPE PER FDM TABLE 210.4.2
2. 4:1 MAX SLOPE, SOD
3. EROSION CONTROL STRUCTURE. USE SILT FENCE WHEN THE NWL IS BELOW TOE. USE FLOATING TURBIDITY BARRIER PER FDOT INDEX #103 IF NWL IS ABOVE TOE. SOD DISTURBED AREAS
4. TOP OF BERM
5. TOE OF BERM
6. MAINTAIN A 4' WIDE CLEAR SPACE ADJACENT TO THE SHARED USE PATH. WITHIN THE CLEAR SPACE, PROVIDE A 2' GRADED AREA WITH A MAXIMUM 1:6 SLOPE ADJACENT TO SHARED USE PATH, PER FDM 224.7 HORIZONTAL CLEARANCE
7. 10' SHARED USE PATH PER FDM 224.4
8. 10' LANE WIDTH PER FDM TABLE 210.2.1 (3)
9. 6' SEPARATION REQUIRED PER FDOT FDM TABLE 215.2.1
10. EXISTING DRAINAGE STRUCTURE IS TO BE RELOCATED PER TYPICAL INTERNAL CONTROL STRUCTURE AND DISTRIBUTION PIPE DETAIL. CONTRACTOR IS TO MATCH EXISTING PIPE MATERIAL AND DIAMETER.
11. BOLLARDS TO BE ADDED AT SHARED USE PATH ENTRANCES LOCATED IN INTERSECTIONS



TYPICAL INTERNAL CONTROL STRUCTURE & DISTRIBUTION PIPE

NTS

NORTH

0 100 200 400

GRAPHIC SCALE
SCALE: 1" = 200'
HALF SIZE: 1" = 400'

LEGEND :

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER / GRASSED STABLIZED AREA
- EXISTING GRADE
- NWL — NORMAL WATER LEVEL
- TYP. — TYPICAL

MARYELEN E. SAMITAS, P.E.
FLORIDA REGISTRATION #72230

Rev	Date	Description	By	Ch kd	Ap pd

Drawing Status: CONCEPT PLAN | Suitability: CR

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FBPR CERTIFICATE OF AUTHORIZATION NO.24
www.atkinsglobal.com

Client: BREVARD COUNTY UTILITIES SERVICES DEPARTMENT

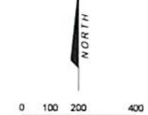
Project Title: RITCH GRISSOM MEMORIAL WETLANDS ACCESS IMPROVEMENTS

Drawing Title: SECTION AND DETAILS OPTION A

Scale	Designed	Drawn	Checked	Authorized
AS SHOWN	KLC	KLC	JRR	MES
Original Size: ARCH D	Date: 9/01/21	Date: 9/01/21	Date:	Date:

Drawing Number: CS-101 | Revision: 0

OPTION B - PAVED MULTI-USE PATH WITH NO PUBLIC VEHICULAR ACCESS



GRAPHIC SCALE
SCALE: 1" = 200'
HALF SIZE: 1" = 400'

LEGEND :

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER
- LIMITS OF CONSTRUCTION
- TRAFFIC DIRECTIONAL ARROW
- CELL ID NUMBER

MARYELEN E. SAMTAS, P.E.
FLORIDA REGISTRATION #72230

Rev	Date	Description	By		

Drawing Status: CONCEPT PLAN
Suitability: CR

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AUTHORIZATION NO.24
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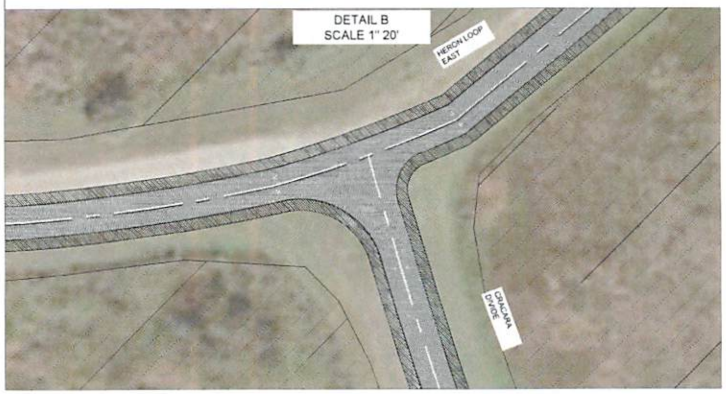
Client:
BREVARD COUNTY
UTILITIES SERVICES
DEPARTMENT

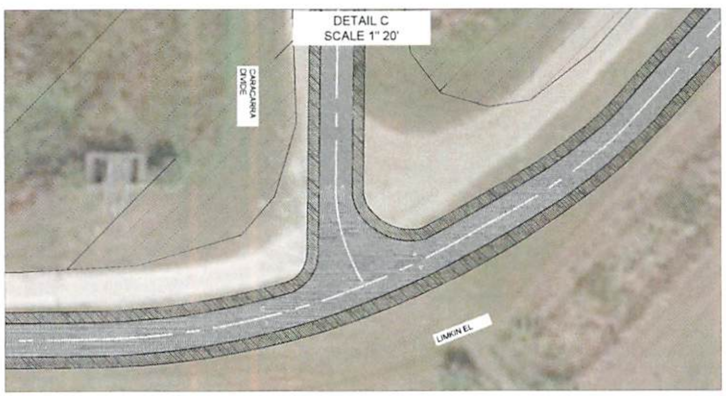
Project Title:
VIERA WETLANDS
ACCESS IMPROVEMENTS

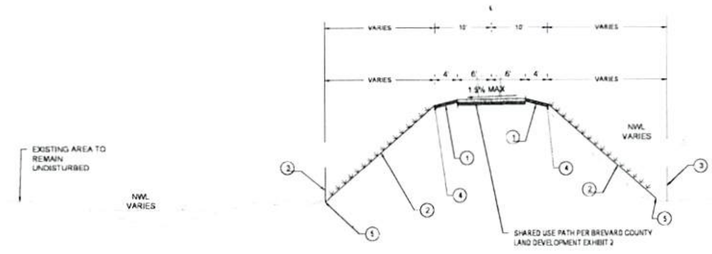
Drawing Title:
SITE PLAN - CELL 2
OPTION B

Scale	Designed	Drawn	Checked	Authorized
AS SHOWN	KLC	KLC	JRR	MES
Original Size: ARCH D	Date: 9/01/21	Date: 9/01/21	Date:	Date:

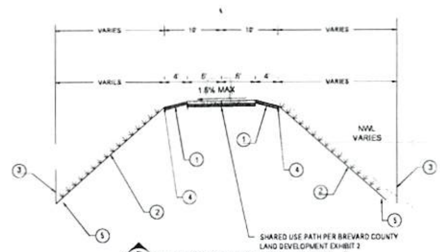
Drawing Number: CS-102
Revision: 0





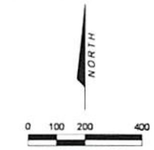


A — SECTION A: TYPICAL EXTERIOR BERM AND STORMWATER CONVEYANCE DITCH DETAIL NTS



B — SECTION B: TYPICAL INTERIOR BERM DETAIL NTS

1. TYPE B STABILIZED SHOULDER. 1:6 MAX SLOPE PER FDM TABLE 210.4.2
2. 4:1 MAX SLOPE, SOD
3. EROSION CONTROL STRUCTURE. USE SILT FENCE WHEN THE NWL IS BELOW TOE, USE FLOATING TURBIDITY BARRIER PER FDOT INDEX #103 IF NWL IS ABOVE TOE. SOD DISTURBED AREAS
4. TOP OF BERM
5. TOE OF BERM
6. MAINTAIN A 4' WIDE CLEAR SPACE ADJACENT TO THE SHARED USE PATH. WITHIN THE CLEAR SPACE, PROVIDE A 2' GRADED AREA WITH A MAXIMUM 1:6 SLOPE ADJACENT TO SHARED USE PATH, PER FDM 224.7 HORIZONTAL CLEARANCE
7. 10' SHARED USE PATH PER FDM 224.4



GRAPHIC SCALE
SCALE: 1" = 200'
HALF SIZE: 1" = 400'

LEGEND :

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER / GRASSED STABLIZED AREA
- EXISTING GRADE
- NWL — NORMAL WATER LEVEL
- TYP. — TYPICAL

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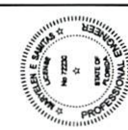

SIGNATURE — DATE

Rev	Date	Description	By	Ch.	Ap.

Drawing Status: CONCEPT PLAN — Suitability: CR

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FBPR CERTIFICATE OF AUTHORIZATION NO.24
www.atkinsglobal.com

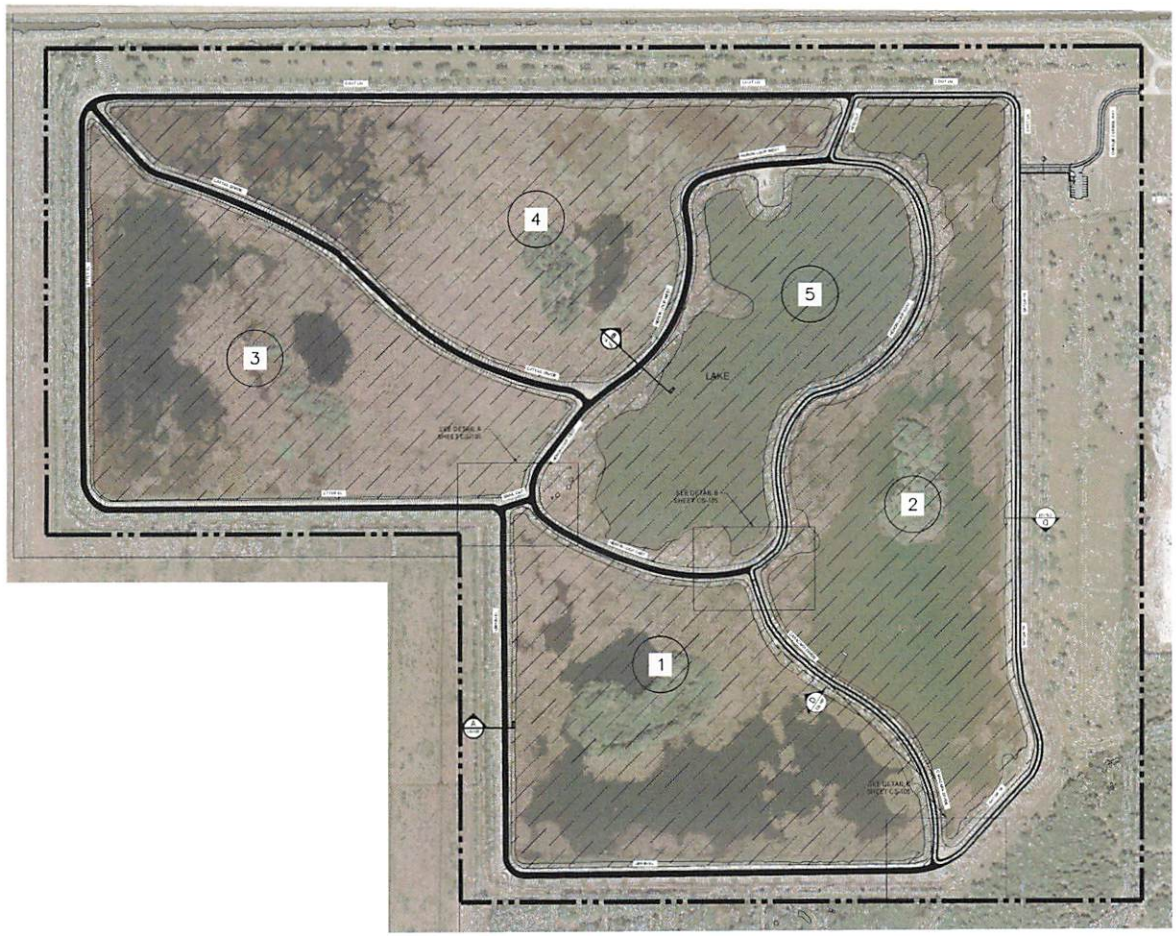
Client: BREVARD COUNTY UTILITIES SERVICES DEPARTMENT

Project Title: VIERA WETLANDS ACCESS IMPROVEMENTS

Drawing Title: SECTION AND DETAILS OPTION B

Scale	Designed	Drawn	Checked	Authorized
AS SHOWN	KLC	KLC	JRR	MES
Original Size: ARCH D	Date: 9/01/21	Date: 9/01/21	Date:	Date:

Drawing Number: CS-103 — Revision: 0



OPTION C - PAVED MULTI-USE TRAIL AROUND CELL 2 ONLY WITH REMAINDER OF TRAIL STABILIZED UNPAVED; NO PUBLIC VEHICULAR ACCESS

NORTH

0 100 200 400

GRAPHIC SCALE
SCALE: 1" = 200'
HALF SIZE: 1" = 400'

LEGEND :

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER
- LIMITS OF CONSTRUCTION
- TRAFFIC DIRECTIONAL ARROW
- (1) CELL ID NUMBER

MARYELEN E. SANTAS, P.E.
FLORIDA REGISTRATION #72293

SIGNATURE DATE

Rev	Date	Description	By	Ch'ked	Appr'd

Drawing status: CONCEPT PLAN
Suitability: CR

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TAMPA, FLORIDA 33607
FBPE CERTIFICATE OF AUTHORIZATION NO.28
www.atkinsglobal.com

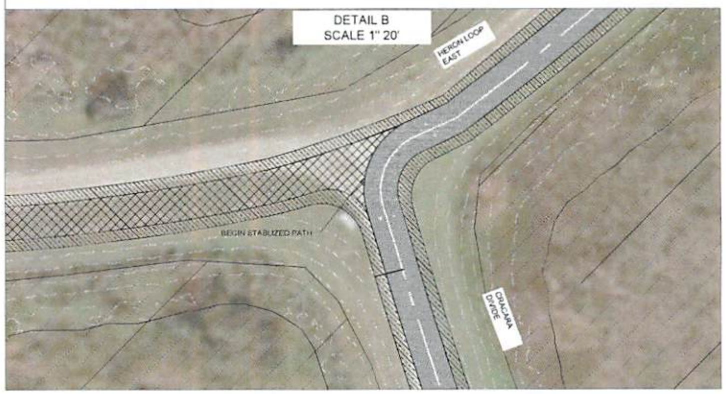
Client:
BREVARD COUNTY
UTILITIES SERVICES
DEPARTMENT

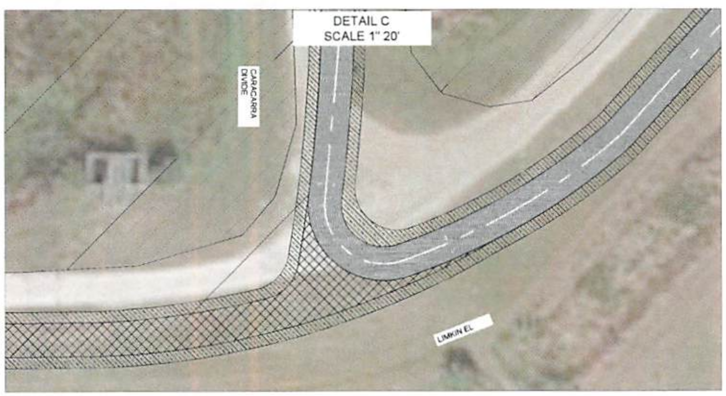
Project Title:
VIERA WETLANDS
ACCESS IMPROVEMENTS

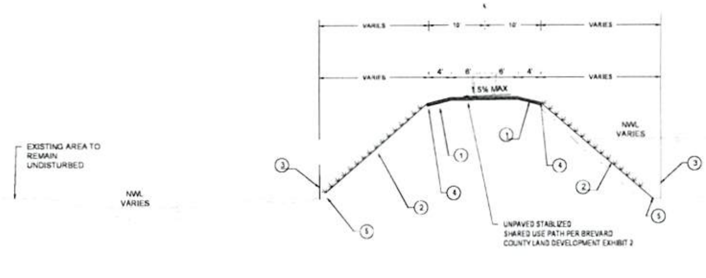
Drawing Title:
SITE PLAN - CELL 4
OPTION C

Scale	Designed	Drawn	Checked	Authorised
AS SHOWN	KLC	KLC	JRR	MES
Originator	Date	Date	Date	Date
ARCH D	8/31/21	8/31/21		

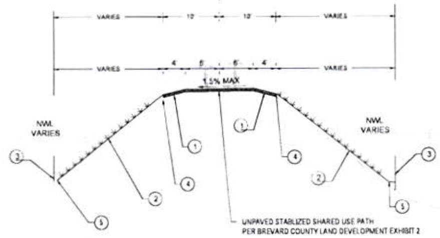
Drawing Number: CS-104
Revision: 0



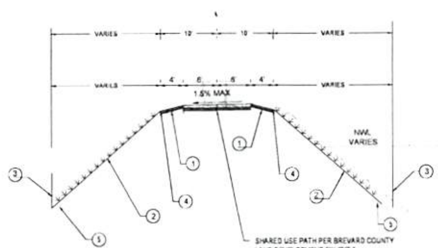




SECTION A TYPICAL EXTERIOR BERM AND STORMWATER CONVEYANCE DITCH DETAIL NTS



SECTION B TYPICAL INTERIOR BERM DETAIL NTS



SECTION D TYPICAL EXTERIOR BERM AND STORMWATER NTS

1. TYPE B STABILIZED SHOULDER. 1:6 MAX SLOPE PER FDM TABLE 210.4.2
2. 4:1 MAX SLOPE. SOD
3. EROSION CONTROL STRUCTURE. USE SILT FENCE WHEN THE NWL IS BELOW TOE. USE FLOATING TURBIDITY BARRIER PER FDOT INDEX #103 IF NWL IS ABOVE TOE. SOD DISTURBED AREAS
4. TOP OF BERM
5. TOE OF BERM
6. MAINTAIN A 4' WIDE CLEAR SPACE ADJACENT TO THE SHARED USE PATH. WITHIN THE CLEAR SPACE, PROVIDE A 2' GRADED AREA WITH A MAXIMUM 1:6 SLOPE ADJACENT TO SHARED USE PATH, PER FDM 224.7 HORIZONTAL CLEARANCE
7. 10' SHARED USE PATH PER FDM 224.4

NORTH

0 100 200 400
GRAPHIC SCALE
SCALE: 1" = 200'
HALF SIZE: 1" = 400'

LEGEND:

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER / GRASSED STABLIZED AREA
- EXISTING GRADE
- NWL NORMAL WATER LEVEL
- TYP. TYPICAL

MARYELEN E. SAMITAS, P.E.
FLORIDA REGISTRATION #72230

SIGNATURE
DATE

Rev	Date	Description	By	Ch'd	Ap'd

Drawing Status: CONCEPT PLAN
Suitability: CR

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FBPR CERTIFICATE OF AUTHORIZATION NO.24
www.atkinsglobal.com

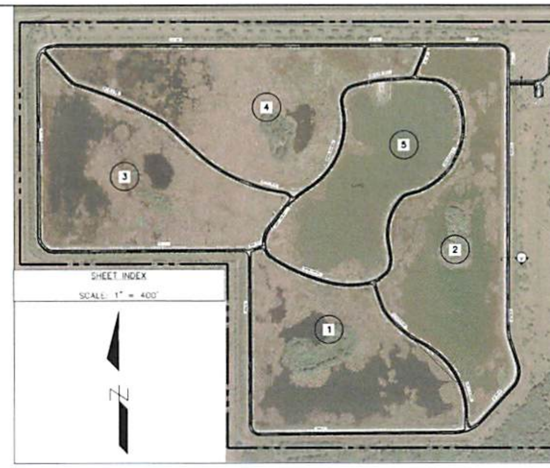
Client: BREVARD COUNTY UTILITIES SERVICES DEPARTMENT

Project Title: VIERA WETLANDS ACCESS IMPROVEMENTS

Drawing Title: SECTION AND DETAILS OPTION C

Scale	Designed	Drawn	Checked	Authorized
AS SHOWN	KLC	KLC	JRR	MES
Original Size: ARCH D	Date: 9/01/21	Date: 9/01/21	Date:	Date:

Drawing Number: CS-105
Revision: 0



NORTH

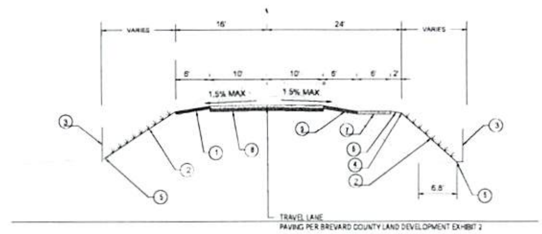
0 15 30 60

GRAPHIC SCALE
SCALE: 1" = 30'
HALF SIZE: 1" = 60'

LEGEND :

- ASPHALT PAVEMENT
- CONCRETE PAVEMENT
- SURFACE WATER IMPACTS
- STABILIZED SURFACE
- GRASSED SHOULDER
- LIMITS OF CONSTRUCTION
- TRAFFIC DIRECTIONAL ARROW
- CELL ID NUMBER

MARYELEN E. SAMITAS, P.E.
FLORIDA REGISTRATION #72230



SECTION C: PARKING ROAD ACCESS SECTION
NTS

1. TYPE B STABILIZED SHOULDER [illegible]
2. 4:1 MAX SLOPE, SOD
3. EROSION CONTROL STRUCTURE. USE SILT FENCE WHEN THE NWL IS BELOW TOE. USE FLOATING TURBIDITY BARRIER PER FDOT INDEX #102 IF NWL IS ABOVE TOE. SOD DISTURBED AREAS
4. TOP OF BERM
5. TOE OF BERM
6. MAINTAIN A 2' WIDE GRADED AREA WITH A MAXIMUM 1:6 SLOPE ADJACENT TO SHARED USE PATH. PER FDM 224.7 HORIZONTAL CLEARANCE
7. 8' SIDEWALK
8. 12' LANE WIDTH PER FDM TABLE 210.2.1 (3)
9. 6' SEPERATION REQUIRED PER FDOT TABLE 215.2.1
10. PARKING SPACE COUNT IS ESTIMATED BASED ON EXISTING UNPAVED LOT SIZE. OVERFLOW PARKING IN THE GRASS SOUTH OF THE PARKING LOT MAY BE USED IN TIMES OF HIGH DEMAND. TWO ADA SPACES HAVE BEEN PROVIDED, EXCEEDING THE CODE REQUIREMENT.

CONCEPT PLAN

CR

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BREVARD COUNTY
UTILITIES SERVICES
DEPARTMENT

VIERA WETLANDS
ACCESS IMPROVEMENTS

SITE PLAN - PARKING
AREA

Scale	Designed	Drawn	Checked	Authorized
AS SHOWN	KLC	KLC	JRR	MES
ARCH D	9/01/21	9/01/21		

CS-106

0

Appendix B. Cost Estimates

B.1. Option A – Paved One-way road with shared use path

B.2. Option B – Paved shared use path

B.3. Option C – Partially paved shared use path

B.4. Paved Parking Lot

ATKINS
Member of the SNC-Lavalin Group

ESTIMATE OF PROBABLE CONSTRUCTION COST
FOR
OPTION A - ONE WAY DRIVE WITH SHARED USE PATH
Concept Plans
6/6/2022

THIS ESTIMATE REPRESENTS IMPROVEMENTS SHOWN ONLY IN OPTION A. VALUES SHOWN DO NOT INCLUDE COST OF PARKING LOT CONSTRUCTION.

	ITEM DESCRIPTION	QTY	UNIT	UNIT-COST	TOTAL COST
000-199					
101-1	MOBILIZATION	1	LS	$ 630,600.00	$ 630,600.00
102-1	MAINTENANCE OF TRAFFIC	1	LS	$ 183,700.00	$ 183,700.00
104-12	STAKED TURBIDITY BARRIER (SILT FENCE)	41,000	LF	$ 5.00	$ 205,000.00
104-18	INLET PROTECTION	14	EA	$ 166.00	$ 2,324.00
110-1-1	CLEARING & GRUBBING	13.9	AC	$ 25,000.00	$ 347,500.00
120-6	EMBANKMENT	73,200	CY	$ 21.00	$ 1,537,200.00
160-4	TYPE B STABILIZATION	81,000	SY	$ 10.00	$ 810,000.00
200-299					
285-701	OPTIONAL BASE 1	24,000	SY	$ 15.00	$ 360,000.00
285-706	OPTIONAL BASE 6	81,000	SY	$ 19.00	$ 1,539,000.00
300-399					
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	3,709	TN	$ 98.00	$ 363,482.00
400-499					
425-11	MODIFY EXISTING DRAINAGE STRUCTURE	14	EA	$ 15,893.00	$ 222,502.00
430-175-130	PIPE CULVERT, OPT MATERIAL, ROUND 30" S/CD	84	LF	$ 217.00	$ 18,228.00
430-175-136	PIPE CULVERT, OPT MATERIAL, ROUND 36" S/CD	56	LF	$ 338.00	$ 18,928.00
430-175-148	PIPE CULVERT, OPT MATERIAL, ROUND 48" S/CD	14	LF	$ 540.00	$ 7,560.00
430-175-154	PIPE CULVERT, OPT MATERIAL, ROUND 54" S/CD	14	LF	$ 701.00	$ 9,814.00
430-94-1	DESILT PIPES 0-24"	1,052	LF	$ 15.00	$ 15,780.00
500-599					
519-7-8	BOLLARD	24	EA	$ 2,433.00	$ 58,392.00
527-2	DETECTABLE WARNINGS	400	SF	$ 45.00	$ 18,000.00
530-1100	RIP-RAP - SAND CEMENT BAGS	80	CY	$ 750.00	$ 60,000.00
570-1-2	SODDING (BAHIA)	130,000	SY	$ 4.00	$ 520,000.00
600-699					
700-799					
711-11-123	SOLID TRAFFIC STRIPE (THERMOPLASTIC, 12", WHITE, FOR CROSSWALK)	587	LF	$ 5.00	$ 2,935.00
711-11-125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24" FOR STOP LINE AND CROSSWALK	205	LF	$ 9.00	$ 1,845.00
711-11-170	THERMOPLASTIC, STANDARD, WHITE, ARROW	19	EA	$ 100.00	$ 1,900.00
711-11-224	THERMOPLASTIC, STANDARD, YELLOW, SOLID, 18" FOR DIAGONAL OR CHEVRON	46	LF	$ 7.00	$ 322.00
711-16-201	THERMOPLASTIC, STANDARD, YELLOW, SOLID, 6"	600	LF	$ 2.00	$ 1,200.00
800-899					
900-999					
1000-1999					
	ESTIMATED SUB TOTAL				$ 6,936,212.00
	Estimated Contingency			25%	$ 1,734,100.00
	Estimated Total				**$ 8,670,312.00**

NOTES:

- Quantities are considered approximate only, it is the contractors responsibility to verify the actual quantities required.
- This estimate was developed to determine a reasonable cost to construct the proposed improvements based on CONCEPT PHASE PLANS
- This estimate assumes that the proposed improvements will not have any site work conflicts other than those indicated on the plans.
- Estimate assumes existing soils are adequate for the proposed improvements.
- Estimate excludes the removal and replacement of muck or any unsuitable soils.
- Estimate is based on unit prices from FDOT and historical ATKINS projects.
- Estimate excludes cost associated with dewatering.
- Estimate excludes Environmental Remediation & Mitigation, if required.
- Does not include relocation of power poles or subsurface utilities.
- Unit Bid Prices include overhead and profit.
- Estimate does not include cost associated with obtaining right-of-way and/or easements.

Unit Prices Updated:
June 2, 2022

CONCEPT PLANS
NOT FOR CONSTRUCTION

Date:

Maryelen Samitas, PE
FL Reg No 72230
ATKINS | **2671 W. Eau Gallie Blvd, Suite 104 | Melbourne | FL | 32935**

ATKINS
Member of the SNC-Lavalin Group

ESTIMATE OF PROBABLE CONSTRUCTION COST
FOR
OPTION B - PAVED SHARED USE PATH
Concept Plans
6/6/2022

THIS ESTIMATE REPRESENTS IMPROVEMENTS SHOWN ONLY IN OPTION B. VALUES SHOWN DO NOT INCLUDE COST OF PARKING LOT CONSTRUCTION.

	ITEM DESCRIPTION	QTY	UNIT	UNIT-COST	TOTAL COST
000-199					
101-1	MOBILIZATION	1	LS	$ 170,900.00	$ 170,900.00
102-1	MAINTENANCE OF TRAFFIC	1	LS	$ 49,800.00	$ 49,800.00
104-12	STAKED TURBIDITY BARRIER (SILT FENCE)	41,000	LF	$ 5.00	$ 205,000.00
104-18	INLET PROTECTION	14	EA	$ 166.00	$ 2,324.00
110-1-1	CLEARING & GRUBBING	0.9	AC	$ 25,000.00	$ 22,956.84
160-4	TYPE B STABILIZATION	50,000	SY	$ 10.00	$ 500,000.00
200-299					
285-701	OPTIONAL BASE	45,000	SY	$ 15.00	$ 675,000.00
300-399					
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	2,225	TN	$ 98.00	$ 218,057.84
400-499					
500-599					
570-1-2	SODDING (BAHIA)	9,000	SY	$ 4.00	$ 36,000.00
600-699					
700-799					
800-899					
900-999					
1000-1999					
	ESTIMATED SUB TOTAL				$ 1,880,038.68
	Estimated Contingency			25%	$ 470,000.00
				Estimated Total	**$ 2,350,038.68**

NOTES:

- Quantities are considered approximate only, it is the contractors responsibility to verify the actual quantities required.
- This estimate was developed to determine a reasonable cost to construct the proposed improvements based on CONCEPT PHASE PLANS
- This estimate assumes that the proposed improvements will not have any site work conflicts other than those indicated on the plans.
- Estimate assumes existing soils are adequate for the proposed improvements.
- Estimate excludes the removal and replacement of muck or any unsuitable soils.
- Estimate is based on unit prices from FDOT and historical ATKINS projects.
- Estimate excludes cost associated with dewatering.
- Estimate excludes Environmental Remediation & Mitigation, if required.
- Does not include relocation of power poles or subsurface utilities.
- Unit Bid Prices include overhead and profit.
- Estimate does not include cost associated with obtaining right-of-way and/or easements.

Unit Prices Updated:
June 2, 2022

CONCEPT PLANS
NOT FOR CONSTRUCTION

Date: _____
Maryelen Samitas, PE

FL Reg No 72230

ATKINS | **2671 W. Eau Gallie Blvd, Suite 104 | Melbourne | FL | 32935**

ATKINS
Member of the SNC-Lavalin Group

ESTIMATE OF PROBABLE CONSTRUCTION COST
FOR
OPTION C - PARTIALLY PAVED SHARED USE PATH
Concept Plans
6/6/2022

THIS ESTIMATE REPRESENTS IMPROVEMENTS SHOWN ONLY IN OPTION C. VALUES SHOWN DO NOT INCLUDE COST OF PARKING LOT CONSTRUCTION.

	ITEM DESCRIPTION	QTY	UNIT	UNIT-COST	TOTAL COST
000-199					
101-1	MOBILIZATION	1	LS	$ 153,300.00	$ 153,300.00
102-1	MAINTENANCE OF TRAFFIC	1	LS	$ 44,600.00	$ 44,600.00
104-12	STAKED TURBIDITY BARRIER (SILT FENCE)	41,000	LF	$ 5.00	$ 205,000.00
104-18	INLET PROTECTION	14	EA	$ 166.00	$ 2,324.00
110-1-1	CLEARING & GRUBBING	0.9	AC	$ 25,000.00	$ 22,956.84
160-4	TYPE B STABILIZATION	50,000	SY	$ 10.00	$ 500,000.00
200-299					
285-701	OPTIONAL BASE 1 (4" TOPPING FOR UNPAVED AREAS)	45,000	SY	$ 15.00	$ 675,000.00
300-399					
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC C	478	TN	$ 98.00	$ 46,844.00
400-499					
570-1-2	SODDING (BAHIA)	9,000	SY	$ 4.00	$ 36,000.00
600-699					
700-799					
800-899					
900-999					
1000-1999					
	ESTIMATED SUB TOTAL				$ 1,686,024.84
	Estimated Contingency			25%	$ 421,500.00
	Estimated Total				**$ 2,107,524.84**

NOTES:

- Quantities are considered approximate only, it is the contractors responsibility to verify the actual quantities required.
- This estimate was developed to determine a reasonable cost to construct the proposed improvements based on CONCEPT PHASE PLANS
- This estimate assumes that the proposed improvements will not have any site work conflicts other than those indicated on the plans.
- Estimate assumes existing soils are adequate for the proposed improvements.
- Estimate excludes the removal and replacement of muck or any unsuitable soils.
- Estimate is based on unit prices from FDOT and historical ATKINS projects.
- Estimate excludes cost associated with dewatering.
- Estimate excludes Environmental Remediation & Mitigation, if required.
- Does not include relocation of power poles or subsurface utilities.
- Unit Bid Prices include overhead and profit.
- Estimate does not include cost associated with obtaining right-of-way and/or easements.

Unit Prices Updated:
June 2, 2022

CONCEPT PLANS
NOT FOR CONSTRUCTION

Date: _____

Maryelen Samitas, PE
FL Reg No 72230

ATKINS | **2671 W. Eau Gallie Blvd, Suite 104 | Melbourne | FL | 32935**

ATKINS
Member of the SNC-Lavalin Group

ESTIMATE OF PROBABLE CONSTRUCTION COST

FOR

PAVED PARKING LOT

Concept Plans

6/6/2021

THIS ESTIMATE REPRESENTS IMPROVEMENTS SHOWN ONLY IN PARKING AREA. VALUES SHOWN DO NOT INCLUDE COST OF TRAIL IMPROVEMENTS.

	ITEM DESCRIPTION	QTY	UNIT	UNIT-COST	TOTAL COST
000-199					
101-1	MOBILIZATION	1	LS	$ 13,000.00	$ 13,000.00
102-1	MAINTENANCE OF TRAFFIC	1	LS	$ 3,800.00	$ 3,800.00
104-12	STAKED TURBIDITY BARRIER (SILT FENCE)	1,300	LF	$ 5.00	$ 6,500.00
110-1-1	CLEARING & GRUBBING	0.1	AC	$ 25,000.00	$ 3,168.04
120-6	EMBANKMENT	375	CY	$ 21.00	$ 7,866.13
160-4	TYPE B STABILIZATION	900	SY	$ 10.00	$ 9,000.00
200-299					
285-706	OPTIONAL BASE	1,400	SY	$ 19.00	$ 26,600.00
300-399					
334-1-13	SUPERPAVE ASPHALTIC CONC, TRAFFIC B	116	TN	$ 98.00	$ 11,319.00
400-499					
500-599					
522-2	CONCRETE 6" THICK - SIDEWALKS & DRIVEWAYS	136	SY	$ 72.00	$ 9,776.00
527-2	DETECTABLE WARNINGS	12	SF	$ 30.00	$ 360.00
570-1-2	SODDING (BAHIA)	11,800	SY	$ 4.00	$ 47,200.00
550-60-122	DOUBLE LEAF SWING GATE	2	EA	$ 1,200.00	$ 2,400.00
700-799					
711-11-125	THERMOPLASTIC, STANDARD, WHITE, SOLID, 24" FOR STOP LINE AND CROSSWALK	11	LF	$ 9.00	$ 99.00
711-11-201	THERMOPLASTIC, STANDARD, YELLOW, SOLID, 6"	630	LF	$ 2.00	$ 1,260.00
711-14-160	THERMOPLASTIC, PREFORMED, WHITE, MESSAGE	2	EA	$ 267.00	$ 534.00
711-15-101	THERMOPLASTIC, SOLID 6" WHITE	286	LF	$ 1.00	$ 286.00
800-899					
900-999					
1000-1999					
	ESTIMATED SUB TOTAL				$ 143,168.18
	Estimated Contingency			25%	$ 35,800.00
	Estimated Total				**$ 178,968.18**

NOTES:

- Quantities are considered approximate only, it is the contractors responsibility to verify the actual quantities required.
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- This estimate assumes that the proposed improvements will not have any site work conflicts other than those indicated on the plans.
- Estimate assumes existing soils are adequate for the proposed improvements.
- Estimate excludes the removal and replacement of muck or any unsuitable soils.
- Estimate is based on unit prices from FDOT and historical ATKINS projects.
- Estimate excludes cost associated with dewatering.
- Estimate excludes Environmental Remediation & Mitigation, if required.
- Does not include relocation of power poles or subsurface utilities.
- Unit Bid Prices include overhead and profit.
- Estimate does not include cost associated with obtaining right-of-way and/or easements.

Unit Prices Updated:
June 2, 2022

CONCEPT PLANS
NOT FOR CONSTRUCTION

Date: _____

Maryelen Samitas, PE

FL Reg No 72230

ATKINS | **2671 W. Eau Gallie Blvd, Suite 104 | Melbourne | FL | 32935**

Appendix C. Environmental Assessment

C.1. Environmental Assessment Memo

SNC·LAVALIN ATKINS Member of the SNC-Lavalin Group

Memo

To:	Ferdinand Vasquez, P.E. Atkins		
From:	Michael Ray, Sr. Scientist II	Email:	michael.ray@atkinsglobal.com
Date:	August 17 2021	Phone:	407.806.4344
Ref:		cc:	
Subject:	Brevard County Viera Wetlands Road Feasibility: Environmental Assessment Memo		

This document summarizes the environmental features located within the boundaries and vicinity of the Viera Wetlands, also referred to as the Ritch Grissom Memorial Wetlands (Study Area). The Study Area is located at 3658 Charlie Corbeil Way, Viera, FL 32940 in Brevard County (Sections 07 & 18; Township 26 South; Range 36 East) (**Map 1**). The approximate midpoint of the Study Area is 28.226531 N, -80.764753 W.

Brevard County has identified the need for a feasibility study to evaluate the existing unpaved maintenance access that was constructed within the Study Area (then known as South-Central Regional Wastewater System (SCRWS) Constructed Wetlands in 1999/2000). This environmental assessment was commissioned to identify environmental issues within the Study Area and its vicinity.

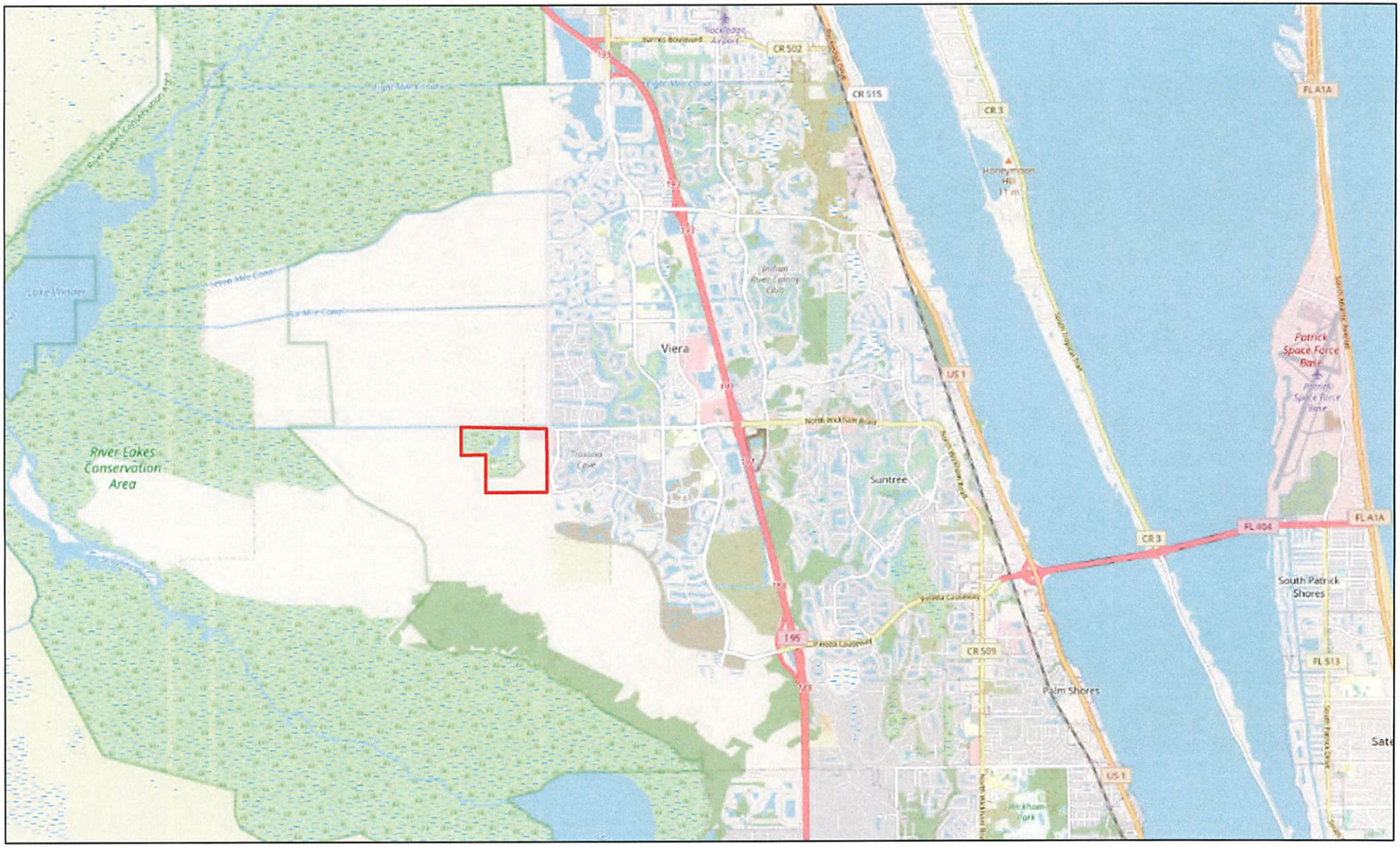
Per the Brevard County website[1], the Viera Wetlands:

> *consist of 200 acres divided into four cells of approximately 35 acres each, plus a central lake. The cells were designed to maintain differing depths of water, reflecting diverse wetland conditions. These treatment wetlands are an integral component of Brevard County's water reuse system. Providing increased water quality and savings over traditional water treatment methods, the constructed wetland system polishes reclaimed water for irrigation or overflow into the adjacent Four-mile Canal. Approximately 210,000 visitors/year pass through the main entrance to the constructed treatment wetland system, many drawn by the site's breath-taking views and stunning abundance of wildlife.*

Atkins scientists reviewed published data resources to identify recorded onsite ecologic conditions within the Study Area. These resources included:

- previous permits and plans
- topographic maps

[1] https://www.brevardfl.gov/UtilityServices/VieraWetlands, 2021, Brevard County website, Accessed 08/12/21.



SNC·LAVALIN ATKINS

Member of the SNC-Lavalin Group

Study Area Location Map

Brevard County Viera Wetlands Road Feasibility Study Brevard County, FL

Document Path: G:\Projects\Brevard County\Rich Grissom Memorial\Wetlands\GIS\MXD\1.0 Location.mxd

Property Boundary

Map 1

Date: 8/13/2021 | Author: M.Ray

Section: 07 & 18
Township: 26 South
Range: 36 East

1 inch equals 1.5 miles

N

0 0.75 1.5

Miles

- National Resource Conservation Service (NRCS) Soil Survey
- high-resolution aerial photographs
- St. Johns River Water Management District (SJRWMD) land use map(s)
- National Wetland Inventory (NWI) map
- Florida Natural Areas Inventory (FNAI) database of listed species
- Brevard County Scrub Jay database
- Florida Fish and Wildlife Conservation Commission (FWC) Bald Eagle Nest Locator database
- previous recorded data from other Atkins (PBSJ) studies conducted onsite

After completion of the data review, a site visit was scheduled to identify the environmental resources present within the proposed project areas (wetland area, berms, and proposed parking enhancement area).

On August 6, 2021, Atkins scientists conducted a site visit to identify environmental resources present within the boundaries and vicinity of the Study Area. The site assessment of the Study Area included identifying the wetlands and surface waters limits and potential threatened and endangered species habitat. Wetlands and surface waters were not formally delineated; however, the approximate limits of the wetlands and surface waters areas were confirmed during the onsite review. Potential habitat for threatened and endangered species, listed species observations, and/or other observed environmental constraints were also identified.

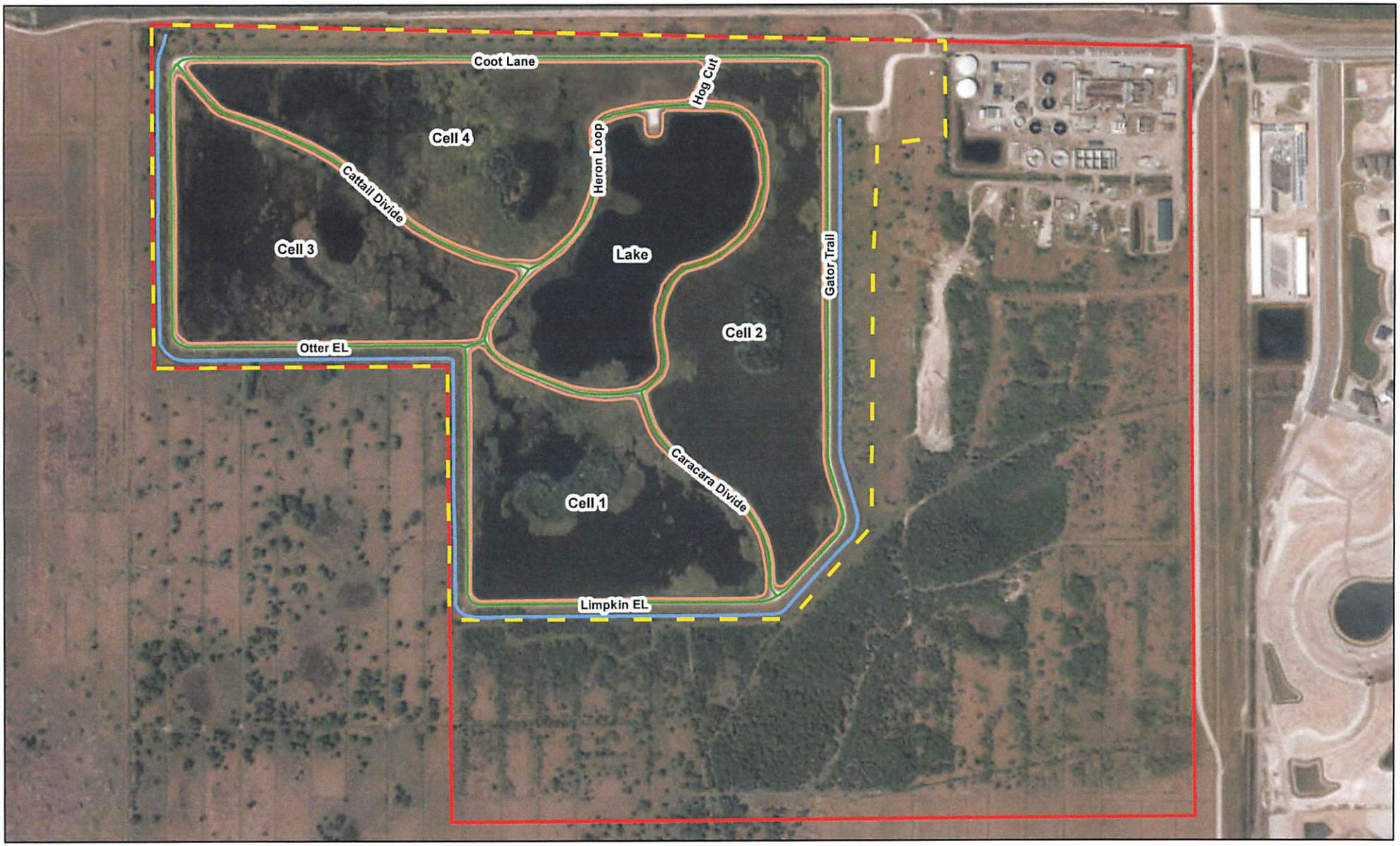
This Environmental Assessment Memo describes wetland, surface water, vegetation, and listed wildlife conditions observed onsite.

WETLANDS AND SURFACE WATERS

During the August 2021 site visit, Atkins scientists inspected the Study Area for the presence of aquatic habitats (i.e., wetlands, surface waters, and other surface waters) as determined in accordance with *Chapter 62-340, Florida Administrative Code (F.A.C.)*, and the *2010 Regional Supplement to the Army Corps of Engineers (ACOE) Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0)*. **Map 2** depicts the overall location and extent of all areas identified within the Study Area. Representative photos of all identified systems can be found in the **Photolog** (**Attachment A**). Since this was a preliminary environmental assessment, no boundaries were formally delineated.

The Study Area is comprised of four wetland "cells" and one open water lake, all which are freshwater and were created under the Florida Department of Environmental Protection (FDEP) Permit FL0102679 when the Viera Wetlands were constructed in 1999/2000 (**Attachment B**). The limits of these wetlands are constrained to (and mimic) the toe of slope (TOS) of the berm roads throughout the Study Area. All wetland "cells" also contained a created upland island within its limits. A brief description of these wetlands can be found below:

- Wetland Cell 1 – This wetland is located in the southern portion of the Study Area. Dominant vegetation observed within this system included: cattail (*Typha sp.*), torpedograss (*Panicum repens*), hempvine (*Mikania sp.*), giant bulrush (*Schoenoplectus californicus*) and spikerush



SNC·LAVALIN ATKINS

Wetland and Surface Water Map

Brevard County Viera Wetlands Road Feasibility Study Brevard County, FL

Document Path: G:\Projects\Brevard County\Rich Grissom Memorial Wetlands\GIS\MXD\2.0 WL_SW Map.mxd

- Wetland Cell
- Surface Water Ditch
- Berm Road
- Study Area
- Property Boundary

Map 2

Date: 8/13/2021 | Author: M.Ray

Section: 07 & 18
Township: 26 South
Range: 36 East

1 in = 650 ft

N

0 325 650

Feet

(*Eleocharis sp.*). This system contained an upland island named Cypress Dome Island which was dominated by Brazilian pepper (*Schinus terebinthifolia*), wax myrtle (*Morella cerifera*), cabbage palm (*Sabal palmetto*), Australian pine (*Casuarina equisetifolia*), and cypress (*Taxodium sp.*). Water depth within this system was greater than 12 inches.

- Wetland Cell 2 – This wetland is located in the eastern portion of the Study Area. Dominant vegetation observed within this system included: cattail, torpedograss, hempvine, giant bulrush, pickerelweed (*Pontederia cordata*) and manyflower marshpennywort (*Hydrocotyle umbellata*). This system contained an upland island named Hardwood Hammock Island which was dominated by Brazilian pepper, red maple (*Acer rubrum*), and a variety of oaks (*Quercus sp.*). Water depth within this system was greater than 12 inches.
- Wetland Cell 3 – This wetland is located in the western portion of the Study Area. Dominant vegetation observed within this system included: cattail, torpedograss, hempvine, giant bulrush, pickerelweed, manyflower marshpennywort, bulltongue arrowhead (*Sagittaria lancifolia*), and yellow bristlegrass (*Setaria parviflora*). This system contained an upland island named Shorebird Nesting Island which was dominated by Brazilian pepper and wax myrtle. Water depth within this system was greater than 12 inches.
- Wetland Cell 4 – This wetland is located in the northern portion of the Study Area. Dominant vegetation observed within this system included: cattail, torpedograss, spikerush, giant bulrush, pickerelweed, bulltongue arrowhead, alligatorflag (*Thalia geniculata*), fragrant flatsedge (*Cyperus odoratus*), and Carolina willow (*Salix caroliniana*). This system contained an upland island named Cedar Upland Island which was dominated by Brazilian pepper and red cedar (*Juniperus virginiana*). Water depth within this system was greater than 12 inches.
- Lake – This open water lake is located in the central portion of the Study Area. Dominant vegetation observed along the littoral zone included: cattail, torpedograss, spikerush, pickerelweed, bulltongue arrowhead, hempvine, wax myrtle, fragrant flatsedge and smartweed (*Persicaria sp.*). Water depth within this system was greater than 12 inches.

Reclaimed water flows through the system by first entering Wetland Cells 1 & 2 before discharging into the Lake through control structures. From the Lake, the flow is further split into Wetland Cells 3 & 4 via control structures, before eventually leaving Wetland Cells 3 & 4 through a combined common structure located in the northwest corner for discharge into 4-Mile Canal (**Attachment B**).

One surface water ditch (SWD) was also identified as within the Study Area. In many locations, the SWD limits were also associated with the TOS of the exterior berm roads. A description of the SWD groups can be found below:

- Surface Water Ditch- This freshwater ditch traverses the western, southern, and eastern boundaries of the Study Area. Based on historic aerial imagery, it also connects (discharges) to the Four-mile Canal at its northwest terminus (**Attachment B**). Dominant vegetation observed along the littoral zone included: cattail, torpedograss, spikerush, pickerelweed, bulltongue arrowhead, wax myrtle, alligatorflag, and cogongrass (*Imperata cylindrica*). Water depth within this system ranged between 2-12+ inches.

Wetland Berm Roads

Approximately two miles of berm roads traverse the Study Area and encircle and divide all four wetland cells as well as the open water lake. Currently, the berm roads are closed to public vehicular traffic due to previous high-traffic (and costly) wear & tear and occasional berm blockage disruption caused by visiting public vehicles. Overall, the berm roads consist of pervious material and appeared in fair to poor condition, with some rutting and erosion observed. **Map 2** depicts the location and names of all berm roads traversing the Study Area. Representative photos of these berm roads can also be found in the **Photolog** (**Attachment A**).

Wildlife Utilization

During the August 2021 site visit, a variety of wildlife species were observed utilizing all aspects of the Study Area. The following is a list of wildlife species observed during the site visit:

Bird

- American Coot — *Fulica americana*
- Anhinga — *Anhinga*
- Black Vulture — *Coragyps atratus*
- Black-bellied Whistling-Duck — *Dendrocygna autumnalis*
- Boat-tailed Grackle — *Quiscalus major*
- Cattle Egret — *Bubulcus ibis*
- Common Gallinule — *Gallinula galeata*
- Common Grackle — *Quiscalus quiscula*
- Double-crested Cormorant — *Phalacrocorax auritus*
- Glossy Ibis — *Plegadis falcinellus*
- Great Blue Heron — *Ardea herodias*
- Great Egret — *Ardea alba*
- Green Heron — *Butorides virescens*
- Limpkin — *Aramus guarauna*
- Little Blue Heron — *Egretta caerulea*
- Osprey — *Pandion haliaetus*
- Red-winged Blackbird — *Agelaius phoeniceus*
- Sandhill Crane — *Grus canadensis*
- Snowy Egret — *Egretta thula*
- Turkey Vulture — *Cathartes aura*
- White Ibis — *Eudocimus albus*

Reptile

- American Alligator — *Alligator mississippiensis*

Amphibian

- American Bullfrog — *Lithobates catesbeianus*
- Pig Frog — *Lithobates grylio*

Mammal

- River Otter — *Lontra canadensis*

FEDERAL & STATE PROTECTED SPECIES

Prior to the field survey, numerous resources were referenced to determine the potential existence of wildlife species listed as endangered, threatened, or of special concern within and in the vicinity

of the Study Area. Field assessments were also conducted by qualified Atkins scientists during the August 2021 site visit to determine if suitable habitat for listed species was present, and if any protected species were present and observed within the Study Area. If encountered, evidence of direct observation, vocalizations, scat, tracks, burrows, dens, nests, etc. was to be noted and recorded via a sub-meter GPS device.

Based on the available data from the Florida Natural Areas Inventory (FNAI) website[2] (**Attachment C**) and the observations made during the site visit, the Study Area provides suitable habitat for multiple native wildlife species that are likely to occur. These include: Crested Caracara (*Caracara cheriway*), bald eagle (*Haliaeetus leucocephalus*), snail kite (*Rostrhamus sociabilis plumbeus*), sandhill crane (*Grus canadensis*), wood stork (*Mycteria americana*), and eastern indigo snake (*Drymarchon couperi*).

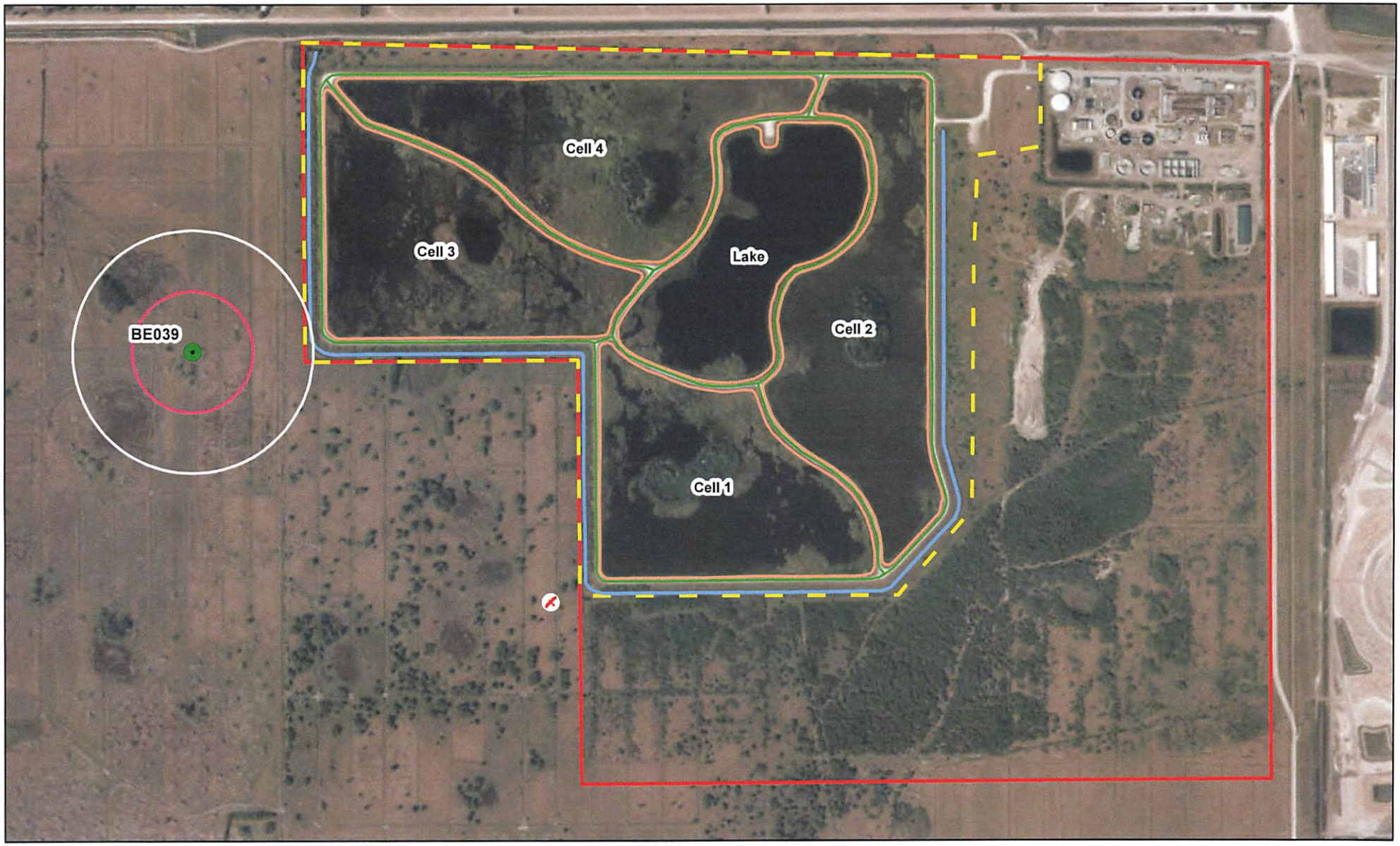
Crested Caracara – The crested caracara is a large species of raptor that has a dark brown-black belly, wings, back, and crown, and a white lower belly, head, and throat. The caracara also has a bluish-gray to light bluish bill, red cere (facial skin) and a white tail with dark crossbars. Suitable habitat consists of open country, including dry or wet prairie and pasture lands with cabbage palm, cabbage palm/live oak hammocks, and shallow ponds and sloughs. Preferred nest trees are cabbage palms, followed by live oaks. ***Nesting season is from January 10 to April 30***. The crested caracara is protected by the U.S. Migratory Bird Treaty Act. It is also protected as a Threatened species by the Federal Endangered Species Act and as a Federally (USFWS) designated Threatened species by Florida's Endangered and Threatened Species Rule.

Historically, caracaras have been observed throughout the site. In 2007, a viable nest tree was recorded and monitored approximately 200ft. southwest of Wetland Cell 1. **Map 3** depicts the recorded location of the historic nest tree. During the August 2021 site visit, no nest was observed in this designated location or anywhere within the vicinity of the Study Area. However, suitable foraging and nesting habitat exists within the Study Area and its vicinity.

In order to avoid the potential for unauthorized take, any project sites within the caracara consultation area (**Map 4**) that contain suitable habitats, are recommended to undergo a formal caracara survey to determine site utilization by caracaras. USFWS Crested Caracara Draft Survey Protocol[3] recommends a survey area which should include the project area and a 1,500-m buffer zone around the perimeter of the project area (including access roads) to account for off-site nest trees in territories that might overlap onto the project area. A complete survey of the project area consists of one survey session every two weeks of each observation block within the project area and the 1,500-m buffer from early January (i.e., Jan 1-10) through April 30 (unless a nest is found within the observation block prior to April 30; in that event, a Nest Productivity Survey will need to commence). If a nest tree is confirmed or highly suspected, nest productivity surveys begin. These nest productivity surveys involve the same repeated, two-week visits, but the surveyor is only required to observe the nest for the necessary amount of time needed to determine nest status (i.e., incubating, nestlings, fledglings, or failed). If an active nest is encountered, no construction

[2] FNAI Biodiversity Matrix website. https://www.fnai.org/BiodiversityMatrix/index.html. Accessed August 2021.

[3] USFWS Crested Caracara Survey protocol. USFWS Website. https://www.fws.gov/verobeach/BirdsPDFs/20161209_CCsurveyprotocol.pdf. Accessed August 2021.



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Listed Species Map

Brevard County Viera Wetlands
Road Feasibility Study
Brevard County, FL

Document Path: O:\Projects\Brevard County\Rich Grissom Memorial Wetlands\GIS\MXD\3.0 Listed Species.mxd

- Historic Crested Caracara Nest (2007*)
- Historic Bald Eagle Nest (2008*)
- 330-ft. Buffer
- 660-ft. Buffer
- Wetland Cell
- Surface Water Ditch
- Berm Road
- Study Area
- Property Boundary

*Date documented as last active

Map 3

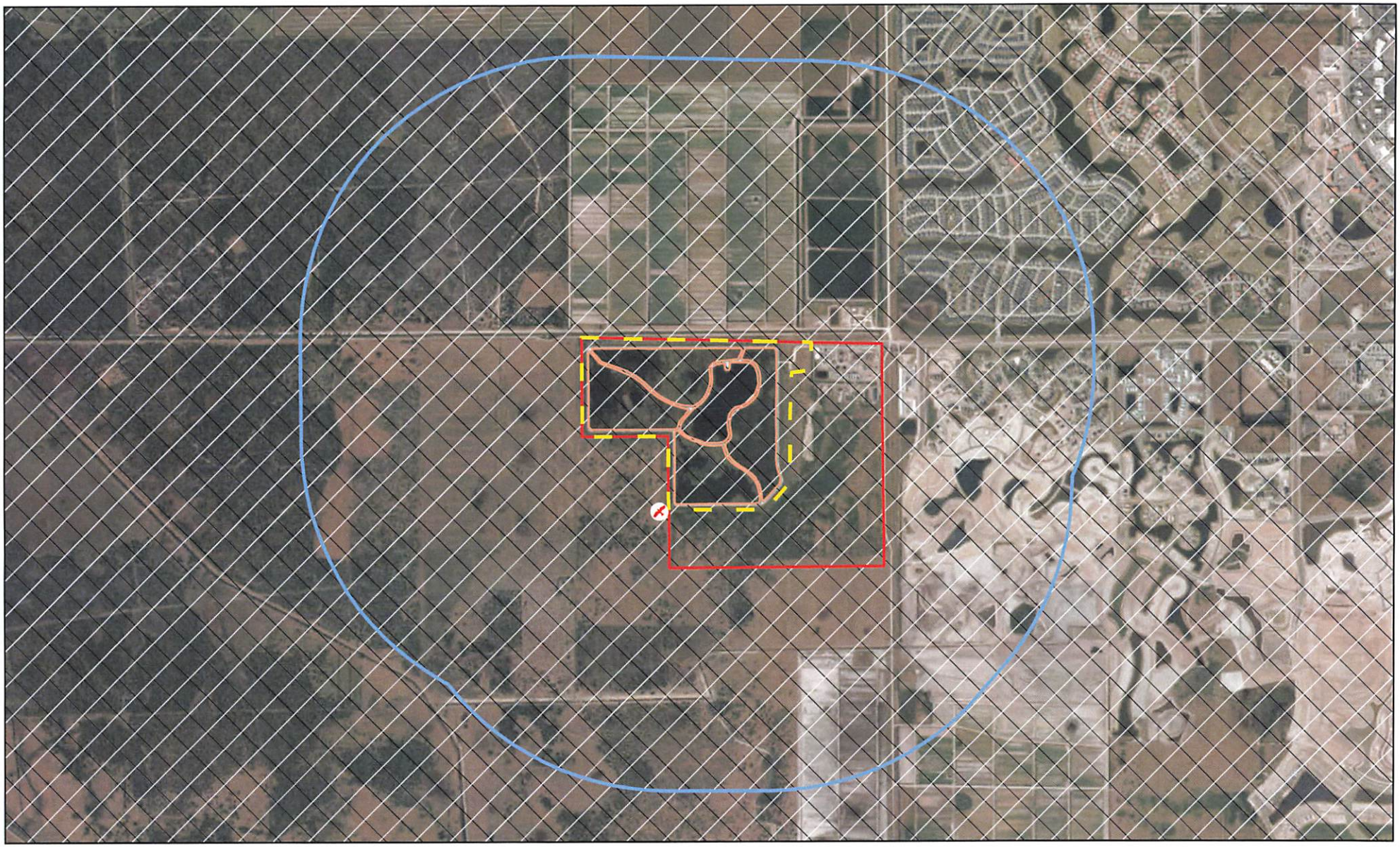
Date: 8/17/2021 | Author: M.Ray

Section: 07 & 18
Township: 26 South
Range: 36 East

1 in = 700 ft

N

0 350 700
Feet



SNC·LAVALIN ATKINS

Listed Species Consultation Area Map

Brevard County Viera Wetlands
Road Feasibility Study
Brevard County, FL

Document Path: O:\Projects\Brevard County\Rich Grissom Memorial Wetlands\GIS\MXD\4.0 Consultation Area Map.mxd

- Study Area
- 1500m Buffer
- Crested Caracara Consultation Area
- Snail Kite Consultation Area
- Historic Crested Caracara Nest (2007)
- Wetland Cell
- Property Boundary

Map 4

Date: 8/17/2021 | Author: M.Ray

Section: 07 & 18
Township: 26 South
Range: 36 East

1 in = 2,250 ft

N

0 1,125 2,250
Feet

activity can occur within 985ft. of the nest tree. Construction activities can commence between 985ft. and 1,500ft. when monitored by a qualified professional during periods of construction.

Bald Eagle – Bald eagles are large raptors. Adult bald eagles have white heads and tails with dark brown bodies and wings. Their legs and bills are bright yellow. Immature birds have mostly dark heads and tails; with wings and bodies mottled with white. Bald eagles can be found in a variety of habitats but mainly near lakes, reservoirs, rivers, marshes, and coasts. Although the species was delisted from the Endangered Species Act in 2007, eagle populations are still protected under the Migratory Bird Treaty Act and the Bald and Golden Eagle Act. A search of the FWC Bald Eagle Nest Locator website[4] was used to determine if any previously documented eagle nests are located in or near the Study Area. The search returned a positive result within the vicinity of the Study Area. FWC Nest ID 1667 (BE039) was deemed as active from 1999-2008. It was last monitored by FWC in 2016. **Map 3** depicts the recorded location of the historic nest tree. During the August 2021 site visit, no nest was observed in this designated location or anywhere within the vicinity of the Study Area. It is highly possible that this nest tree was lost due to tree fall since its last know activity was 13+ years ago.

The FWC Bald Eagle Management Plan states that the ***bald eagle nesting season is defined as the period from October 1 through May 15***. No bald eagles (or nest) were observed during the site visit; however, the Study Area is known to have potential for nesting. If a bald eagle nest is encountered, then consultation with U.S. Fish and Wildlife Service (USFWS) should be done to determine if a federal permit is required when proposing work activities in the vicinity of a nest. According to the USFWS website[5], the Bald Eagle Management Guidelines and Conservation Measures detail further information regarding nest buffers of 330- ft and 660- ft during periods of construction.

Snail Kite – The snail kite is a medium-sized raptor, with a tail that is square-tipped with a distinctive white base and broad, paddle-shaped wings. Adults of both sexes have red eyes, while juveniles have brown eyes. They have a slender, distinguishing, decurved bill which is used for extracting the kite's primary prey, the apple snail (*Pomace sp.*). Snail kite habitat consists of freshwater marshes and the shallow vegetated edges of lakes where apple snails can be found. ***The snail kite nests throughout the year, with a peak nesting season between the months of February and July***. The nest is a woven configuration of dry sticks and plant material. The sticks are insulated with green nest material that forms a cup to hold the eggs. Males do most of the nest building which are built over water to reduce access to the nest by predators[6].

The snail kite is protected as an Endangered species by the Federal Endangered Species Act and as a Federally designated Endangered species by Florida's Endangered and Threatened Species Rule. The USFWS recommends staying at least 500ft. from any active snail kite nest. During the August 2021 site visit, no snail kites were observed in the Study Area or its vicinity. However, the Study

[4] FWC Bald Eagle Nest Locator website. https://myfwc.maps.arcgis.com/apps/webappviewer/index.html?id=fca6f17a0ef64b7b8bdcb51c9de43fb4. Accessed August 2021.

[5] USFWS Ecological Services website. https://www.fws.gov/northeast/ecologicalservices/eagleguidelines/constructionnesting.html. Accessed August 2021.

[6] FWC Website. Snail Kite Species Profile. https://myfwc.com/wildlifehabitats/profiles/birds/raptors-and-vultures/everglade-snail-kite/. Accessed August 2021.

Area lies within the snail kite consultation area (**Map 4**) and does contain suitable habitats for foraging and nesting.

Sandhill Crane - Sandhill Cranes are very large, tall birds with a long neck, long black legs, and very broad wings. They are slate gray in color, often with a rusty wash on the upperparts. Adults have a pale cheek and red skin on the crown. Sandhill Cranes breed and forage in open prairies, grasslands, and wetlands. ***Nesting season is defined as a period from January 1 to July 31***. Sandhill cranes nest on mats of vegetation about two feet in diameter, and nests are located in shallow water to aid in predator avoidance. The Florida sandhill crane is protected by the U.S. Migratory Bird Treaty Act as well as being listed as a State-designated Threatened species by Florida's Endangered and Threatened Species Rule. FWC Final Florida Sandhill Crane Species Guidelines (2016)[7]recommend avoidance measures to eliminate the need for FWC take permitting, which includes no construction activity within 400ft. of an active nesting site. During the August 2021 site visit, two pairs of sandhill cranes were observed foraging in the Study Area. The Study Area also contains suitable habitat for nesting.

Wood Stork - The wood stork is a large, long legged wading bird. Both primary and tail feathers are black. The head and upper neck of adult wood storks have no feathers but have gray rough scaly skin. Wood storks also have a black bill and black legs with pink toes[8]. Wood storks typically nest in colonies within habitats such as inundated forested wetlands (including cypress strands and domes), mixed hardwood swamps, mangroves, and sloughs from ***November to March***. The species is also increasingly found in artificial habitats such as impoundments and dredged areas with native or exotic vegetation. Wood storks generally forage in shallow water (less than 10-12 inches) in habitats such as freshwater marshes, lagoons, swamps, ponds, tidal creeks, and flooded pastures and ditches. Wood storks tend to seek out areas with reduced water levels where their prey (mostly fish) is concentrated. The wood stork is protected by the U.S. Migratory Bird Treaty Act. It is also protected as a Threatened species by the Federal Endangered Species Act and as a Federally designated Threatened species by Florida's Endangered and Threatened Species Rule. The wood stork was reclassified by the USFWS on June 30, 2014, from Endangered to Threatened. During the August 2021 site visit, no wood storks were observed in the Study Area or its vicinity. However, the Study Area contains suitable habitats for foraging and roosting.

Eastern Indigo Snake - The eastern indigo snake is federally listed as a threatened species by the USFWS. This large, thick bodied snake is glossy black and in sunlight has iridescent blue highlights. The chin and throat are reddish or white, and the color may extend down the body. The scales on its back are smooth, but some individuals may possess some scales that are partially keeled. It occurs in a broad range of habitats and requires large tracts of land for survival. It is often considered a gopher tortoise commensal, as it often winters in burrows found in xeric habitats. It also uses mesic and wetland habitats for foraging during the warmer summer months. No occurrences were documented within 1 mile of the Study Area, based on FNAI biodiversity matrix records, but there is a potential to occur. During the August 2021 site visit, no indigo snakes were

[7] FWC Website. Florida Sandhill Crane Species Overview. https://myfwc.com/media/11565/final-florida-sandhill-crane-species-guidelines-2016.pdf. Accessed August 2021.

[8] FWC Website. Wood Stork Species Profile. https://myfwc.com/wildlifehabitats/profiles/birds/waterbirds/wood-stork/. Accessed August 2021.

observed in the Study Area or its vicinity. Suitable foraging habitat does exist within the Study Area, although the potential for occurrence remains low due to development of surrounding habitats that would provide limited winter refugia.

If an eastern indigo snake is encountered within 100-feet of the Study Area during any construction activities, the *USFWS Standard Protection Measures Protocol for Eastern Indigo Snake* shall be implemented. Training for construction personnel and signage with direction on how to identify the species and what to do if encountered should be provided prior to commencement of silt fence installation and staging for construction.

Conclusion

In summary:

- Within the Study Area, all wetland and surface water feature limits were confined to toe of slope of their original design when created under FDEP permit FL0102679
- If direct impacts to the wetlands and/or surface water are anticipated, then permitting through state/federal agencies may be required. Once project specifics have been determined, a pre-application meeting with the agencies is recommended
- No documented (historic) bald eagle or crested caracara nests were observed in the Study Area or its vicinity
- Although not directly observed, numerous listed species are known to utilize the Study Area
- Every effort should be made to conduct planned construction activities outside of the nesting seasons of listed species; and if not possible, then consultation with FWC and USFWS is recommended to determine proper survey protocols. In addition, it is recommended that a clearance letter be submitted to FWC/USFWS to determine suggested avoidance measures.

Should there be questions regarding the site visit or the Study Area ecological conditions, please feel free to contact Atkins staff by email or office phone.

Attachment A

Photolog

Photolog

Rich Grissom Wetlands Roads Feasibility Environmental Study

Coot Lane – Looking West

Coot Lane – Looking East

Otter EL – Looking South

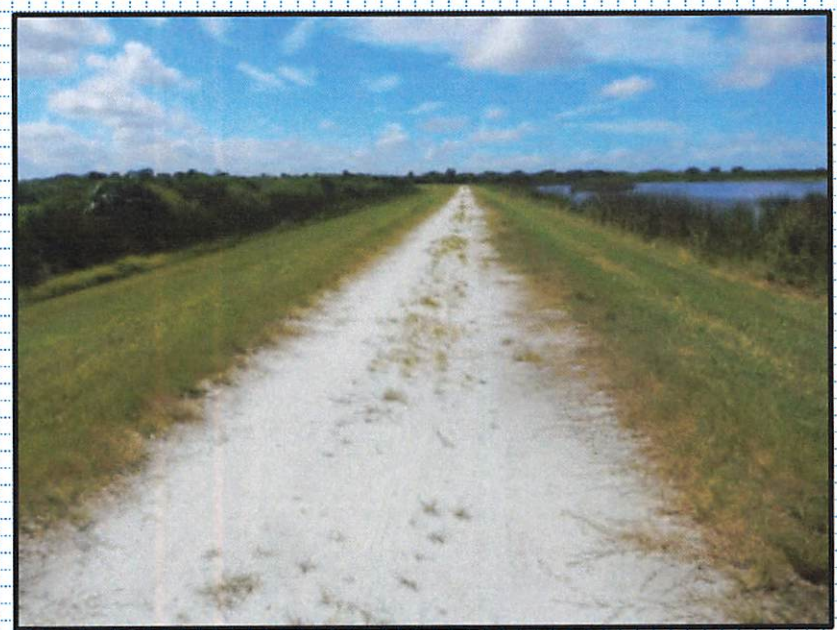
Otter EL – Looking North

Photolog

Rich Grissom Wetlands Roads Feasibility Environmental Study

Limpkin EL – Looking West

Limpkin EL – Looking East



Gator Trail– Looking South

Gator Trail – Looking North

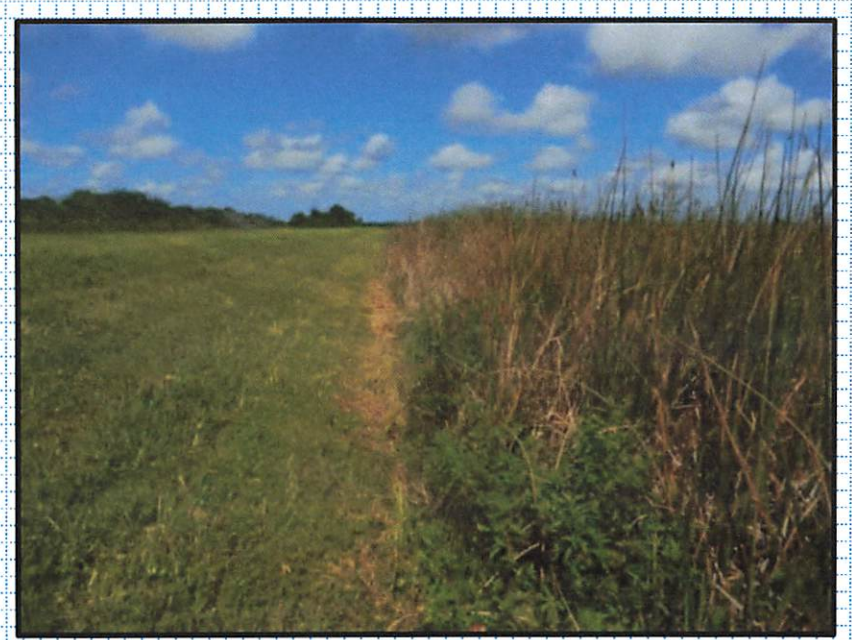
Photolog

Rich Grissom Wetlands Roads Feasibility Environmental Study

Heron Loop – Looking North

Heron Loop – Looking South

Wetland Cell 1 – Looking Northwest



Wetland Cell 1 TOS – Looking West

TOS = Toe of Slope

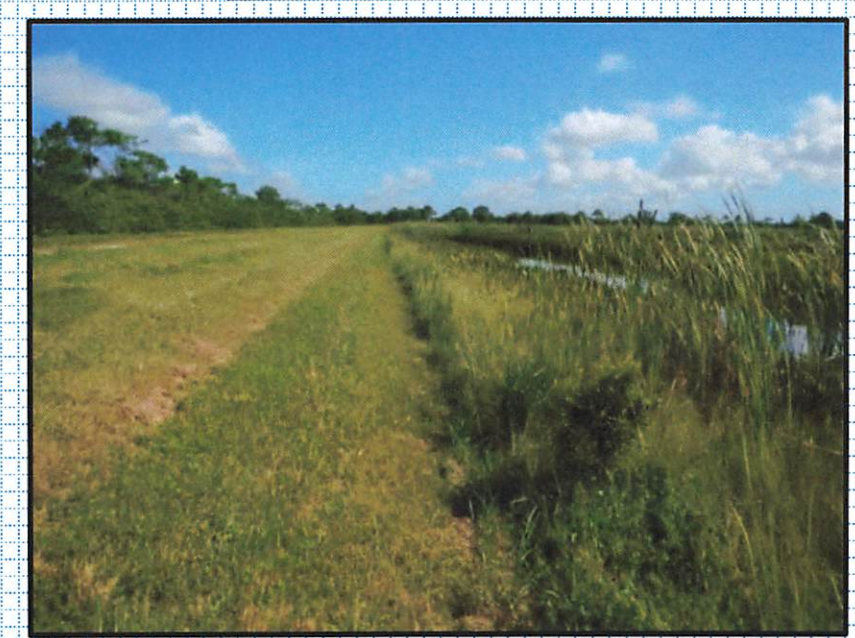
Photolog

Rich Grissom Wetlands Roads Feasibility Environmental Study

Wetland Cell 2 – Looking Northwest

Wetland Cell 2 TOS – Looking South

Wetland Cell 3 – Looking Southeast



Wetland Cell 3 TOS – Looking North

TOS = Toe of Slope

Photolog

Rich Grissom Wetlands Roads Feasibility Environmental Study

Wetland Cell 4 – Looking Southwest

Wetland Cell 4 TOS – Looking West

Lake – Looking Northwest

Lake TOS – Looking North

TOS = Toe of Slope

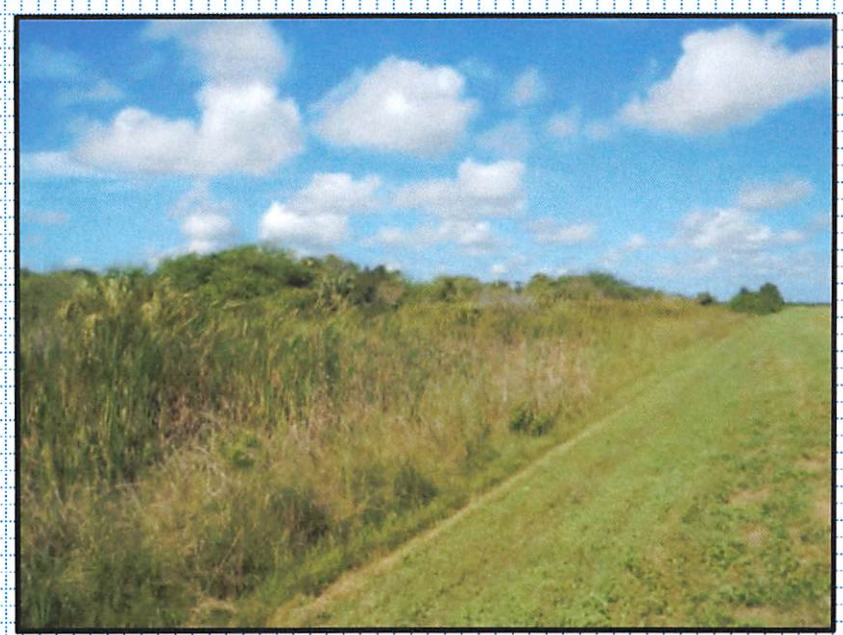
Photolog

Rich Grissom Wetlands Roads Feasibility Environmental Study

Surface Water Ditch – Looking North

Surface Water Ditch – Looking South

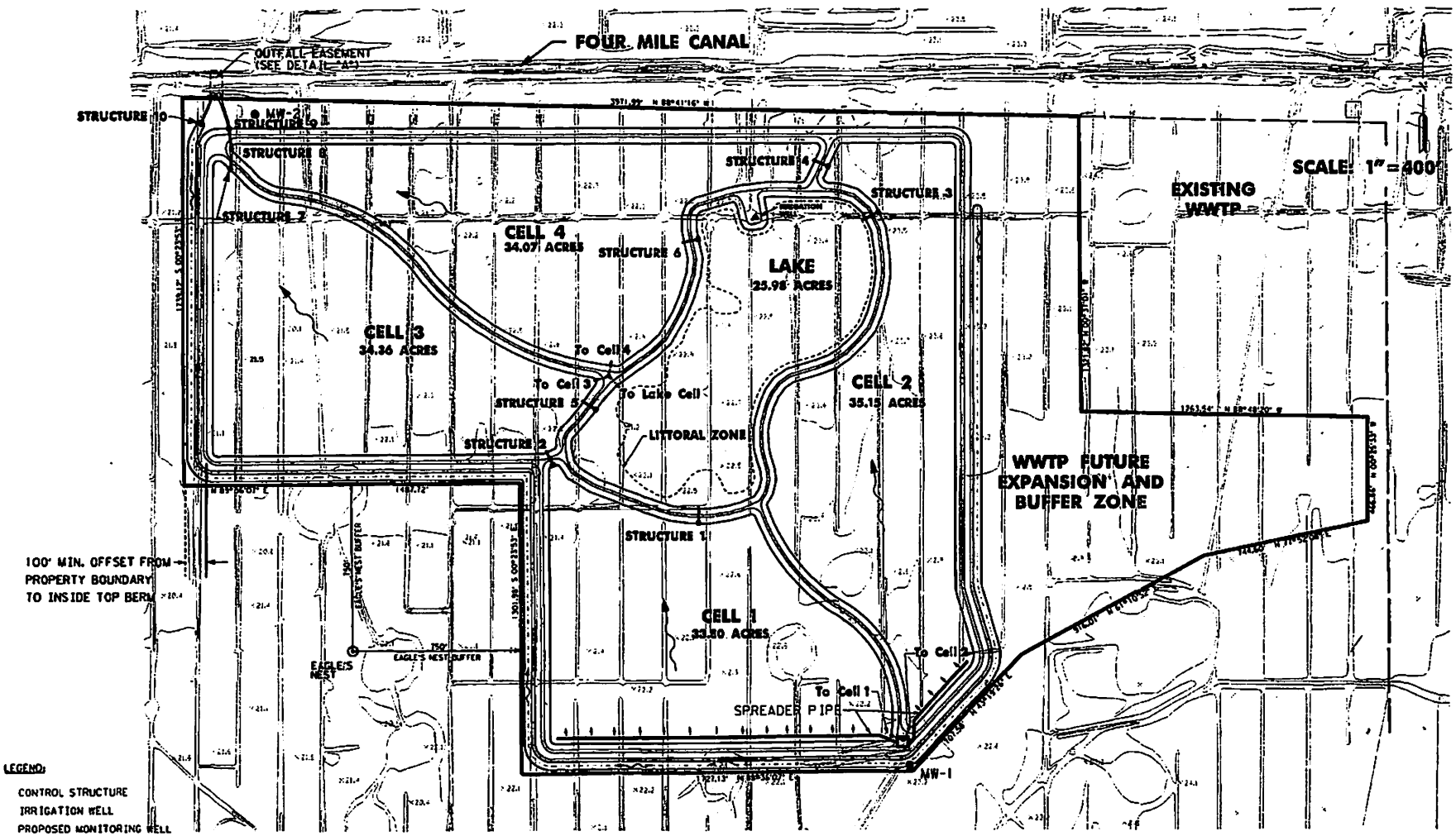
Surface Water Ditch – Looking East



Surface Water Ditch – Looking East

Attachment B

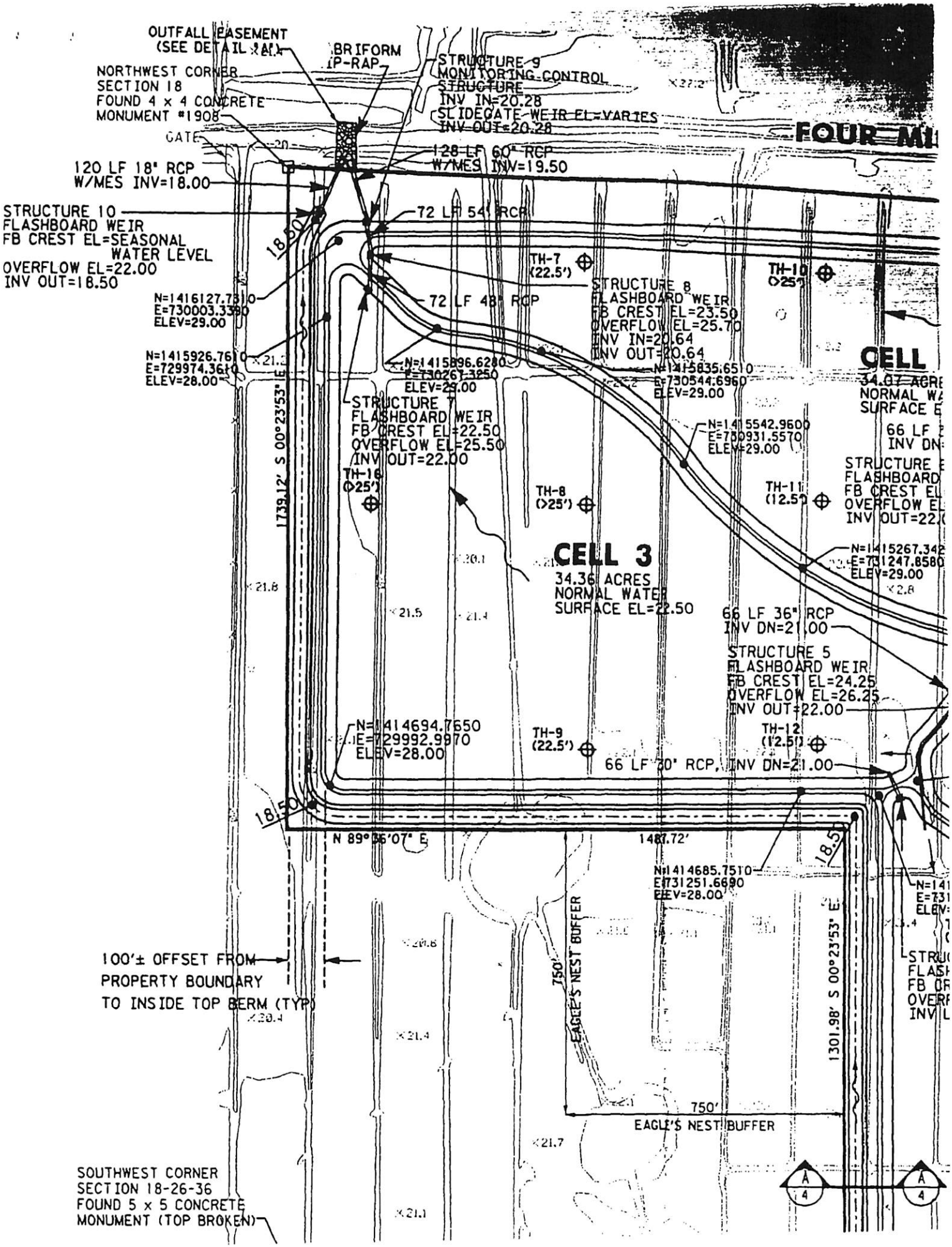
Permit Drawings



PBSJ POST, BUCKLEY, SCHUH & JERNIGAN, INC.

SOUTH CENTRAL REGIONAL WASTEWATER SYSTEM
CONSTRUCTED WETLANDS

FIGURE 4-3


OUTFALL EASEMENT
(SEE DETAIL 2A)
BRIFORM
RIP-RAP
STRUCTURE 9
MONITORING CONTROL
STRUCTURE
INV IN=20.28
SLIDEGATE WEIR EL=VARIES
INV OUT=20.28
NORTHWEST CORNER
SECTION 18
FOUND 4 x 4 CONCRETE
MONUMENT #1908
GATE
128 LF 60" RCP
W/MES INV=19.50
120 LF 18" RCP
W/MES INV=18.00
STRUCTURE 10
FLASHBOARD WEIR
FB CREST EL=SEASONAL
WATER LEVEL
OVERFLOW EL=22.00
INV OUT=18.50
72 LF 54" RCP
72 LF 48" RCP
TH-7
(22.5')
TH-10
(>25')
STRUCTURE 8
FLASHBOARD WEIR
FB CREST EL=23.50
OVERFLOW EL=25.70
INV IN=20.64
INV OUT=20.64
N=1416127.7310
E=730003.3390
ELEV=29.00
N=1415926.7610
E=729974.3610
ELEV=28.00
N=1415896.6280
E=730267.3250
ELEV=29.00
N=1415835.6510
E=730544.6960
ELEV=29.00
STRUCTURE 7
FLASHBOARD WEIR
FB CREST EL=22.50
OVERFLOW EL=25.50
INV OUT=22.00
TH-16
(>25')
TH-8
(>25')
TH-11
(12.5')
N=1415542.9600
E=730931.5570
ELEV=29.00
CELL 3
34.36 ACRES
NORMAL WATER
SURFACE EL=22.50
66 LF 36" RCP
INV DN=21.00
STRUCTURE 5
FLASHBOARD WEIR
FB CREST EL=24.25
OVERFLOW EL=26.25
INV OUT=22.00
N=1415267.3420
E=731247.8580
ELEV=29.00
N=1414694.7650
E=729992.9970
ELEV=28.00
TH-9
(22.5')
TH-12
(12.5')
66 LF 30" RCP, INV DN=21.00
18.50
N 89°36'07" E
1487.72'
N=1414685.7510
E=731251.6690
ELEV=28.00
1739.12' S 00°23'53" E
1301.98' S 00°23'53" E
750'
EAGLE'S NEST BUFFER
750'
EAGLE'S NEST BUFFER
100'± OFFSET FROM
PROPERTY BOUNDARY
TO INSIDE TOP BERM (TYP)
SOUTHWEST CORNER
SECTION 18-26-36
FOUND 5 x 5 CONCRETE
MONUMENT (TOP BROKEN)
A4
A4

Attachment C

FNAI Biodiversity

1018 Thomasville Road
Suite 200-C
Tallahassee, FL 32303
850-224-8207
850-681-9364 fax
www.fnai.org

Florida Natural Areas Inventory

Biodiversity Matrix Query Results

UNOFFICIAL REPORT

Created 8/17/2021

(Contact the FNAI Data Services Coordinator at 850.224.8207 or kbrinegar@fnai.fsu.edu for information on an official Standard Data Report)

NOTE: The Biodiversity Matrix includes only rare species and natural communities tracked by FNAI.

Report for 2 Matrix Units: 59356 , 59357

Descriptions

DOCUMENTED - There is a documented occurrence in the FNAI database of the species or community within this Matrix Unit.

DOCUMENTED-HISTORIC - There is a documented occurrence in the FNAI database of the species or community within this Matrix Unit; however the occurrence has not been observed/reported within the last twenty years.

LIKELY - The species or community is *known* to occur in this vicinity, and is considered likely within this Matrix Unit because:

1. documented occurrence overlaps this and adjacent Matrix Units, but the documentation isn't precise enough to indicate which of those Units the species or community is actually located in; *or*
2. there is a documented occurrence in the vicinity and there is suitable habitat for that species or community within this Matrix Unit.

POTENTIAL - This Matrix Unit lies within the known or predicted range of the species or community based on expert knowledge and environmental variables such as climate, soils, topography, and landcover.

Matrix Unit ID: 59356

1 **Documented** Element Found

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
Haliaeetus leucocephalus Bald Eagle	G5	S3	N	N

0 **Documented-Historic** Elements Found

2 **Likely** Elements Found

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
Caracara cheriway Crested Caracara	G5	S2	LT	FT
Mycteria americana Wood Stork	G4	S2	LT	FT

Matrix Unit ID: 59357

0 **Documented** Elements Found

0 **Documented-Historic** Elements Found

2 **Likely** Elements Found

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
Caracara cheriway Crested Caracara	G5	S2	LT	FT
Mycteria americana Wood Stork	G4	S2	LT	FT

Matrix Unit IDs: 59356 , 59357

18 **Potential** Elements Common to Any of the 2 Matrix Units

Scientific and Common Names	Global Rank	State Rank	Federal Status	State Listing
Athene cunicularia floridana Florida Burrowing Owl	G4T3	S3	N	SSC
Calopogon multiflorus Many-flowered Grass-pink	G2G3	S2S3	N	T
Carex chapmanii Chapman's Sedge	G3	S3	N	T
Centrosema arenicola Sand Butterfly Pea	G2Q	S2	N	E
Conradina brevifolia Short-leaved Rosemary	G2Q	S2	LE	E
Drymarchon couperi Eastern Indigo Snake	G3	S3	LT	FT
Gopherus polyphemus Gopher Tortoise	G3	S3	C	ST
Grus canadensis pratensis Florida Sandhill Crane	G5T2T3	S2S3	N	ST
Lechea cernua Nodding Pinweed	G3	S3	N	T
Linum carteri var. smallii Small's Flax	G2T2	S2	N	E
Mustela frenata peninsulae Florida Long-tailed Weasel	G5T3	S3	N	N
Nemastylis floridana Celestial Lily	G2	S2	N	E
Nolina atopocarpa Florida Beargrass	G3	S3	N	T
Panicum abscissum Cutthroat Grass	G3	S3	N	E
Peucaea aestivalis Bachman's Sparrow	G3	S3	N	N
Picoides borealis Red-cockaded Woodpecker	G3	S2	LE	FE
Sceloporus woodi Florida Scrub Lizard	G2G3	S2S3	N	N
Sciurus niger shermani Sherman's Fox Squirrel	G5T3	S3	N	SSC

for the accuracy and completeness of these data, or opinions or conclusions drawn from these data. FNAI is not inviting reliance on these data. Inventory data are designed for the purposes of conservation planning and scientific research and are not intended for use as the primary criteria for regulatory decisions.

Unofficial Report

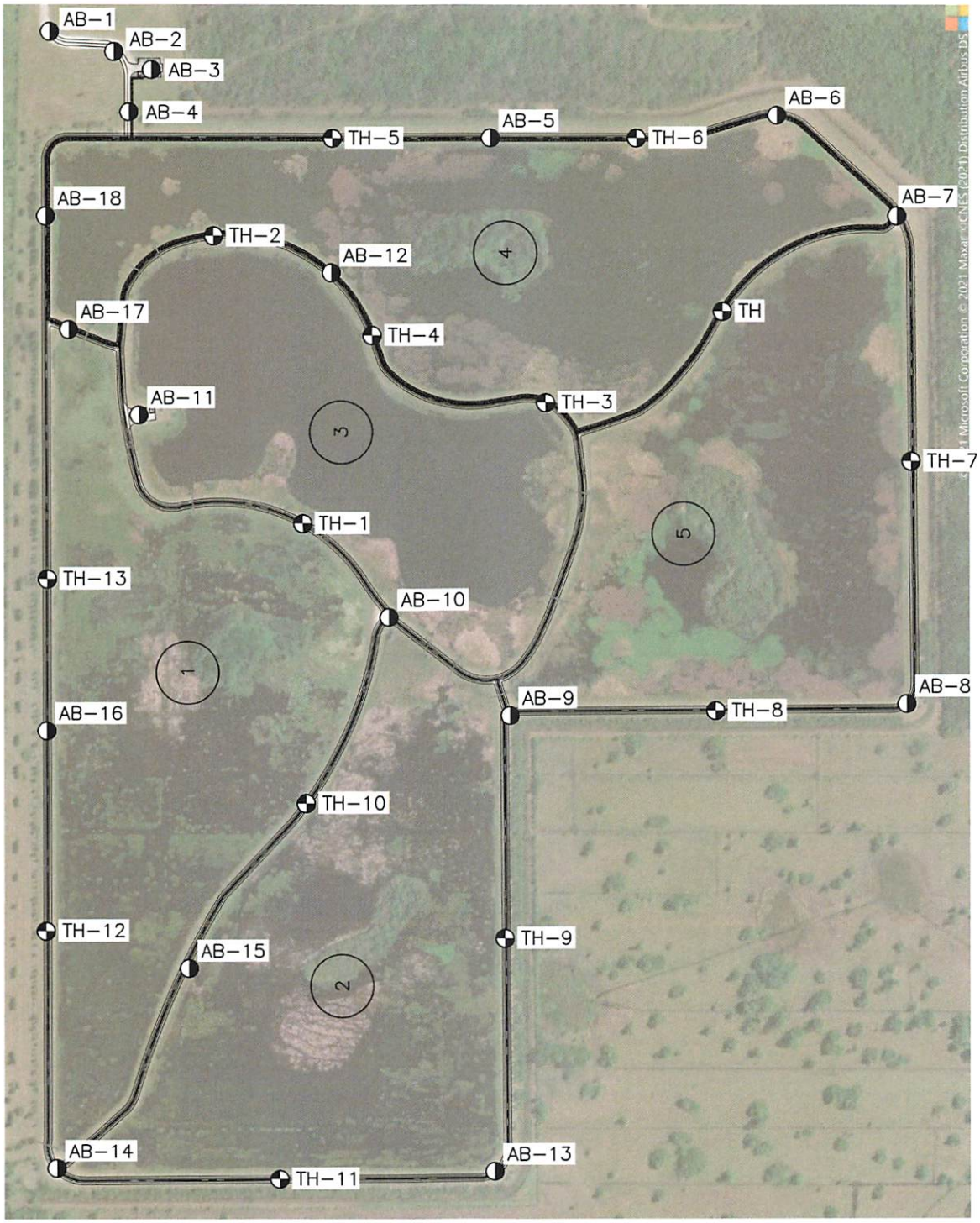
These results are considered unofficial. FNAI offers a Standard Data Request option for those needing certifiable data.

Appendix D. Geotechnical Investigation

D.1. Preliminary Soil Boring Profiles

D.2. Cell Containment Berm Global Stability Analysis

D.3. Recommendations for Site Preparation and Construction



LEGEND

TH STANDARD PENETRATION TEST (SPT) BORING LOCATION

AB AUGER BORING LOCATION

N

0 250 500

SCALE: 1"=500'

BORING LOCATION PLAN

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/1/21
FILE NO. 21-5280	APPROVED BY:	FIGURE: 2

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LEGEND

SOIL DESCRIPTIONS

1. FINE SAND (SP)
2. FINE SAND WITH SILT (SP-SM)
3. SILTY FINE SAND (SM)
4. CLAYEY FINE SAND (SC)
5. CLAY (CL,CH)

COLORS

A. LIGHT BROWN TO BROWN
B. GRAYISH-BROWN
C. LIGHT GRAY TO GRAY
D. DARK GRAY OR DARK BROWN
E. YELLOWISH BROWN OR ORANGE-BROWN

TH	STANDARD PENETRATION TEST (SPT) BORING
AB	AUGER BORING
N	STANDARD PENETRATION RESISTANCE IN BLOWS PER FOOT
WOH	SAMPLER ADVANCED BY STATIC WEIGHT OF HAMMER AND RODS ONLY
GNE	GROUNDWATER NOT ENCOUNTERED ON DATE DRILLED
GNM	GROUNDWATER NOT ENCOUNTERED ABOVE 10.5 FEET ON DATE DRILLED
▽	GROUNDWATER LEVEL MEASURED ON DATE DRILLED
-200	PERCENT PASSING NO. 200 SIEVE SIZE (PERCENT FINES)(ASTM D-1140)
NM	NATURAL MOISTURE CONTENT IN PERCENT (ASTM D-2216)
SP,SP-SM SM,SC,CH	UNIFIED SOIL CLASSIFICATION SYSTEM

ENGINEERING CLASSIFICATION

I COHESIONLESS SOILS

DESCRIPTION	BLOW COUNT "N"
VERY LOOSE	0 TO 4
LOOSE	4 TO 10
MEDIUM DENSE	10 TO 30
DENSE	30 TO 50
VERY DENSE	>50

II COHESIVE SOILS

DESCRIPTION	UNCONFINED COMPRESSIVE STRENGTH, QU, TSF	BLOW COUNT "N"
VERY SOFT	<1/4	0 TO 2
SOFT	1/4 TO 1/2	2 TO 4
MEDIUM STIFF	1/2 TO 1	4 TO 8
STIFF	1 TO 2	8 TO 15
VERY STIFF	2 TO 4	15 TO 30
HARD	>4	>30

WHILE THE BORINGS ARE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT THEIR RESPECTIVE LOCATIONS AND FOR THEIR RESPECTIVE VERTICAL REACHES, LOCAL VARIATIONS CHARACTERISTIC OF THE SUBSURFACE MATERIALS OF THE REGION ARE ANTICIPATED AND MAY BE ENCOUNTERED. THE BORING LOGS AND RELATED INFORMATION ARE BASED ON THE DRILLER'S LOGS AND VISUAL EXAMINATION OF SELECTED SAMPLES IN THE LABORATORY. THE DELINEATION BETWEEN SOIL TYPES SHOWN ON THE LOGS IS APPROXIMATE AND THE DESCRIPTION REPRESENTS OUR INTERPRETATION OF SUBSURFACE CONDITIONS AT THE DESIGNATED BORING LOCATIONS ON THE PARTICULAR DATE DRILLED.

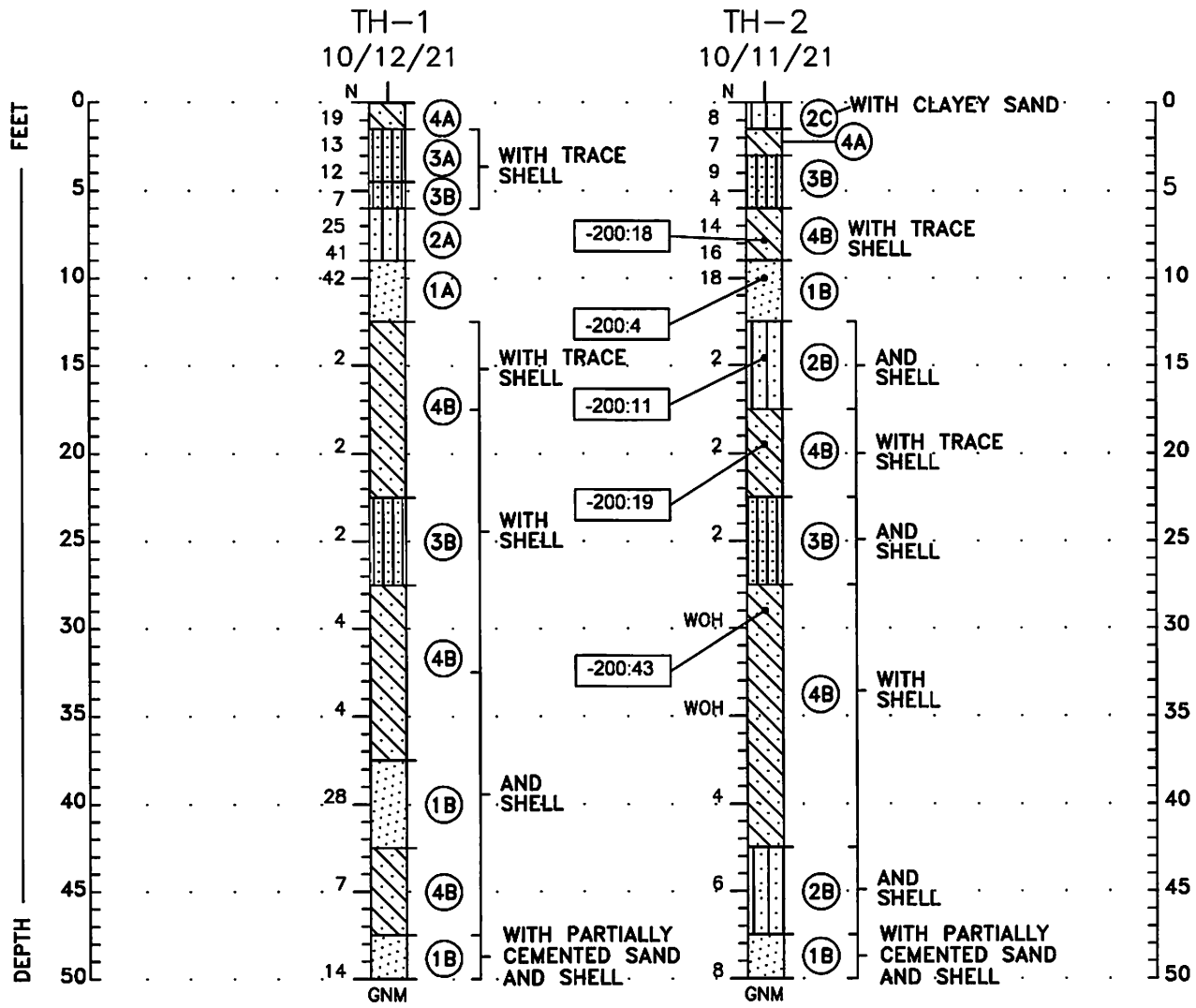
GROUNDWATER ELEVATIONS SHOWN ON THE BORING LOGS REPRESENT GROUNDWATER SURFACES ENCOUNTERED ON THE DATES SHOWN. FLUCTUATIONS IN WATER TABLE LEVELS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR. ABSENCE OF WATER SURFACE DATA ON CERTAIN BORINGS IMPLIES THAT NO GROUNDWATER DATA IS AVAILABLE, BUT DOES NOT NECESSARILY MEAN THAT GROUNDWATER WILL NOT BE ENCOUNTERED AT THESE LOCATIONS OR WITHIN THE VERTICAL REACHES OF THESE BORINGS IN THE FUTURE.

SOIL PROFILES LEGEND

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/28/21
FILE NO. 21-5280	APPROVED BY:	FIGURE:



SOIL BORING PROFILES

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

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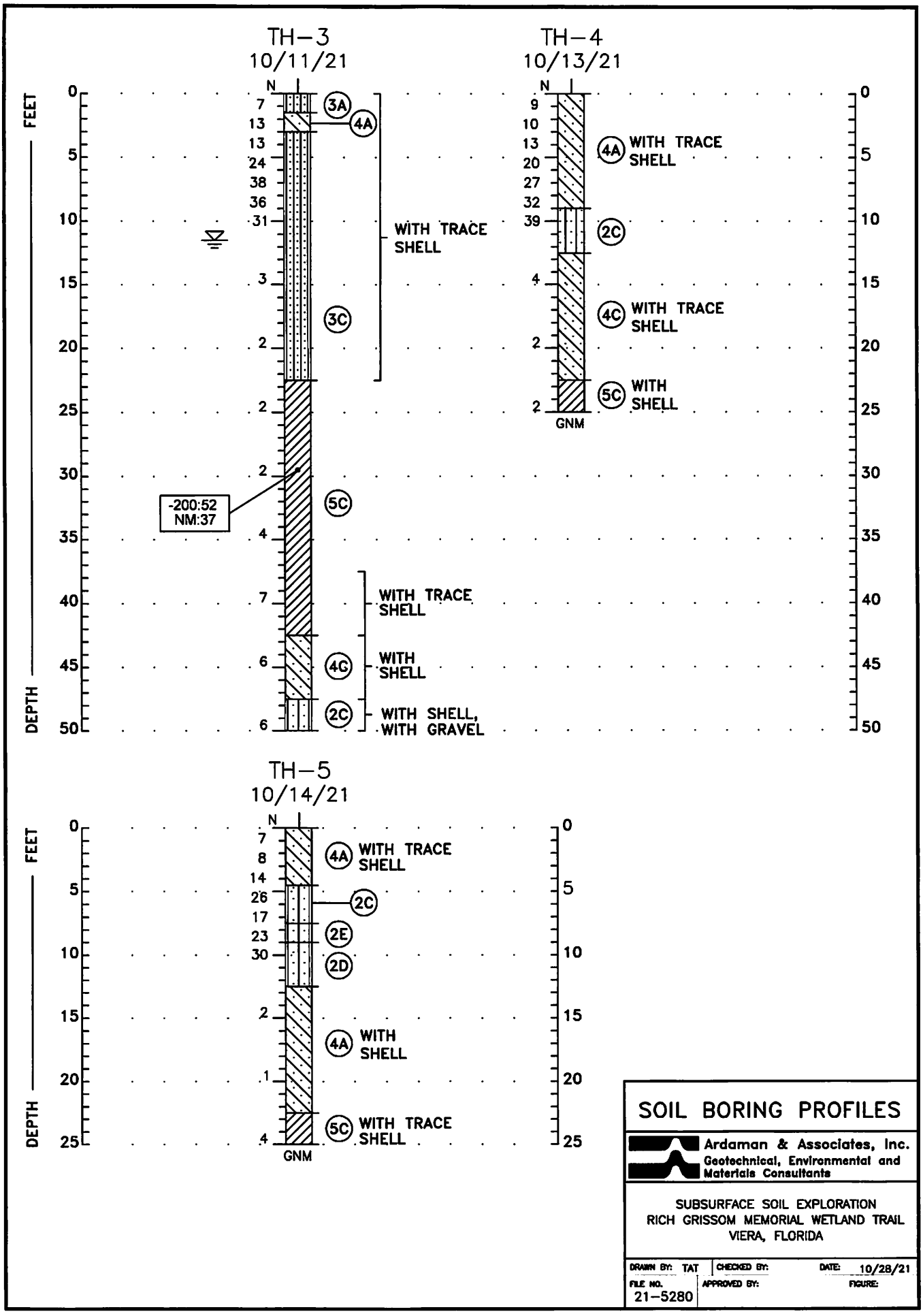

SOIL BORING PROFILES

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

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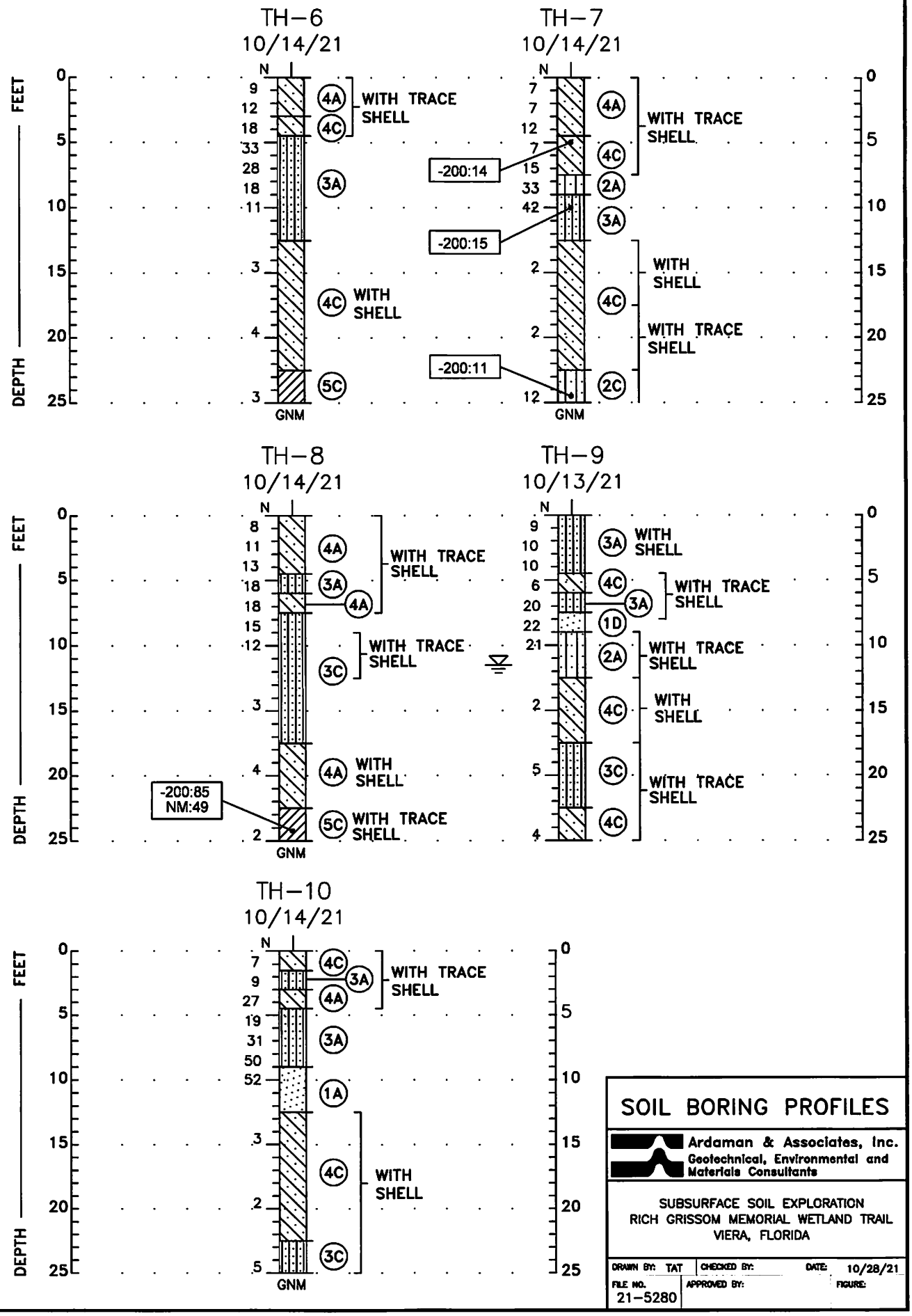

SOIL BORING PROFILES

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/28/21
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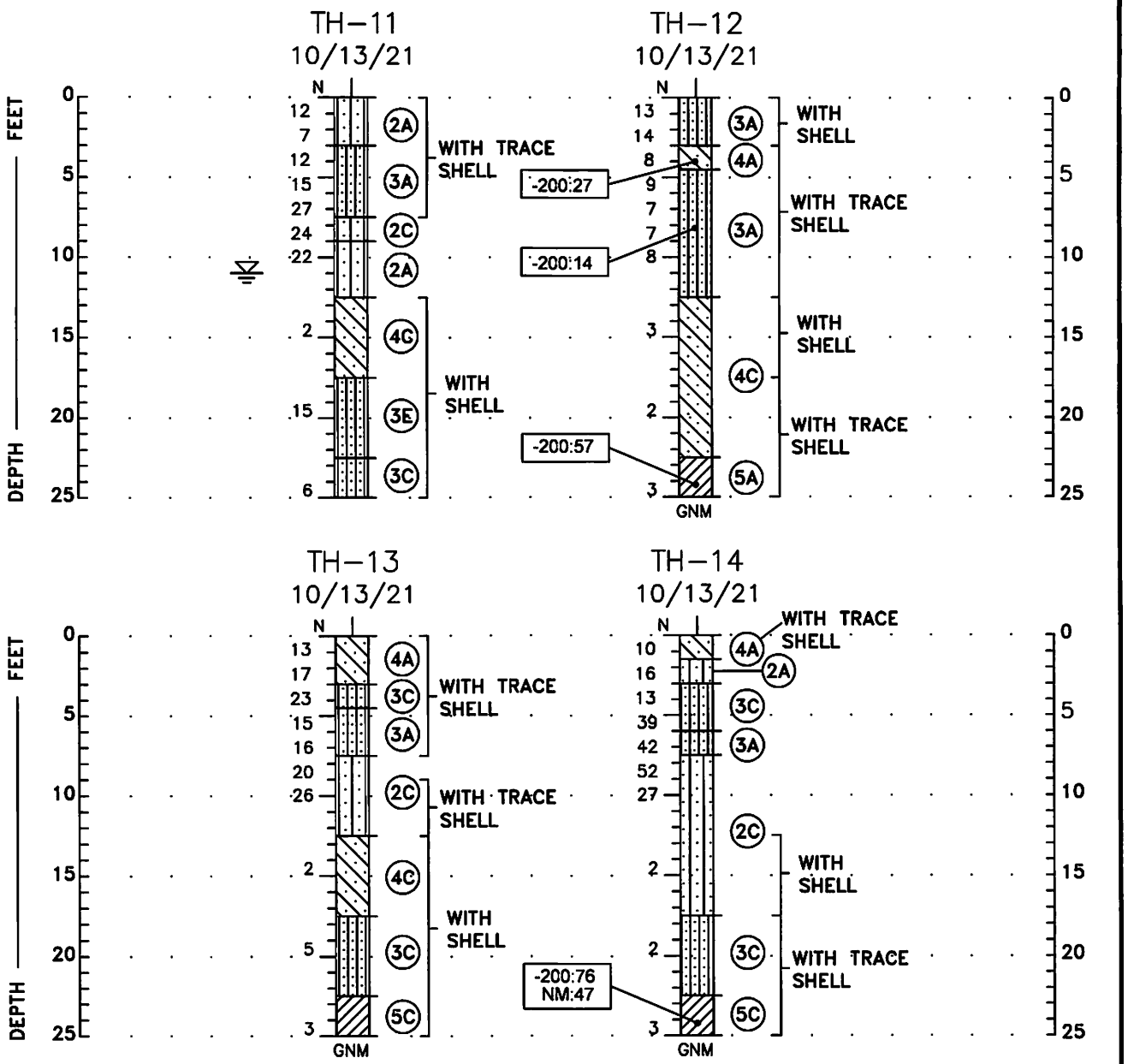
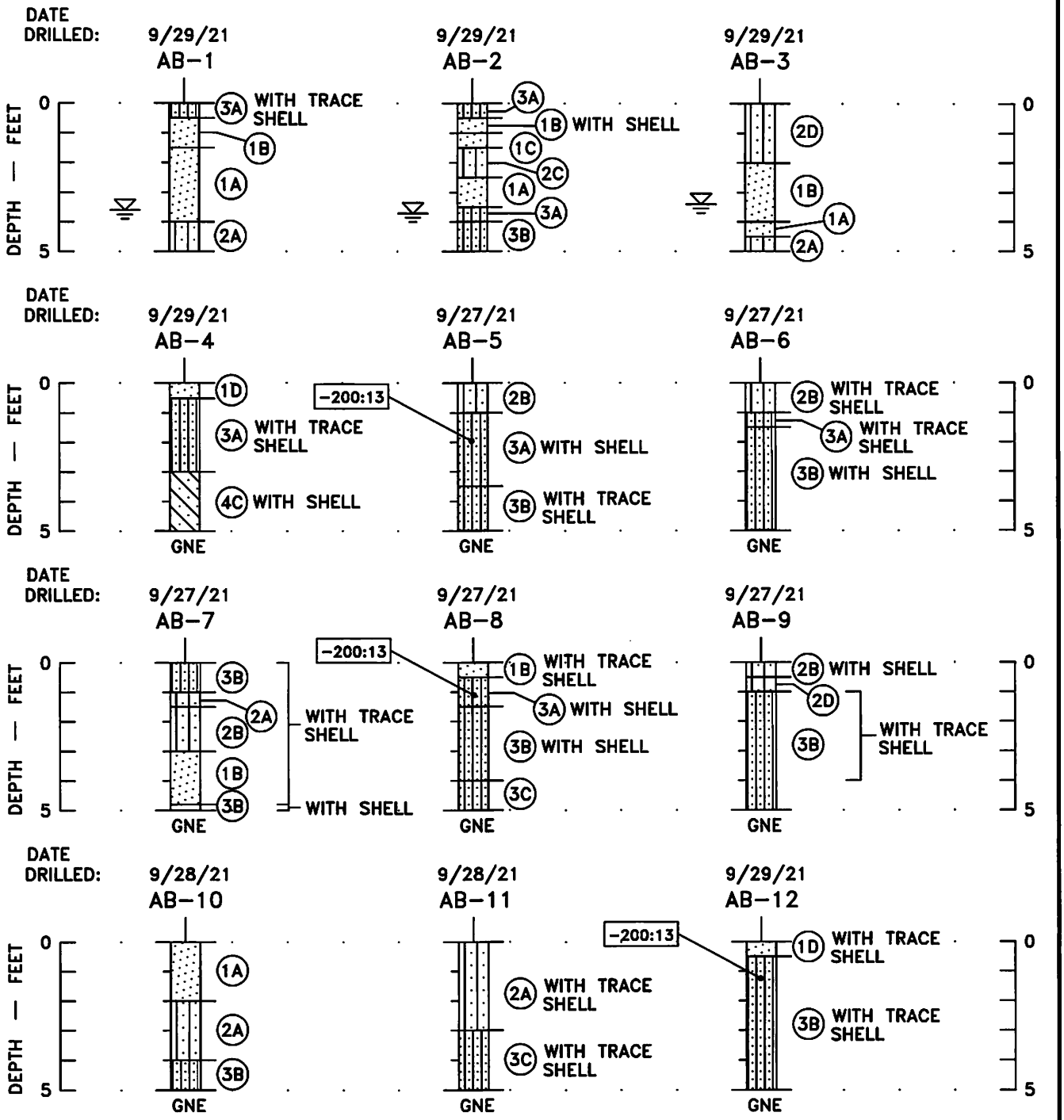


SOIL BORING PROFILES

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/28/21
FILE NO. 21-5280	APPROVED BY:	FIGURE:

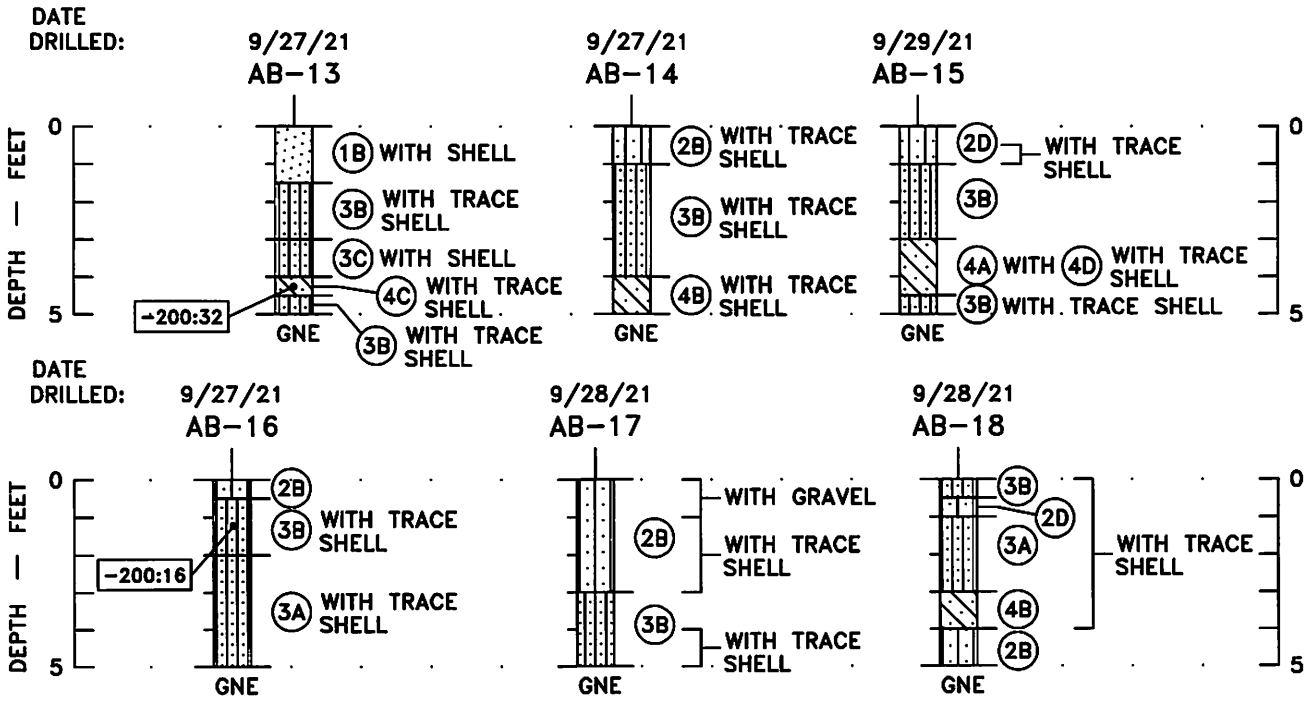


SOIL BORING PROFILES

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/1/21
FILE NO. 21-5280	APPROVED BY:	FIGURE:



SOIL BORING PROFILES

Ardaman & Associates, Inc.
Geotechnical, Environmental and Materials Consultants

SUBSURFACE SOIL EXPLORATION
RICH GRISSOM MEMORIAL WETLAND TRAIL
VIERA, FLORIDA

DRAWN BY: TAT	CHECKED BY:	DATE: 10/1/21
FILE NO. 21-5280	APPROVED BY:	FIGURE:

Global Stability Results
Rich Grissom Memorial Wetland Trail

Cross Section by AAI Boring	Factor of Safety per Vehicle Type			
	N/A (i.e., Pedestrian)	Passenger Vehicle	Dump Truck (Full)	Bulldozer
TH-1	2.0	2.0	1.9	1.8
TH-2	2.3	2.2	2.0	1.9
TH-5	1.9	1.9	1.7	1.5
TH-7	1.9	1.9	1.8	1.6
TH-8	1.8	1.8	1.7	1.6
TH-9	1.9	1.9	1.9	1.6
TH-10	2.4	2.3	2.2	1.8
TH-11	2.0	2.0	1.8	1.5
TH-13	1.9	1.9	1.8	1.6
TH-14	2.4	2.3	2.1	1.7

Proposed Roadway and Parking Improvements

General

The results of our exploration indicate that, with proper site preparation as recommended in this report, the existing soils are suitable for construction of the proposed berms, for construction of the asphalt paved roadways on top of the berms, and for the proposed asphalt paved parking area at the facility entrance.

The following are our recommendations for overall site preparation and pavement construction which we feel are best suited for the proposed facility and existing soil conditions. The recommendations are made as a guide for the design engineer, parts of which should be incorporated into the project's specifications.

Stripping and Grubbing

The "footprints" of the proposed berm and pavement areas, plus a minimum margin of 5 feet, should be stripped of all surface vegetation, stumps, debris, organic topsoil or other deleterious materials, as encountered. Buried utilities should be removed or plugged to eliminate conduits into which surrounding soils could erode.

After stripping, the construction areas should be grubbed or root-raked such that roots with a diameter greater than ½ inch, stumps, or small roots in a dense state, are completely removed. The actual depth(s) of stripping and grubbing must be determined by visual observation and judgment during the earthwork operation.

Proof-rolling

We recommend proof-rolling the cleared surface to locate any unforeseen soft areas or unsuitable surface or near-surface soils, to increase the density of the upper soils, and to prepare the existing surface for the addition of the fill soils (as required). Proof-rolling of the berm and pavement areas should consist of at least three passes of a compactor capable of achieving the density requirements described in the next paragraph. Each pass should overlap the preceding pass by 30 percent to achieve complete coverage. If deemed necessary, in areas that continue to "yield", remove all deleterious material and replace with clean, compacted sand backfill. The proof-rolling should occur after cutting and before filling.

A density equivalent to or greater than 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value for a depth of 1 foot in the berm and pavement areas must be achieved beneath the stripped and grubbed ground surface. Additional passes and/or overexcavation and recompaction may be required if these minimum density requirements are not achieved. The soil moisture should be adjusted as necessary during compaction.

Care should be exercised to avoid damaging any neighboring structures while the compaction operation is underway. Prior to commencing compaction, occupants of adjacent structures should be notified and the existing condition (i.e. cracks) of the structures documented with photographs and survey (if deemed necessary). Compaction should cease if deemed detrimental to adjacent structures, and Ardaman & Associates should be notified immediately. Heavy vibratory

compaction equipment should not be used on top of the existing berms or within 200 feet of existing structures.

Suitable Fill Material and the Compaction of Fill Soils

All fill soil should be free of organic materials, such as roots and vegetation. We recommend using fill with less than 12 percent by dry weight of material passing the U.S. Standard No. 200 sieve size. The fine sand and fine sand with silt (Strata Nos. 1 and 2 as shown in Appendix II) are suitable for use as fill soil and, with proper moisture control, should densify using conventional compaction methods. Soils with more than 12 percent passing the No. 200 sieve (Strata Nos. 3 and 4) can be used in some applications, but will be more difficult to compact due to their inherent nature to retain soil moisture.

All fill beneath in the berm construction areas and the pavement areas should be placed in level lifts not to exceed 12 inches in uncompacted thickness. Each lift should be compacted to at least 95 percent of the modified Proctor (ASTM D-1557) maximum dry density value. The filling and compaction operations should continue in lifts until the desired elevation(s) is achieved. If hand-held compaction equipment is used, the lift thickness should be reduced to no more than 6 inches.

Dewatering

Dewatering will be necessary for the berm construction and may also be necessary during construction of the proposed parking area at the facility entrance. If the control of groundwater is required to achieve the necessary stripping, excavation, proof-rolling, filling, compaction, and any other earthwork, sitework, and/or foundation subgrade preparation operations required for the project, the actual method(s) of dewatering should be determined by the contractor. Dewatering should be performed to lower the groundwater level to depths that are adequately below excavations and compaction surfaces. Adequate groundwater level depths below excavations and compaction surfaces vary depending on soil type and construction method, and are usually 2 feet or more. Dewatering solely with sump pumps may not achieve the desired results.

Typical Asphaltic Concrete Surface Pavement Section

All areas to be paved should be prepared as previously outlined. Prior to pavement base installation, the subgrade soil compaction should be verified for a depth of 12 inches (i.e.; compacted to at least 95 percent of the modified Proctor (ASTM D-1557, AASHTO T-180) maximum dry density value).

A. Limerock or Cemented Coquina Base

A limerock or cemented coquina base course 6 inches thick overlying an 8-inch thick stabilized subbase can be used provided that grading and drainage plans preclude periodic saturation of the base material. The periodic saturation of a limerock/coquina base material could lead to premature pavement distress. A minimum clearance of 18 inches must be maintained between the bottom of the limerock/coquina base and the seasonal high groundwater table.

The limerock or cemented coquina should have a minimum Limerock Bearing Ratio (LBR) value of 100 and should be compacted to at least 98 percent of the modified Proctor (ASTM D-1557,

AASHTO T-180) maximum density value. For truck parking and drive areas, the base thickness should be a minimum of 8 inches.

An 8-inch thick subbase having a minimum Limerock Bearing Ratio (LBR) value of 40 must be achieved beneath the limerock or cemented coquina base. The natural soils may have to be stabilized with suitable clayey soil in order to achieve the required LBR value. The stabilized subbase must be compacted to at least 95 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180).

B. Recycled Concrete Aggregate Base (Optional)

Recycled concrete aggregate base supported by a free-draining subgrade may be used. Six inches of recycled concrete aggregate base should be used in automobile parking areas and 8 inches of recycled concrete aggregate base should be used in truck parking and drive areas. A minimum clearance of 12 inches should be maintained between the bottom of the recycled concrete aggregate base and the seasonal high groundwater table.

The recycled concrete aggregate base should have a minimum LBR value of 150 and should be compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180). The recycled concrete aggregated should meet gradation requirements according to Section 911-3.4 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition. Other requirements for recycled concrete aggregate base are outlined in Section 334 in the Florida Department of Transportation, Standards for Road and Bridge Construction, latest edition. The subgrade beneath the recycled concrete aggregate base should consist of free draining sand compacted to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557, AASHTO T-180).

We note that if the contractor's means and methods include stabilizing soils beneath the recycled concrete aggregate base, then the stabilizing material should be coarse material (e.g; gravel). Low permeability soils (e.g; silt and/or clay) should not be used as stabilizing material beneath recycled concrete aggregate base.

If recycled concrete aggregate base is utilized for the proposed parking area at the facility entrance, we recommend that the silty fine sand soil (Stratum No. 3 in Appendix II) encountered at the existing ground surface in Borings AB-1 and AB-2 be removed in its entirety and replaced with clean, compacted fine sand of the Unified Soil Classification SP.

C. Wearing Surface

A minimum 1½-inch layer of Type SP-9.5 or SP-12.5 asphaltic concrete should be used for a wearing surface in automobile parking/drive areas. For truck parking and drive areas, 2 inches of Type SP-9.5 or SP-12.5 asphaltic concrete should be used.

Specific requirements for the Type-SP asphaltic concrete wearing surface are outlined in Section 334 in the Florida Department of Transportation, Standard Specifications for Road and Bridge Construction, latest edition. Equivalent Type S asphaltic concrete may be substituted for Type SP-9.5 or SP-12.5; however, we recommend a minimum Marshall stability of 2,200 pounds if Type S is used.

The latest specifications of Florida Department of Transportation shall govern the placement of the base and asphaltic concrete wearing surface. The above minimum requirements will satisfactorily support Traffic Level A*. If a heavier traffic pattern is anticipated, the design section should be increased accordingly.

QUALITY ASSURANCE

We recommend establishing a comprehensive quality assurance program to verify that all site preparation and pavement construction is conducted in accordance with the appropriate plans and specifications. Materials testing and inspection services should be provided by Ardaman & Associates.

As a minimum, an on-site engineering technician should monitor all stripping and grubbing to verify that all deleterious materials have been removed and should observe the proof-rolling operation to verify that the appropriate number of passes are applied to the subgrade. In-situ density tests should be conducted during filling activities and below all pavement areas to verify that the required densities have been achieved. In-situ density values should be compared to laboratory Proctor moisture-density results for each of the different natural and fill soils encountered.

Additionally for the pavements, Limerock Bearing Ratio tests should be performed. The base course(s) should be tested for density and thickness. We recommend that Ardaman & Associates be retained to review the asphalt pavement mix design proposed for use on the project prior to pavement placement. During asphalt pavement construction, samples of the asphaltic concrete should be obtained and tested in the laboratory to verify compliance with the mix design, including testing Marshall Stability (Type S asphalt), flow, asphalt content, and aggregate gradation. We also recommend full-time monitoring/testing in the batch plant and on the site during pavement placement. The asphaltic concrete thickness should be verified in the field.

IN-PLACE DENSITY TESTING FREQUENCY

In Central Florida, earthwork testing is typically performed on an on-call basis when the contractor has completed a portion of the work. The test result from a specific location is only representative of a larger area if the contractor has used consistent means and methods and the soils are practically uniform throughout. The frequency of testing can be increased and full-time construction inspection can be provided to account for variations. We recommend that the following minimum testing frequencies be utilized.

In the proposed parking area, a minimum frequency of one in-place density test for each 5,000 square feet of area (minimum of four test locations) should be used. In the proposed roadway areas, a minimum frequency of one in-place density test for each 200 lineal feet of roadway should be used. The existing, natural ground should be tested to a depth of 12 inches at the prescribed frequency. Each 12-inch lift of fill, as well as the stabilized subgrade (where applicable) and base should be tested at this frequency. Utility backfill should be tested at a minimum frequency of one

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* Reference: "Flexible Pavement Design Manual", Florida Department of Transportation. (Latest Edition)

in-place density test for each 12-inch lift for each 200 linear feet of pipe. Additional tests should be performed in backfill for manholes, inlets, etc.

Representative samples of the various natural ground and fill soils, as well as stabilized subgrade (where applicable) and base materials, should be obtained and transported to our laboratory for Proctor compaction tests. These tests will determine the maximum dry density and optimum moisture content for the materials tested and will be used in conjunction with the results of the in-place density tests to determine the degree of compaction achieved.