

ADDENDUM NO. 1

TAYLOR ENGINEERING, INC.



**DREDGED MATERIAL MANAGEMENT
AREA M-8 CONSTRUCTION;**

**ST. LUCIE COUNTY, FLORIDA
MAY 8, 2018**



SUMMARY OF AMENDMENTS TO PROJECT SPECIFICATIONS

Section 32 92 19 Grassing Establishment – Replaced with “SECTION 32 92 19_REV1.docx”

The previous Grassing establishment specification has been completely replaced with a revised Section 32 92 19 specification. The intention is to change the grassing type from a standard Bahia-type seed mix to a coastal/dune-type grassing plan which will establish and grown better in the M-8 soil conditions.

PERMITS

U.S. Army Corps of Engineers permit SAJ-2017-2292 is provided.

Note: Special conditions in this permit related to wildlife surveys and relocations are **NOT** the responsibility of the bidding contractors. FIND will be responsible for all wild life surveys and relocations.

SUMMARY OF QUESTIONS AND RESPONSES

1. **QUESTION:** Is the Contractor required to obtain building permit from St Lucie County for this project?

RESPONSE: Yes, the contractor will be required to coordinate with St. Lucie County to obtain a Right of Way permit and get an approved Maintenance of Traffic Plan for the pipeline construction beneath S. Indian River Drive.

2. **QUESTION:** Can the Contractor close S. Indian River Drive for the pipe crossing construction?

RESPONSE: The contractor will need to work this out with St. Lucie County, based on your approved Maintenance of Traffic Plan. Taylor Engineering has met with the County Engineering Manager and discussed this upcoming project. The County is open to considering any of several possible scenarios for the pipeline installation including the following: keeping one lane open with flaggers; temporary bypass road along eastern side of Indian River Drive median; closure of S. Indian River Drive and night time construction.

3. **QUESTION:** Does this project require a permit from US Army Corps of Engineer? If so, who is responsible for the permit fee?

RESPONSE: Yes, an Army Corps of Engineers permit is required and will be provided as an addendum to this solicitation no later than 5/10/18. The permit fee has already been paid by FIND. We do not expect any restrictive or significant Special Conditions to be in the permit.

4. **QUESTION:** For item 23 (Bid Schedule), is the Contractor required to furnish the resilient gate valve?

RESPONSE: Yes.

5. **QUESTION:** For item 21 (Bid Schedule) - Pipeline Sleeve Installation - Is the Contractor required to furnish the 36" sleeve pipe?

RESPONSE: Yes.

6. **QUESTION:** For item 21 (Bid Schedule) - Pipeline Sleeve Installation - Is the Contractor required to furnish the precast headwall?

RESPONSE: Yes.

SECTION 32 92 19

GRASSING ESTABLISHMENT

~~PART 1 — GENERAL~~

~~1.01 — SUMMARY~~

- ~~A. — This section consists of requirements for all labor, equipment, and materials required to grass the disturbed areas where grassing is specified in the Project Drawings and Specifications.~~
- ~~B. — This section covers materials and execution for seeding, hydroseeding, and sodding. However, the Contractor shall select the appropriate means and methods among seeding, hydroseeding sodding for establishing grass to meet the Satisfactory Stand of Grass as described in this specification. The Contractor may select multiple means methods of meeting these requirements at different grassing areas if desired.~~
- ~~C. — Grass seed listed under Part 2 and seed mixture listed under Part 3 is intended for general guidelines for bidding purposes for seeding and hydroseeding. The Contractor shall submit their site specific proposed mixture based on topsoil pH tests, grassing season, and local experience for Engineer Approval before ordering grassing materials.~~

~~1.02 — REFERENCES~~

~~The publications listed below form a part of this specification to the extent referenced. The publications are referred to within the test by the basic designation only.~~

~~A. — American Society for Testing and Materials (ASTM)~~

~~ASTM C602 — Standard Specification for Agricultural Liming Materials
ASTM D4972 — Standard Test Method for pH of Soils
ASTM F1647 — Standard Test Methods for Organic Matter Content of Athletic Field
Rootzone Mixes Method A (Loss on Ignition)~~

~~B. — U.S. Department of Agriculture (USDA)~~

~~AMS Seed Act — Federal Seed Act~~

~~1.03 — SUBMITTALS~~

~~The following shall be submitted in accordance with SECTION 01 33 00 SUBMITTAL PROCEDURES.~~

~~A. — Grassing Establishment Plan~~

~~Prior to grassing, the Contractor shall submit a Grass Establishment Plan including the following information:~~

- ~~1. An outline explaining general procedure, listing of equipment to be used, order of application, and method of application to be used.~~
- ~~2. Results of topsoil pH and organic content tests on five (5) different soil samples taken as directed by the Engineer. Submit test results, prepared by an independent testing agency.~~
- ~~3. Submit the seed mixture, tackifiers, mulch, soil amendments, fertilizer, weed control, insect/pest control, and times and rates of application of each.~~
- ~~4. The name and location of the source, and pH and chloride content, of the water used for grass watering for the Engineer's approval.~~

~~B. Grassing Material Certificates~~

- ~~1. Prior the delivery of materials, certificates of compliance demonstrating that the proposed materials meet the specified requirements.~~

~~C. Grass Watering and Maintenance Records~~

- ~~1. Submit to the Engineer a written record of all grass watering and maintenance including, type of action taken, dates, amounts (in pounds or gallons) of material applied (including water), weather conditions, and rainfall amounts as recorded in the nearest local newspaper.~~

PART 2 — PRODUCTS

2.01 — SEED

- ~~A. Provide State-Certified seed of the latest season's crop delivered in original sealed packages, bearing producer's guaranteed analysis for percentages of mixtures, purity, germination, hard seed, weed seed content, and inert material. Label in conformance with AMS Seed Act and applicable state seed laws. Damaged seed will be rejected.~~
- ~~B. Temporary seeding species shall be selected based on season.~~
- ~~C. Seed species shall meet germination and seed content as follows:~~

Seed	Minimum Pure Seed Content	Minimum Active Germination	Total Germination	Additional Requirements
Pensacola Bahia	95%	40%	80% including firm seed	N/A
Bermuda	95%	N/A	85%	Shall be the common variety
Annual Rye Grass	95%	N/A	90%	N/A
Millet	90%	N/A	85%	Shall be of the brown top variety

~~D. Weed seed shall be a maximum 1 percent by weight of the total mixture.~~

~~E. The mixing of seed may be done by the seed supplier prior to delivery, or on site as directed.~~

2.02 SOD

~~A. Sod shall be Pensacola Bahia. Sod shall be relatively free of thatch, diseases, nematodes, soil-borne insects, weeds or undesirable plants, stones larger than 1 inch in diameter, woody plant roots, and other materials detrimental to a healthy stand of grass plants. Broadleaf weeds and patches of foreign grasses shall be a maximum of 2 percent of the sod section.~~

~~B. Sod shall be machine cut to a minimum 1 - 3/8 inch thickness. Measurement for thickness shall exclude top growth and thatch.~~

~~C. Sod shall be planted as soon as possible after being dug and shall be shaded and kept moist from the time it is dug until it is planted.~~

2.03 FERTILIZER

~~A. Fertilizers shall comply with the State fertilizer laws. The numerical designations for fertilizer indicate the minimum percentages (respectively) of (1) total nitrogen, (2) available phosphoric acid, and (3) water-soluble potash, contained in the fertilizer.~~

~~B. The chemical composition of the fertilizer for each application shall be chosen by the Contractor.~~

2.04 SOIL AMENDMENTS

~~A. Soil amendments shall consist of pH adjuster, fertilizer, organic material, and soil conditioners meeting the following requirements. Vermiculite shall not be used. The pH adjuster shall be used to create a favorable soil pH for the plant material specified.~~

~~B. These materials may be burnt lime, hydrated lime, ground limestone, sulfur, or shells. Agricultural liming material in accordance with ASTM C602.~~

~~C. Organic material shall consist of either bonemeal, rotted manure, decomposed wood derivatives, recycled compost, or worm castings.~~

~~D. Soil conditioner shall be sand, super absorbent polymers, calcined clay, or gypsum for use singularly or in combination to meet the requirements of the soil test.~~

2.05 MULCH

~~A. — Mulch shall be free from weeds, mold, and other deleterious materials. Mulch materials shall be native to the region. The following provides types of mulch that the Contractor may use:~~

~~1. — Seeded Areas: Straw~~

~~a. — Stalks from oats, wheat, rye, barley, or rice. Furnish in air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Straw shall contain no fertile seed.~~

~~2. — Seeded Areas: Hay~~

~~a. — Native hay, sudan-grass hay, broomsedge hay, or other herbaceous mowings, furnished in an air-dry condition and of proper consistency for placing with commercial mulch blowing equipment. Hay shall be sterile, containing no fertile seed.~~

~~3. — Hydroseeded Areas: Wood Cellulose Fiber~~

~~a. — Processed to contain no growth or germination-inhibiting factors and dyed an appropriate color to facilitate placement during application. Composition on air-dry weight basis: 9 to 15 percent moisture, pH range from 4.5 to 6.0. Use with hydraulic application of grass seed and fertilizer.~~

~~4. — Hydroseeded Areas: Paper Fiber~~

~~a. — Paper fiber mulch shall be recycled news print that is shredded for the purpose of mulching seed.~~

2.06 — TOPSOIL —

~~A. — Material suitable for topsoil shall be natural in-situ topsoil taken from onsite areas within the clearing limits but outside the existing dike. Unless otherwise approved by the Engineer, suitable topsoil shall be dark colored soils discolored by the organic content of the soil and having at least 1.0 percent organic content by dry weight.~~

2.07 — WATER

~~A. — Water shall be the responsibility of the Contractor, unless otherwise noted. The water used in the described grassing operations may be obtained from any approved spring, pond, lake, stream, or municipal water system. The water shall be free of excess and harmful chemicals, acids, alkalis, or any other substance that might be harmful to plant growth. Salt water shall not be used.~~

PART 3 — EXECUTION

3.01 — GENERAL

- ~~A. — The intent is to provide a permanent stand of grass over all disturbed areas except the basin interior. Proposed stabilized road surfaces need not receive grassing.~~
- ~~B. — The Contractor shall be responsible for observing and documenting that the seed, mulch, fertilizer, tackifiers, and other materials are applied according to the specifications. The Contractor shall personally observe that all material was delivered to the site unopened and shall collect all bags and containers used to hold these products which will be submitted to the Engineer for inspection. The Contractor shall maintain and submit to the Engineer a written record of all watering and maintenance including, dates, amount (in pounds or gallons) of material applied (including water), weather conditions, and rainfall amounts as recorded in the nearest local newspaper.~~
- ~~C. — Perform grassing operations only during periods when beneficial results can be obtained. When drought, excessive moisture, excessive wind, or other unsatisfactory conditions prevail, the work shall be stopped until conditions again become favorable.~~

3.02 — DELIVERY, INSPECTION, STORAGE, AND HANDLING

- ~~A. — All materials shall be delivered to the site in original, unopened containers bearing the manufacturer's information. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles.~~
- ~~B. — The Contractor shall inspect all materials upon arrival for conformity to approved submittal materials. Seed that is wet, moldy, or bears a test date five months or older shall be rejected. Other materials shall be inspected for compliance with specified requirements. Open soil amendment containers or wet soil amendments will be rejected. Unacceptable materials shall be removed from the job site.~~
- ~~C. — Materials shall be stored in designated cool, dry locations away from contaminants.~~
- ~~D. — Material packaging for all seed, fertilizer, mulch, and other grassing materials shall be stored on-site for Engineer/District review until the end of the Grassing Establishment Period. At the end of the Grassing Establishment Period, and upon approval by the Engineer, the Contractor shall remove the packaging from the site.~~

3.03 — TOPSOIL

- ~~A. — Test five (5) samples of topsoil and test for pH and organic content in accordance with ASTM D4972 and ASTM F1647. Take samples at different levels in the stockpile at locations directed by the Engineer. Tests shall determine the quantities and type of soil amendments required to meet local growing conditions for the specified seed species.~~
- ~~B. — Topsoil shall be raked or sieved as necessary to remove debris, roots, branches, rocks, and other non-desirable materials.~~
- ~~C. — After submitting test to the Engineer for approval, apply topsoil in accordance with SECTION 31 23 00 DIKE AND EARTHWORK CONSTRUCTION.~~

3.04 — SITE PREPARATION

~~A. Application of Soil Amendments~~

- ~~1. The pH adjuster shall be applied as recommended by the soil test. The pH adjuster shall be incorporated into the soil to a maximum 4-inch depth or may be incorporated as part of the tillage operation.~~
- ~~2. The soil conditioner shall be applied as recommended by the soil test. Soil conditioner shall be spread uniformly over the soil minimum 1-inch depth and thoroughly incorporated by tillage into the soil to a maximum 4-inch depth.~~
- ~~3. Polymers shall be spread uniformly over the soil as recommended by the manufacturer and thoroughly incorporated by tillage into the soil to a maximum 4-inch depth.~~

~~B. Tillage for Seeding Installation~~

- ~~1. Soil on slopes up to a maximum of 3 horizontal to 1 vertical shall be tilled to a minimum 4-inch depth. On slopes between 3 horizontal to 1 vertical and 1 to 1, the soil shall be tilled to a minimum 2-inch depth by scarifying with heavy rakes or other method. Rototillers shall be used where soil conditions and length of slope permit. Drainage patterns shall be maintained as indicated on the drawings. Areas compacted by construction operations shall be completely pulverized by tillage. Soil used for repair of surface erosion or grade deficiencies shall conform to topsoil requirements. The pH adjuster, fertilizer, and soil conditioner may be applied during this procedure. Debris and stones larger than 3 inches in any direction shall be removed from the surface.~~

~~C. Prepared Surface~~

- ~~1. The prepared surface shall be a maximum of 1 inch below the adjoining grade of any surface area. New surfaces shall be blended to existing areas. The prepared surface shall be completed with a light raking to remove debris. Debris and stones over a minimum 3 inches in any dimension shall be removed from the surface. Areas with the prepared surface shall be protected from compaction, damage by vehicular and pedestrian traffic, and surface erosion.~~

3.05 PH TESTING AND SEED MIXTURE ADJUSTMENT

~~A. Prior to planting operations, perform pH test on a minimum of five samples of topsoil material in the areas to be grassed. Adjust seed mixture components to match the existing pH conditions. Seed shall be applied at the following rates for the soil pH listed:~~

~~B. Soil with pH greater than 6.5~~

~~Apply seed at the following minimum rates:~~

- ~~1. Pensacola Bahia Grass (Paspalum Notatum) 80 lb/ac~~
- ~~2. Common Bermuda Grass (Cynodon Dactylon) 50 lb/ac~~
- ~~3. Rye or Millet (depending on the season) 50 lb/ac
180 lb/ac total~~

~~C. Soil with pH less than or equal to 6.5~~

~~Apply seed at the following minimum rates:~~

1. ~~Pensacola Bahia Grass (Paspalum Notatum) 100 lb/ac~~
2. ~~Common Bermuda Grass (Cynodon Dactylon) 30 lb/ac~~
3. ~~Rye or Millet (depending on the season) 50 lb/ac~~
~~180 lb/ac total~~

3.06 ~~INSTALLING SEED TIME AND CONDITIONS~~

- A. ~~Check with local Agriculture Extension Service for recommended restrictions on seeding time to meet local growing conditions.~~
- B. ~~Seeding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture, or other unsatisfactory conditions prevail, the work shall be stopped when directed. When special conditions warrant a variance to the seeding operations, proposed alternate times shall be submitted for approval.~~
- C. ~~Immediately prior to commencement of seeding operations, calibration tests shall be conducted on the equipment to be used. These tests shall confirm that the equipment is operating within the manufacturer's specifications and will meet the specified criteria. The equipment shall be calibrated a minimum of once every day during the operation. The calibration test results shall be provided within 1 week of testing.~~

3.07 ~~SEED, AND SOD APPLICATIONS~~

- A. ~~Prior to installing seed, any previously prepared surface compacted or damaged shall be reworked to meet the requirements of the paragraph SITE PREPARATION. Seeding operations shall not take place when the wind velocity will prevent uniform seed distribution.~~
- B. ~~Installing Seed~~
 1. ~~Seeding method shall be broadcast seeding, or hydroseeding. Seeding procedure shall ensure even coverage. Gravity feed applicators, which drop seed directly from a hopper onto the prepared soil, shall not be used, unless otherwise approved, because of the difficulty in achieving even coverage. Absorbent polymer powder shall be mixed with the dry seed at the rate recommended by the manufacturer.~~
- C. ~~Broadcast Seeding~~
 1. ~~Seed shall be uniformly broadcast at the minimum rate specified by the grassing supplier using broadcast seeders. The Contractor shall be responsible for calculating and applying the actual pure live seed poundage based on the label attached to each bag of seed and to achieve the stand of grass required in these specifications. Also, the Contractor shall determine the application rate of temporary seed required. Sow one-half the seed in one direction, and sow remainder at right angles to the first sowing. Cover seed uniformly to a~~

~~maximum depth of 1/4 inch by disk harrow, steel mat drag, cultipacker, or other approved device.~~

~~D. Rolling for Broadcast Seeding~~

- ~~1. The entire area shall be firmed with a roller not exceeding 90 pounds per foot roller width. Slopes over a maximum 3 horizontal to 1 vertical shall not be rolled.~~

~~E. Hydroseeding~~

- ~~1. Seed shall be broadcast at the minimum rate specified by the seed supplier. Seed and fertilizer shall be added to water and thoroughly mixed to meet the rates specified. The Contractor shall be responsible for calculating and applying the actual pure live seed poundage based on the label attached to each bag of seed and to achieve the stand of grass required below. Also, the Contractor shall determine the application rate of temporary seed required. The time period for the seed to be held in the slurry shall not exceed 24 hours. Wood cellulose fiber mulch and tackifier shall be added at the rates recommended by the manufacturer after the seed, fertilizer, and water have been thoroughly mixed to produce a homogeneous slurry. Slurry shall be uniformly applied under pressure over the entire area. The hydroseeded area shall not be rolled.~~

~~F. Sodding Operation~~

- ~~1. Sodding operations shall be performed only during periods when beneficial results can be obtained. When drought, excessive moisture or other unsatisfactory conditions prevail, the work shall be stopped until conditions improve. Rows of sod sections shall be placed parallel to and tightly against each other. Joints shall be staggered laterally. The sod sections shall not be stretched or overlapped. All joints shall be butted tight. Voids and air drying of roots shall be prevented. Sod sections shall be laid across the slope on long slopes. Sod sections shall be laid at right angles to the flow of water in ditches. Displacement of the sod shall be prevented by tamping or rolling the sod in place and knitting the sod to the soil. Air pockets shall be eliminated and a true and even surface shall be provided. Frayed edges shall be trimmed, and holes or missing corners shall be patched with sod. Excess and waste material shall be removed from the sodded areas and shall be disposed of offsite.~~
- ~~2. The prepared surface shall be a maximum 1 inch below the adjoining grade of any surfaced area. New surfaces shall be blended to existing areas. The prepared surface shall be rolled and completed with a light raking to remove from the surface debris and stones over 1 inch in any dimension. Areas within the prepared surface shall be protected from compaction or damage by vehicular or pedestrian traffic and surface erosion.~~
- ~~3. Sod shall be stored in designated areas and kept in a moist condition by watering with a fine mist, and covered with moist burlap, straw, or other covering. Covering shall allow air to circulate, preventing internal heat from building up. Sod shall be protected from exposure to wind and direct sunlight until installed. Sod shall not be damaged during handling. Except for bulk deliveries, materials shall not be dropped or dumped from vehicles. Time limitation between harvesting and installing sod shall be a maximum of 36 hours.~~

3.08 FERTILIZER AND MULCH

A. Fertilizer

1. ~~Seeded/Hydroseeded Areas: Apply initial application of fertilizer at 500 lb/ac.~~
2. ~~Seeded/Hydroseeded Areas: Apply a second application of fertilizer 45-60 days after seeding at 500 lb/ac.~~
3. ~~Sodded Areas: Apply one application of fertilizer at 500 lb/ac when conditions appear favorable.~~

B. Mulching

1. ~~Seeded Areas: Hay or Straw Mulch~~
 - a. ~~Hay or straw mulch shall be spread uniformly at the rate of 2 tons per acre. Mulch shall be spread by hand, blower type mulch spreader, or other approved method. Mulching shall be started on the windward side of relatively flat areas or on the upper part of steep slopes, and continued uniformly until the area is covered. The mulch shall not be bunched or clumped. Sunlight shall not be completely excluded from penetrating to the ground surface. All areas installed with seed shall be mulched on the same day as the seeding. Mulch shall be anchored immediately following spreading.~~
 - b. ~~Mechanical anchor shall be a V-type wheel land packer; a scalloped-disk land packer designed to force mulch into the soil surface; or other suitable equipment.~~
 - c. ~~Hydrophilic colloid shall be applied at the rate recommended by the manufacturer, using hydraulic equipment suitable for thoroughly mixing with water. A uniform mixture shall be applied over the area.~~
2. ~~Hydroseeded Areas: Wood Cellulose Fiber, Paper Fiber, and Recycled Paper~~
 - a. ~~Wood cellulose fiber, paper fiber, or recycled paper shall be applied as part of the hydroseeding operation. The mulch shall be mixed and applied in accordance with the manufacturer's recommendations.~~

3.09 WATERING

- A. ~~Do not water newly seeded areas to force the seed germination. Water these areas only to sustain grass growth.~~
- B. ~~Once seed germination begins water every day at a rate required to keep the grassed areas moist throughout the day. Apply water at a rate that will not cause erosion of the soil, seed, or mulch. If natural rainfall of ¼ in or greater occurs water 3 days after the rainfall event if no further rainfall of sufficient quantity occurs. Continue this watering schedule for 30 days from germination.~~
- C. ~~After this initial 30 day period, water as described above every 7 days for the remainder of the Grassing Establishment Period. The above watering schedule is the required minimum. If the emerging grass appears stressed, or the soil conditions appear excessively dry, the contractor shall apply additional amounts of water as necessary to establish a satisfactory stand of grass.~~

3.10 — SURFACE EROSION CONTROL

- ~~A. — Where indicated or as directed, surface erosion control material shall be installed in accordance with manufacturer's instructions. Placement of the material shall be accomplished without damage to installed material or without deviation to finished grade.~~
- ~~B. — When directed during contract delays affecting the seeding operation or when a quick cover is required to prevent surface erosion, the areas designated shall be seeded with a temporary seed mix. The application rate shall be determined by the Contractor as a temporary erosion control measure.~~

3.11 — QUANTITY CHECK

- ~~A. — For materials provided in bags, the empty bags shall be retained for recording the amount used. For materials provided in bulk, the weight certificates shall be retained as record of the amount used. The amount of material used shall be compared with the total area covered to determine the rate of application used. Differences between the quantity applied and the quantity specified shall be adjusted as directed.~~

3.12 — RESTORATION AND CLEAN UP

- ~~A. — Restore to original condition existing turf areas, pavements, and facilities which have been damaged during seeding operations at the Contractor's expense. Remove excess and waste material and dispose of offsite.~~

3.13 — PROTECTION OF SEEDED AREAS

- ~~A. — Immediately upon completion of the seeding operation in an area, the area shall be protected against traffic or other use by erecting barricades and providing signage as required or directed.~~

3.14 — GRASS ESTABLISHMENT PERIOD

- ~~A. — The grass establishment period to obtain a healthy stand of permanent grass plants will begin on the first day of seeding work required under this contract, shall continue through the remaining life of the contract, and end when a satisfactory stand of grass plants is obtained, or 180 days after the first day of seeding work whichever comes first.~~
- ~~B. — If the Engineer or District deems the grass unsatisfactory at the conclusion of the establishment period, the District may either:
 - ~~1. — Extend the Grassing Establishment Period by a mutually agreed upon time period and require/allow the Contractor to remedy the grassing deficiencies.~~
 - ~~2. — Terminate the Contract and withhold sufficient funds to remedy the grassing deficiencies through other means.~~~~
- ~~C. — Because initial grassing operations would likely begin near the end of the project, the Contractor should understand that this work may continue beyond the date of Substantial Completion. Written calendar time period shall be furnished for the grass establishment period. When there is more than 1 grass establishment period, the boundaries of the seeded area covered for each~~

~~period shall be described. The grass establishment period shall be modified for inclement weather, shut down periods, or for separate completion dates of areas.~~

- ~~D. Maintenance of the seeded areas shall include eradicating weeds, insects and diseases; protecting embankments and ditches from surface erosion; maintaining erosion control materials and mulch; protecting installed areas from damage due to traffic; mowing; watering; and post-fertilization.~~
- ~~E. The Contractor shall mow as frequently as necessary to control the growth of weeds. Weeds shall not be allowed to seed.~~
- ~~F. Unsatisfactory stand of grass plants and mulch shall be repaired or reapplied, and eroded areas shall be repaired in accordance with the section SITE PREPARATION.~~
- ~~G. A record of each site visit shall be furnished, describing the maintenance work performed; areas repaired or reapplied; and diagnosis for unsatisfactory stands of grass plants.~~

~~3.15 SATISFACTORY STAND OF GRASS~~

- ~~A. Permanent grass plants shall be evaluated for species and health when the grass plants are a minimum of 1 inch high. A satisfactory stand of permanent grass plants from the seeding operation shall be a minimum of 20 grass plants per square foot with a least 50% of the grass plants consisting of permanent grass such as Bahia or Bermuda. Bare spots shall be a maximum of 9 inches square. The total bare spots shall not exceed 2 percent of the total seeded area.~~

~~—END OF SECTION—~~

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SECTION 32 92 19

GRASSING ESTABLISHMENT (Revision #1, 5/9/2018)

PART 1 GENERAL

The work covered by this section includes furnishing all labor, equipment, and materials required to revegetate those areas impacted by the M-8 dredged material management area construction and any areas susceptible to erosion (i.e., sloped surfaces) surrounding the M-8 site.

1.1 DEFINITIONS

1.1.1 Fine Material

Material measured by dry weight, passing the U.S. standard No. 200 sieve (ASTM D1140)

1.1.2 Plants

Plants shall include any tree or vegetation to be planted in the revegetation area, as noted on the Drawings.

1.1.3 Preliminary Inspection

Preliminary inspection as defined in this section will mean the preliminary inspection of the revegetation area only.

1.1.4 Final Inspection

Final inspection as defined in this section will mean the final inspection of the revegetation area only.

1.1.5 Revegetation Area Establishment Period

The Revegetation Area Establishment Period will be 180 days. It will begin on the day of the preliminary inspection on the condition that the revegetation area meets the Engineer's approval. In the event the revegetation area does not meet the Engineer's approval the Revegetation Area Establishment Period will begin on the day of a subsequent inspection and approval by the Engineer. The Contractor will notify the Engineer at the end of the Revegetation Area Establishment Period in order that the final inspection may be scheduled.

1.2 SUBMITTALS

The following submittals shall be submitted in accordance with SECTION 01 33 00 SUBMITTAL PROCEDURES.

1.2.1 Grassing Establishment Plan

Prior to grassing, the Contractor shall submit a Grass Establishment Plan including the following information:

- a) An outline explaining general procedure, listing of equipment to be used, order of application, and method of application to be used.
- b) Results of topsoil pH and organic content tests on five (5) different soil samples taken as directed by the Engineer. Submit test results, prepared by an independent testing agency.

- c) Submit the seed mixture, tackifiers, mulch, soil amendments, fertilizer, weed control, insect/pest control, and times and rates of application of each.
- d) The name and location of the source, and pH and chloride content, of the water used for grass watering for the Engineer's approval.

1.2.2 Grassing Material Certificates

Prior the delivery of materials, certificates of compliance demonstrating that the proposed materials meet the specified requirements.

1.2.3 Grass Watering and Maintenance Records

Submit to the Engineer a written record of all grass watering and maintenance including, type of action taken, dates, amounts (in pounds or gallons) of material applied (including water), weather conditions, and rainfall amounts as recorded in the nearest local newspaper.

PART 2 PRODUCTS

2.1 PLANTS

Plants shall be nursery grown and shall comply with all required inspections, grading standards and plant regulations in accordance with the Florida Department of Agriculture's "Grades and Standards for Nursery Plants." Plants shall be Florida No. 1 Grade or better. All plants shall be delivered to the site in good condition and shall be free of insects and disease. After installation and throughout the Revegetation Area Establishment Period, the plants shall be adequately watered to maintain a healthy appearance and prevent oversteering.

2.1.1 Species

Within the newly constructed or disturbed areas of the dike crest and dike side slopes, the contractor shall plant the native dune species listed below in accordance with the specified percentages of total plants.

2.1.1.1 Density

Planting occur according to the following percentages:

- a) Sea oats (*uniola paniculata*) – 80%
- b) Panic grass (*panicum amarum*) – 10%
- c) Diversity species – 10%

2.1.2 Diversity species

The Contractor shall provide and install a minimum of three additional native species according to the percentages specified above. The contractor shall plant the diversity species and panic grass intermittently among the sea oats, in even distributions. The diversity species shall be in even proportions. Diversity species may include (but not limited to):

- a) Beach elder (*iva imbricata*)
- b) Beach morning glory (*ipomoea imperati*)
- c) Railroad vine (*ipomoea pes-caprae*)

- d) Dune sunflower (*helianthus debilis*)
- e) Sea rocket (*cahile lanceolata*)
- f) Saltmeadow cordgrass (*spartina patens*)

2.1.3 Recommendation of other species

The contractor may recommend additional diversity species for approval by the engineer. The contractor shall submit appropriate documentation identifying the advantages of the proposed species and certifying the proposed species are suitable for the site.

2.2 WATER

Water used for the planting operations and for plant establishment shall be obtained from any approved spring, pond, lake, stream, or municipal water supply. The water shall be free of excess and harmful chemicals, acids, alkalis, or any substance which might be harmful to plant growth. The use of onsite surface water and/or the installation of wells are strictly forbidden without the approval of the Engineer. The Contractor may construct a temporary watering system at his own expense. It is the responsibility and an expense of the Contractor to obtain permits for use of water and to ensure that the water used is conducive to plant viability.

PART 3 EXECUTION

3.1 INSPECTIONS

It shall be the Contractor's responsibility to notify the Engineer of the completion of the work and the subsequent need for the preliminary and final inspections. Upon notification by the Contractor of the need for an inspection, the Engineer will have 14 days to schedule and make the necessary inspection.

3.2 CLEARING AND GRUBBING

Clearing and grubbing of the revegetation areas is considered part of the overall clearing of the site and as such, shall be performed in accordance with the SECTION 02262 CLEARING AND GRUBBING

3.3 EXCAVATION AND GRADING

The revegetation areas shall be graded to the dimensions and elevations shown on the Drawings, with no depressions, mounds, or ruts more than 6 inches above/below final grade. Temporary or permanent drainage features such as ditches, swales, or depressional storage areas may be constructed with the approval of the Engineer.

3.4 SAFETY

The Contractor shall follow all manufacturers' safety instructions for the handling of any herbicides and fertilizer.

3.5 PLANTING AND MAINTENANCE

3.5.1 Layout

- 1) Planting units shall be planted on 24-inch centers. Planting units in each row shall be staggered mid-way between planting units in the adjacent rows.
- 2) All plantings shall be 2-inch liner size, grown in multi-well trays (liners) approximately 1.5 inches wide by 1.5 inches long and not less than 2.5 inches deep. Roots shall fill the entire volume of the liner but shall not be root bound.
- 3) For 2-inch planting units, sea oats and panic grasses shall be 8 – 16 inches in height, as measured from the top of the root ball to the apical meristem and have a minimum of three healthy stems.
- 4) Plants shall be 60 – 90 days old, as measured from the approximate time of germination. The engineer may reject planting units younger or older than these specifications.
- 5) The root ball shall be properly moistened to prevent desiccation. All planting units shall be handled, packed, transported, and stored at the installation site in such a manner as to ensure protection against desiccation, thermal stress, disease, or physical damage.
- 6) Plants shall be installed at a minimum depth of 6 inches, as measured from the top of the root ball to the sand surface.

3.5.2 Procedure

- 1) Loosen the soil in bottom of the hole six (6) inches deeper than the required depth of excavation. Position each plant so that it rests in the base of the hole with its root ball level with, or slightly above the position of previous growth. Backfill the hole, eliminate air pockets and bring soil to a smooth and even surface, blending to existing areas.
- 2) The contractor shall “water in” (initially irrigate) all newly installed plants such that the root zone of all newly installed planting units is thoroughly saturated. The contractor shall water and maintain the plants as necessary to meet the minimum specified survival rate at the end of the establishment period.
- 3) Water and fertilize plants as needed to maintain optimum plant health throughout the planting operations and the Revegetation Area Establishment Period. The Contractor shall be responsible for controlling exotic vegetation and weed removal during the establishment period.

3.5.3 Fertilization

- 1) The contractor shall place approximately one-half teaspoon of slow release (90-day) pelletized osmocote fertilizer, or engineer-approved substitute, with an n:p:k ratio of 18-6-12, plus trace elements, beneath the root zone of each planting unit during installation.

3.6 PRELIMINARY INSPECTION

Upon completion of all planting in the revegetation area the Contractor shall notify the Engineer that the revegetation area is ready for preliminary inspection. One hundred percent (100%) of all the plants must be in acceptable condition for Engineer’s approval of the preliminary inspection. Plants shall be rejected that show any indication of probable non-survival or lack of health and vigor, or which do not exhibit the characteristics and conditions for the minimum Grade as specified and in the opinion of the Engineer, will not recover and be within Grade by the end of the 180-day Revegetation Area Establishment Period. Plants rejected during the preliminary inspection shall be removed and replaced with an equivalent healthy plant by the Contractor at no cost to the County. Final grading and elevations must be to the dimensions and elevations shown on the Drawings and approved by the Engineer.

3.7 FINAL INSPECTION

Eight five percent (85%) of all plants must pass final inspection. Plants shall be rejected that show any indication of probable non-survival or lack of health and vigor and in the opinion of the Engineer will not recover. If less than eight five percent (85%) of all plants pass final inspection, rejected plants shall be removed and replaced by the Contractor with an equivalent healthy plant at no cost to the FIND. The quantity of rejected plants to be replaced shall be determined by the Engineer with the intent to provide an eight five percent (85%) survival rate of the original total. This quantity shall be based on the percentage of plants that survived the initial Revegetation Area Establishment Period. When the rejected plants are replaced the Contractor shall request for another preliminary inspection. A subsequent Revegetation Area Establishment Period and final inspection is required for the replacement plants, which shall follow the same procedure as outlined in these specifications for the first Revegetation Area Establishment Period and final inspection.

3.8 RESTORATION AND CLEANUP

The Contractor shall at all times keep his work areas free from accumulations of debris and discarded or unused material. Excess and waste material shall be removed from the site daily. When planting in an area has been completed, the area shall be cleared of all debris, any temporary watering systems, any other related equipment and excess material. Any areas which have been damaged from the planting operation shall be restored to original condition at the Contractor's expense.

-- End of Section --

DEPARTMENT OF THE ARMY PERMIT

Permittee:

Florida Inland Navigation District
c/o Mark Crosley 1314
Marcinski Road Jupiter, FL 33477

Permit No: SAJ-2017-02922(SP-LCK)

Issuing Office: U.S. Army Engineer District, Jacksonville

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the U.S. Army Corps of Engineers (Corps) having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: The applicant seeks authorization to construct a 13.68 acre Dredge Material Management area (DMMA) M-8, to provide long-term storage capacity for the management of approximately 79,000 cubic yards of dredged sediments. Dredged sediment-laden material from the ICWW will be dewatered in the proposed basin and the decanted water will be discharged back into the ICWW channel boundaries. The project also proposes the installation of an emergency outfall structure and 150 square feet of riprap (15-feet by 10-feet) below the mean high water line (MHWL). The work described above is to be completed in accordance with the 29 pages of drawings and 4 attachments affixed at the end of this permit instrument.

Project Location: The project site is located at 10315 South Indian River Drive, vacant lot Parcel ID (3529-701-006-000-7, 3529-701-0011-000-5, 3529-701-008-000-1) adjacent to the Indian River and Intracoastal Waterway (ICWW), in Ft. Pierce (Section 29, Township 36 South, Range 41 East), St. Lucie County Florida.

Directions to site: From I-95 head toward Ft. Pierce and exit onto St. Lucie West Blvd. continue east and turn right onto South Federal Highway, turn left onto Walton Road and then turn right onto Indian River Drive (S.R. 707). Continue to Indian River Drive for approximately 1 miles and the property will be on the left hand side.

Approximate Central Coordinates: Latitude: 27.31239°
Longitude: -80.26223°

Permit Conditions

General Conditions:

1. The time limit for completing the work authorized ends on . If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and State coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature and the mailing address of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit.

Special Conditions:

1. Self-Certification: Within 60 days of completion of the work authorized by this permit, the Permittee shall complete the attached "Self-Certification Statement of Compliance"

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 3 of 9

form (Attachment A) and submit it to the Corps at saj-rd-enforcement@usace.army.mil. In the event that the completed work deviates in any manner from the authorized work, the Permittee shall describe the deviations between the work authorized by this permit and the work as constructed on the "Self-Certification Statement of Compliance" form. The description of any deviations on the "Self-Certification Statement of Compliance" form does not constitute approval of any deviations by the Corps.

2. Assurance of Navigation and Maintenance: The Permittee understands and agrees that, if future operations by the United States require the removal, relocation, or other alteration, of the structures or work herein authorized, or if, in the opinion of the Secretary of the Army or his authorized representative, said structure or work shall cause unreasonable obstruction to the free navigation of the navigable water, the Permittee will be required, upon due notice from the U.S. Army Corps of Engineers, to remove, relocate, or alter the structural work or obstructions caused thereby, without expense to the United States. No claim shall be made against the United States on account of any such removal or alteration.

3. Clean Fill: The Permittee shall use only clean fill material for this project. The fill material shall be free from items such as trash, debris, automotive parts, asphalt, construction materials, concrete block with exposed reinforcement bars, and soils contaminated with any toxic substance, in toxic amounts in accordance with Section 307 of the Clean Water Act.

4. Manatee Conditions: The Permittee shall comply with the "Standard Manatee Conditions for In-Water Work – 2011" (Attachment B).

5. Turbidity Barriers: Prior to the initiation of any of the work authorized by this permit, the Permittee shall install floating turbidity barriers with weighted skirts that extend to within one (1) foot of the bottom around all work areas that are in, or adjacent to, surface waters. The turbidity barriers shall remain in place and be maintained until the authorized work has been completed and all suspended and erodible materials have been stabilized. Turbidity barriers shall be removed upon stabilization of the work area.

6. Project Design Criteria (PDCs) for In-Water Activities: The Permittee shall comply with National Marine Fisheries Service's "PDCs for In-Water Activities" dated November 20, 2017 (Attachment C).

7. Daylight Hours: All activities must be completed during daylight hours.

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 4 of 9

8. Erosion Control: All outfall discharge shall be designed and implemented to prevent erosion and scour.

9. Eastern indigo snake:

a. The Permittee shall comply with U.S. Fish and Wildlife Service's "Standard Protection Measures for the Eastern Indigo Snake" dated August 2013 and provided in Attachment of this permit.

b. All gopher tortoise (threatened *Gopherus polyphemus*) burrows, active or inactive, will be evacuated prior to site manipulation in the vicinity of the burrow. If an indigo snake is encountered, the snake must be allowed to vacate the area prior to additional site manipulation in the vicinity. Any permit will also be conditioned such that holes, cavities, and snake refugia other than gopher tortoise burrows will be inspected each morning before planned site manipulation of a particular area, and, if occupied by an indigo snake, no work will commence until the snake has vacated the vicinity of proposed work. The Permittee shall comply with U.S. Fish and Wildlife Service's "Standard Protection Measures for the Eastern Indigo Snake" dated February 12, 2004 and provided in Attachment of the permit.

10. Audubon's crested caracara: The Permittee shall survey for the caracara before construction and will implement all conservation measures described in the Recommended Management Practices and Survey Protocols for caracara (Attached D) that apply to the Project.

11. Florida scrub-jay: The Permittee shall complete a scrub-jay survey prior to construction. If scrub-jays are documented in the updated survey, a scrub-jay Habitat Management Plan with conservations measures shall be developed if scrub-jay habitat cannot be avoided and preserved. The results of the update survey report shall be submitted to the Corps and FWS within 30 days from the survey date at the below email addresses: saj-rd-enforcement@usace.army.mil, Linda.C.Knoeck@usace.army.mil; jeffrey_howe@fws.gov.

12. Cultural Resources/Historic Properties:

a. No structure or work shall adversely affect impact or disturb properties listed in the National Register of Historic Places (NRHP) or those eligible for inclusion in the NRHP.

b. If during the ground disturbing activities and construction work within the permit area, there are archaeological/cultural materials encountered which were not the

subject of a previous cultural resources assessment survey (and which shall include, but not be limited to: pottery, modified shell, flora, fauna, human remains, ceramics, stone tools or metal implements, dugout canoes, evidence of structures or any other physical remains that could be associated with Native American cultures or early colonial or American settlement), the Permittee shall immediately stop all work and ground-disturbing activities within a 100-meter diameter of the discovery and notify the Corps within the same business day (8 hours). The Corps shall then notify the Florida State Historic Preservation Officer (SHPO) and the appropriate Tribal Historic Preservation Officer(s) (THPO(s)) to assess the significance of the discovery and devise appropriate actions.

c. Additional cultural resources assessments may be required of the permit area in the case of unanticipated discoveries as referenced in accordance with the above Special Condition ; and if deemed necessary by the SHPO, THPO(s), or Corps, in accordance with 36 CFR 800 or 33 CFR 325, Appendix C (5). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume on non-federal lands without written authorization from the SHPO for finds under his or her jurisdiction, and from the Corps.

d. In the unlikely event that unmarked human remains are identified on non-federal lands, they will be treated in accordance with Section 872.05 Florida Statutes. All work and ground disturbing activities within a 100-meter diameter of the unmarked human remains shall immediately cease and the Permittee shall immediately notify the medical examiner, Corps, and State Archeologist within the same business day (8-hours). The Corps shall then notify the appropriate SHPO and THPO(s). Based, on the circumstances of the discovery, equity to all parties, and considerations of the public interest, the Corps may modify, suspend or revoke the permit in accordance with 33 CFR Part 325.7. Such activity shall not resume without written authorization from the State Archeologist and from the Corps.

e. If prehistoric or historic artifacts, such as pottery or ceramics, projectile points, dugout canoes, metal implements, historic building materials, or any other physical remains that could be associated with Native American, early European, or American settlement are encountered at any time within the project site area, the permitted project shall cease all activities involving subsurface disturbance in the vicinity of the discovery. The applicant shall contact the Florida Department of State, Division of Historical Resources, Compliance Review Section at (850)-245-6333. Project activities shall not resume without verbal and/or written authorization. In the event that unmarked human remains are encountered during permitted activities, all work shall stop immediately and

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 6 of 9

the proper authorities notified in accordance with Section 872.05, Florida Statutes.

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

(X) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344)

() Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413)

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, State, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal projects.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 7 of 9

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision: This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (see 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions: General Condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 8 of 9

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE)

(DATE)

(PERMITTEE NAME-PRINTED)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

(DISTRICT ENGINEER)
Jason A. Kirk, P.E.
Colonel, U.S. Army
District Commander

(DATE)

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 9 of 9

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE-SIGNATURE)

(DATE)

(NAME-PRINTED)

(ADDRESS)

(CITY, STATE, AND ZIP CODE)

PERMIT NUMBER: SAJ-2017-02292(SP-LCK)
PERMITTEE: Florida Inland Navigation District
PAGE 10 of 9

***Attachments to Department of the Army
Permit Number SAJ-2017-02922***

PERMIT DRAWINGS: 29 pages

Attachment A: SELF-CERTIFICATION FORM: 1 page

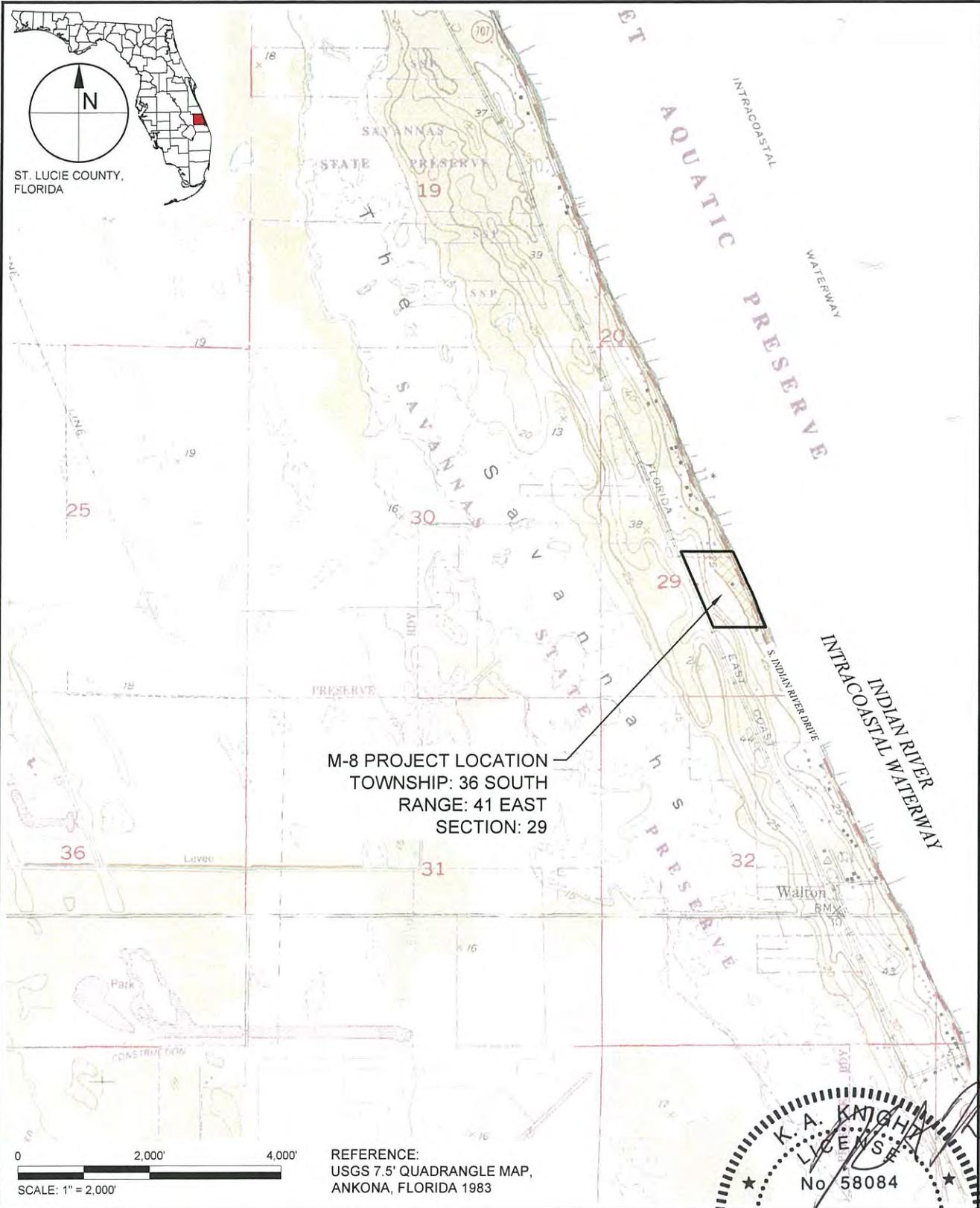
Attachment B: MANATEE CONDITIONS: 2 pages, *Standard Manatee Conditions for In-Water Work – 2011*

Attachment C: PDC's JAXBO

Attachment D: Recommended Management Practices and Survey Protocols for caracara



ST. LUCIE COUNTY,
FLORIDA



M-8 PROJECT LOCATION
TOWNSHIP: 36 SOUTH
RANGE: 41 EAST
SECTION: 29

REFERENCE:
USGS 7.5' QUADRANGLE MAP,
ANKONA, FLORIDA 1983



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TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD
BLDG 300, SUITE 300
JACKSONVILLE, FLORIDA 32256
CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 1
LOCATION MAP
F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	1 of 29	JULY 2017

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



ST. LUCIE COUNTY,
FLORIDA



REFERENCES:
AERIAL REFERENCE: 2016 FDOT

SCALE: 1" = 1,000'

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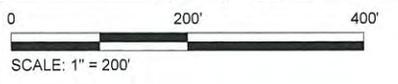
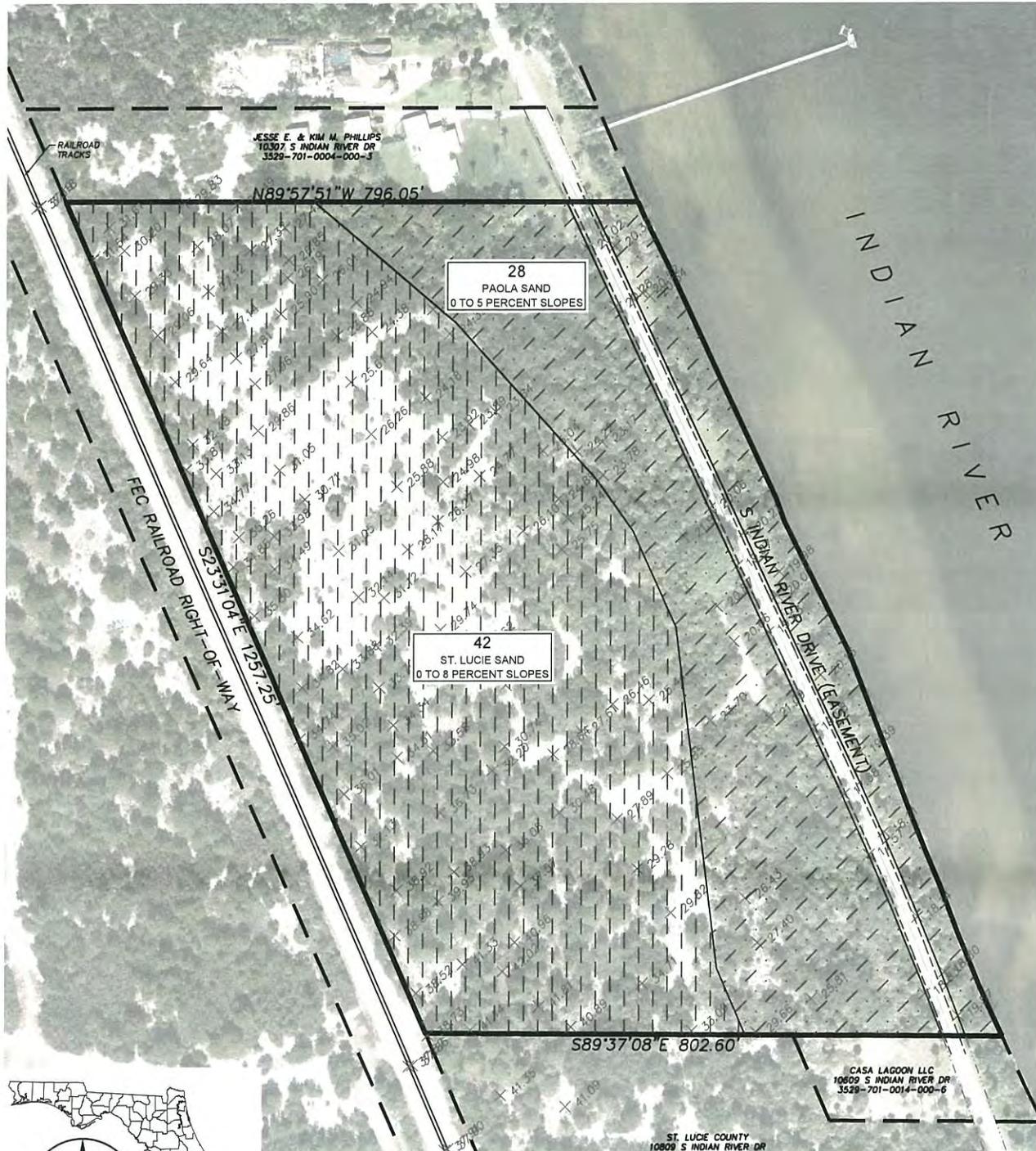
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 2
 VICINITY MAP
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	2 of 29	JULY 2017



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REFERENCES:
 AERIAL REFERENCE: 2016 FDOT
 SURVEY REFERENCE: WHIDDEN SURVEYING & MAPPING, INC..



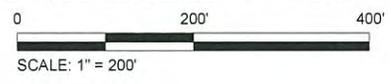
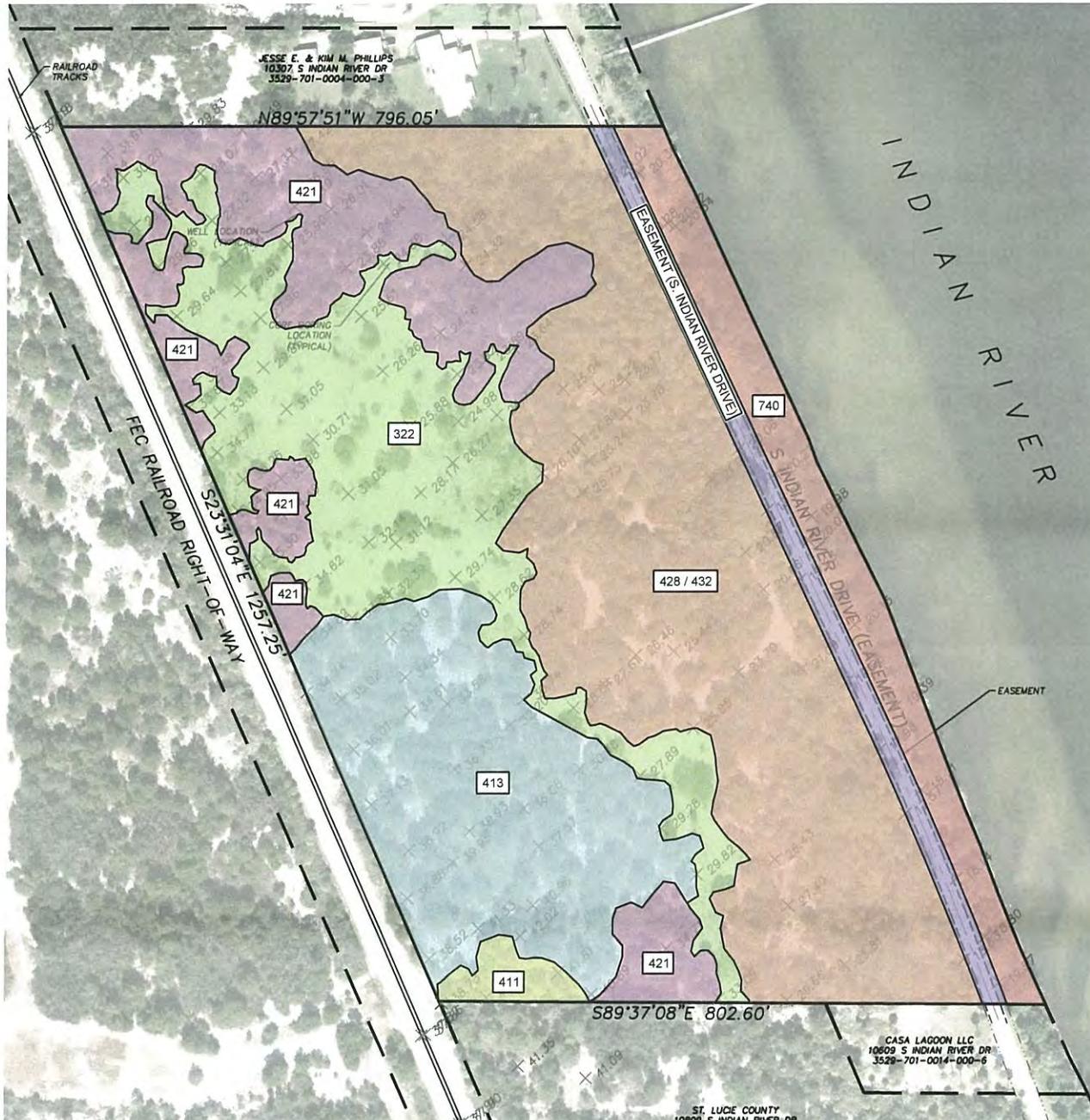
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 3
 NCRS SOILS MAP
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	3 of 29	JULY 2017

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

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REFERENCES:
 AERIAL: 2016 FDOT
 SURVEY: WHIDDEN SURVEYING & MAPPING, INC..

LEGEND

	PROPERTY LINE (20.4 ACRES)
	EASEMENT (0.87 ACRE)
	COASTAL SCRUB - 322 (4.19 ACRES)
	PINE FLATWOODS - 411 (3.24 ACRES)
	SAND PINE - 413 (3.71 ACRES)
	XERIC OAK - 421 (3.21 ACRES)
	CABBAGE PALM / SAND LIVE OAK - 428 / 432 (7.56 ACRES)
	DISTURBED LAND - 740 (1.49 ACRES)

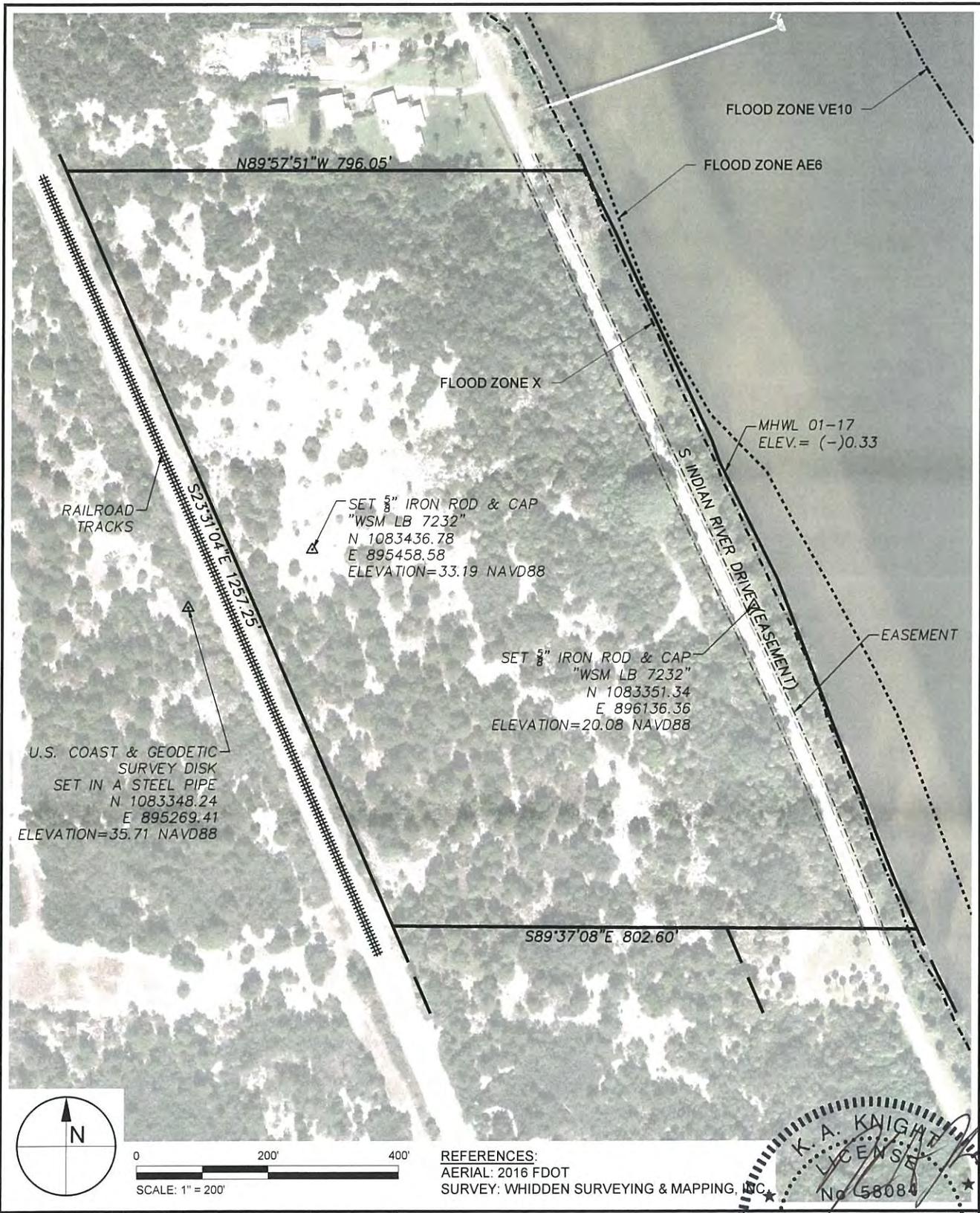
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 4
 EXISTING FLUCCS MAP
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	4 of 29	JULY 2017

Professional Engineer Seal for Keith A. Knight, No. 58084, State of Florida. The seal includes the date '7-28-17' and the signature of the engineer.

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



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 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

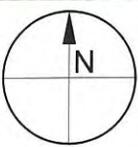
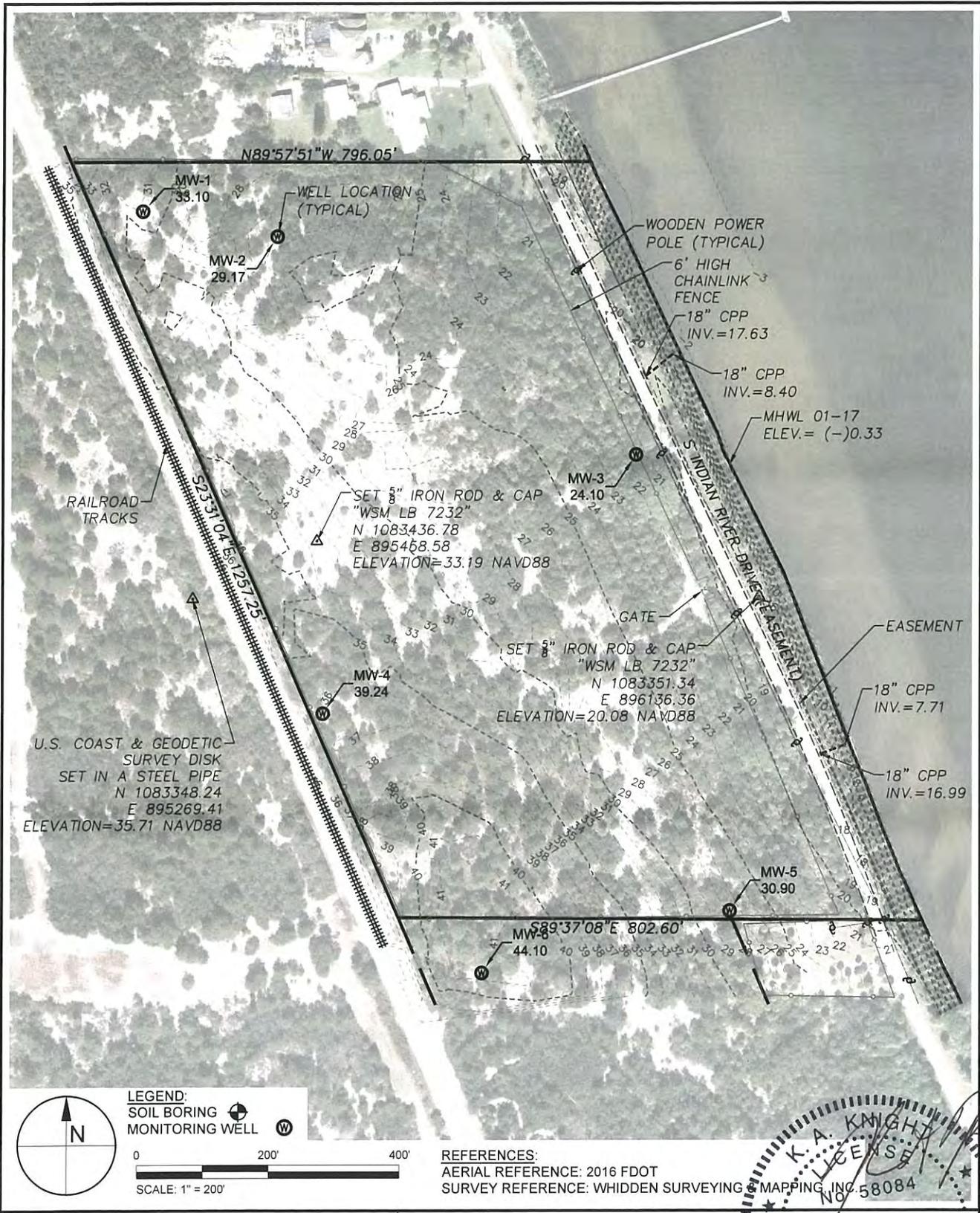
FIGURE 5
 FLOOD ZONE MAP
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	5 of 29	JULY 2017

K. A. KNIGHT
 LICENSE
 No 58084

2-28-17
 STATE OF
 FLORIDA
 PROFESSIONAL ENGINEER

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



LEGEND:
 SOIL BORING
 MONITORING WELL

REFERENCES:
 AERIAL REFERENCE: 2016 FDOT
 SURVEY REFERENCE: WHIDDEN SURVEYING & MAPPING, INC. 58084



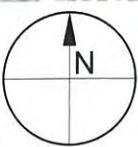
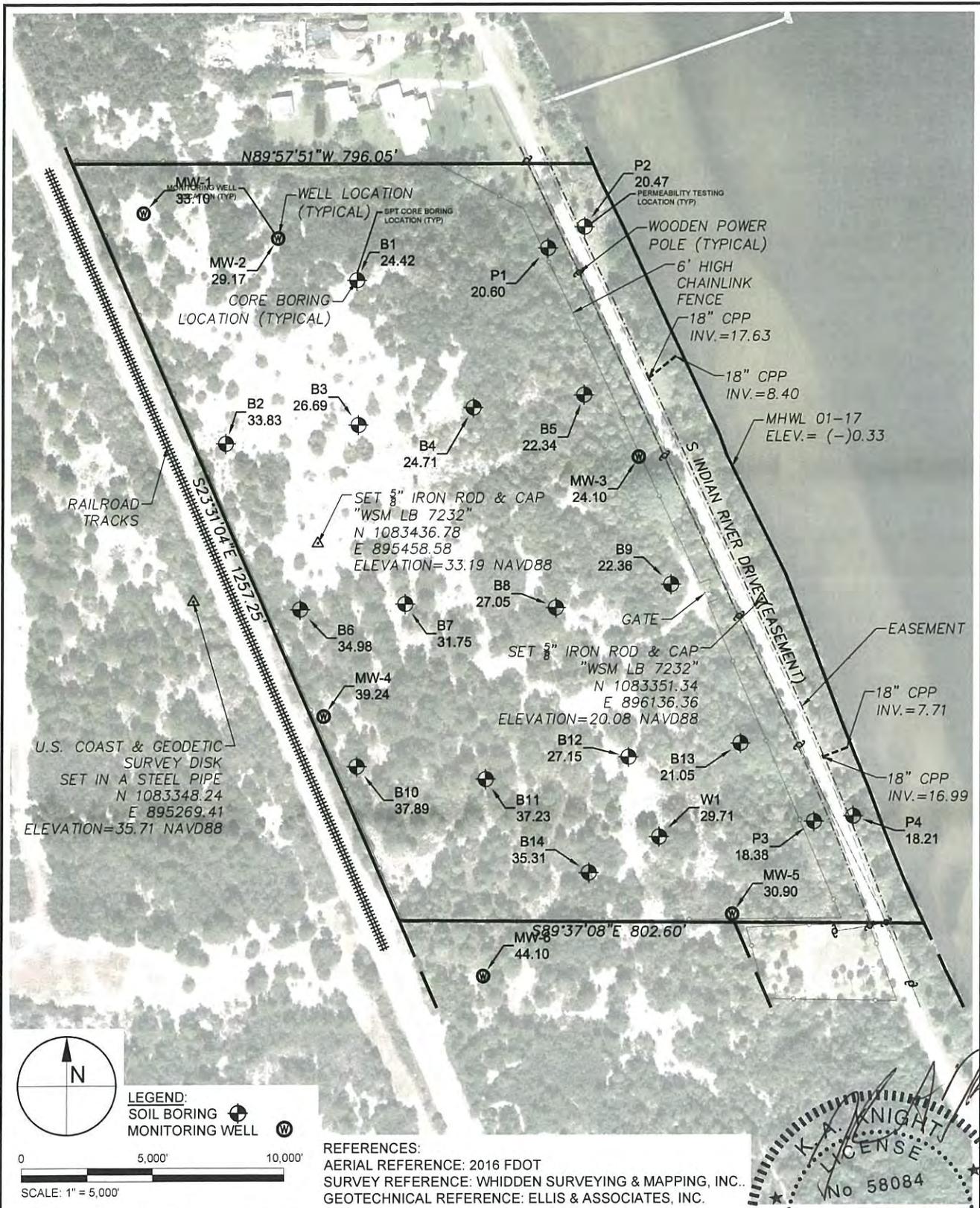
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 6
 EXISTING CONDITIONS
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

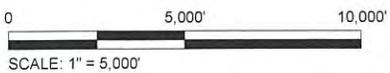
PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	6 of 29	JULY 2017

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PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



LEGEND:
 SOIL BORING
 MONITORING WELL



REFERENCES:
 AERIAL REFERENCE: 2016 FDOT
 SURVEY REFERENCE: WHIDDEN SURVEYING & MAPPING, INC.
 GEOTECHNICAL REFERENCE: ELLIS & ASSOCIATES, INC.



REBECCA JOHNSON X:\GIS\PROJECTS\2016-053\FIND\DMMA\8\PERMIT\2016-053-P-GEO-TECH.DWG 7/26/2017 3:21:13 PM

TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 7
 SPT CORE BORING & MONITORING WELL LOCATIONS
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	7 of 29	JULY 2017

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

GEOTECHNICAL BORING LOCATIONS				
POINT	EASTING	NORTHING	ELEVATION	ID
10001	895695.36	1083643.52	24.71	B4
10002	895519.93	1083617.26	26.69	B3
10003	895517.27	1083837.35	24.42	B1
10004	895318.00	1083588.72	33.83	B2
10005	896276.94	1083020.15	18.21	P4
10006	896216.76	1083012.43	18.38	P3
10007	895864.24	1083918.30	20.47	P2
10008	895808.49	1083886.24	20.60	P1
10011	895821.85	1083338.66	27.05	B8
10012	895932.92	1083111.07	27.15	B12
10013	895979.84	1082989.28	29.71	W1
10014	895872.54	1082935.00	35.31	B14
10015	895518.66	1083096.48	37.89	B10
10016	895715.24	1083077.18	37.23	B11
10017	895592.12	1083344.37	31.75	B7
10018	895432.13	1083335.77	34.98	B6
10019	896104.08	1083131.46	21.05	B13
10020	895997.67	1083373.81	22.36	B9
10021	895864.02	1083662.76	22.34	B5

MONITORING WELL LOCATIONS			
POINT	EASTING	NORTHING	ID
41	895468.32	1083172.94	MW-4
3795	895191.47	1083939.40	MW-1
3796	895712.03	1082777.60	MW-6
3797	896091.93	1082871.66	MW-5
3798	895947.70	1083568.04	MW-3
10051	895396.54	1083901.04	MW-2

REBECCA JOHNSON X SYSD/PROJECTS/C2016-053.FIN.DWG 7/28/2017 3:56:48 PM



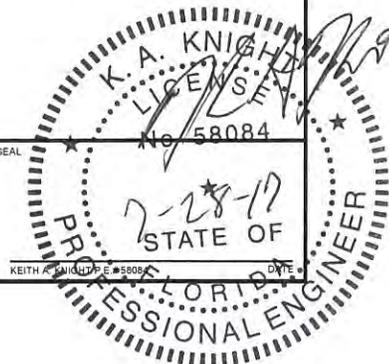
TAYLOR ENGINEERING INC.

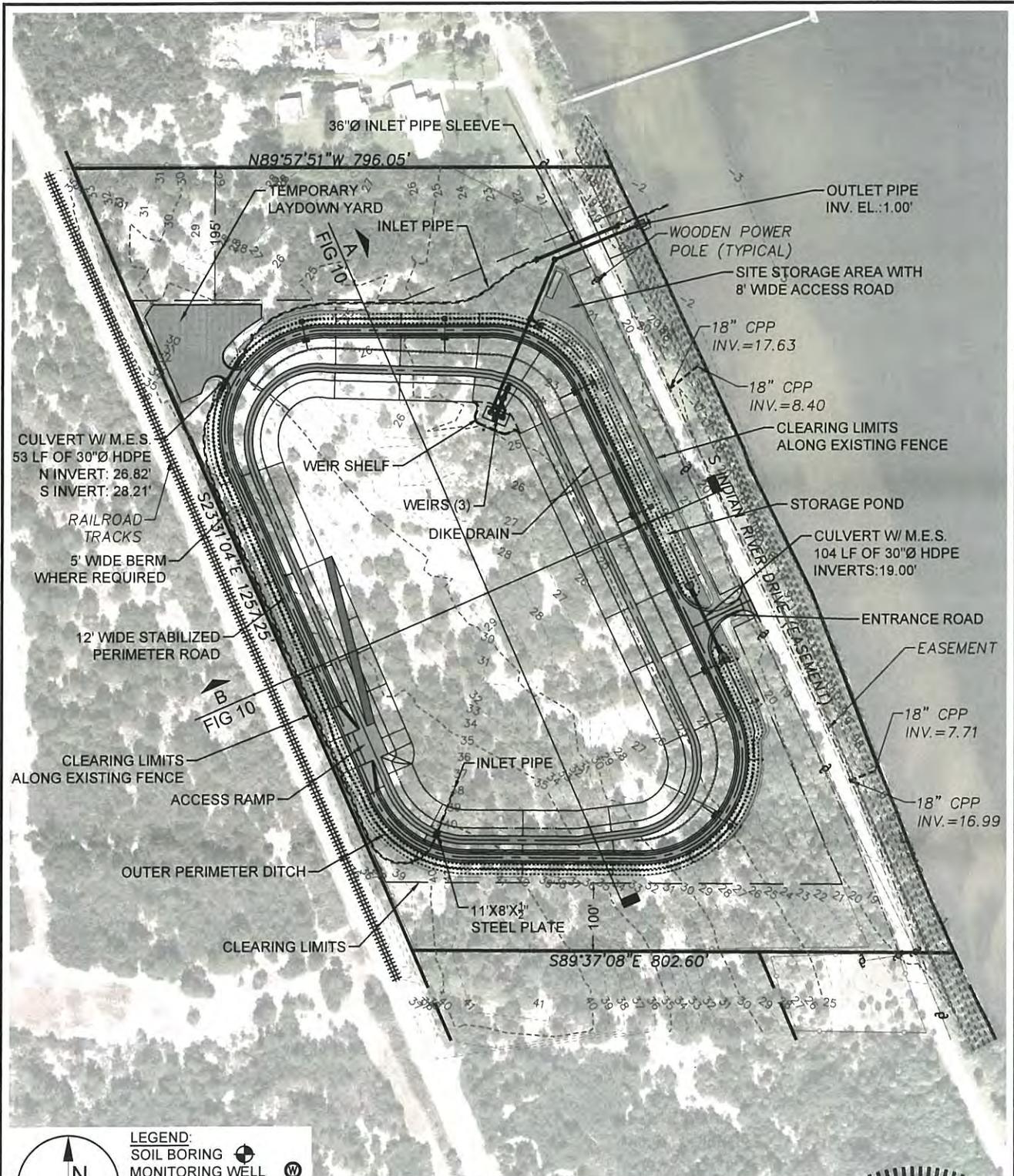
10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 8
 SPT CORE BORING & MONITORING WELL LOCATION TABLES
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

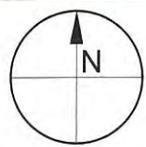
PROJECT: C2016-053 DRAWN BY: RLJ SHEET: 8 of 29 DATE: JULY 2017

SEAL





REBECCA JOHNSON, X:\GIS\PROJECTS\C2016-053_FIND DMAA M-8\PERMIT\C2016-053-F-SITE.DWG 7/26/2017 3:21:41 PM



LEGEND:
 SOIL BORING 
 MONITORING WELL 

REFERENCES:

1. AERIAL: FDOT 2016
2. GEOTECHNICAL: ELLIS & ASSOCIATES, INC.
3. SURVEY & TOPOGRAPHICAL: WHIDDEN SURVEYING & MAPPING, INC.

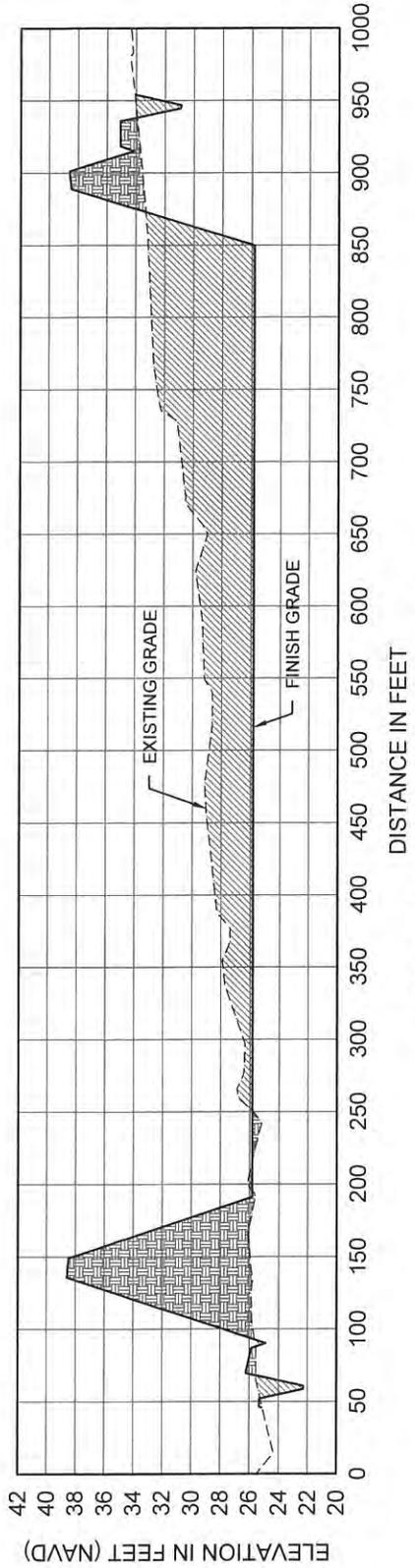
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 9
 SITE PLAN
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

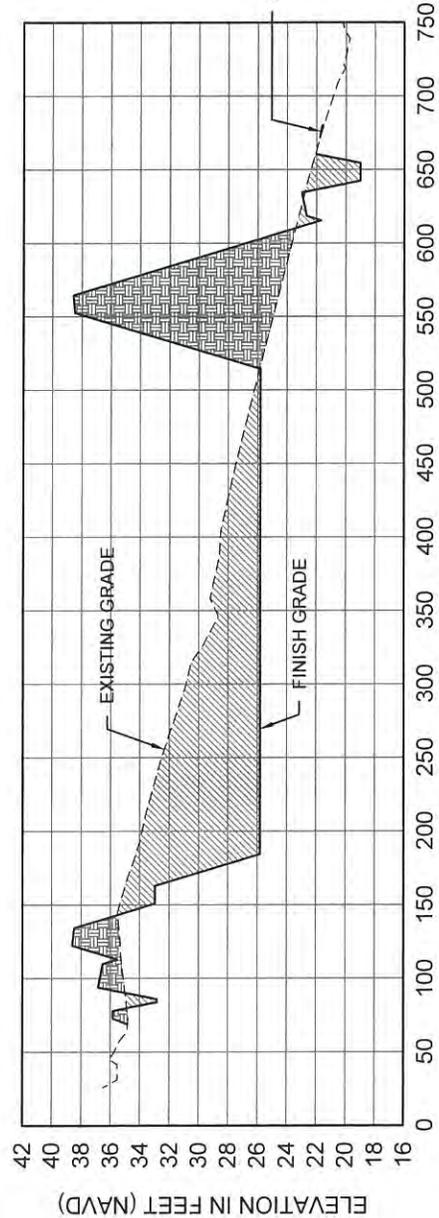
PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	9 of 29	JULY 2017

K. A. KNIGHT
 LICENSE
 No 58084
 2-28-17
 STATE OF
 FLORIDA
 PROFESSIONAL ENGINEER

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



A
DMMA CROSS SECTION
 SCALE: 1" = 120'
 V-SCALE: 1" = 12'



B
DMMA CROSS SECTION
 SCALE: 1" = 120'
 V-SCALE: 1" = 12'

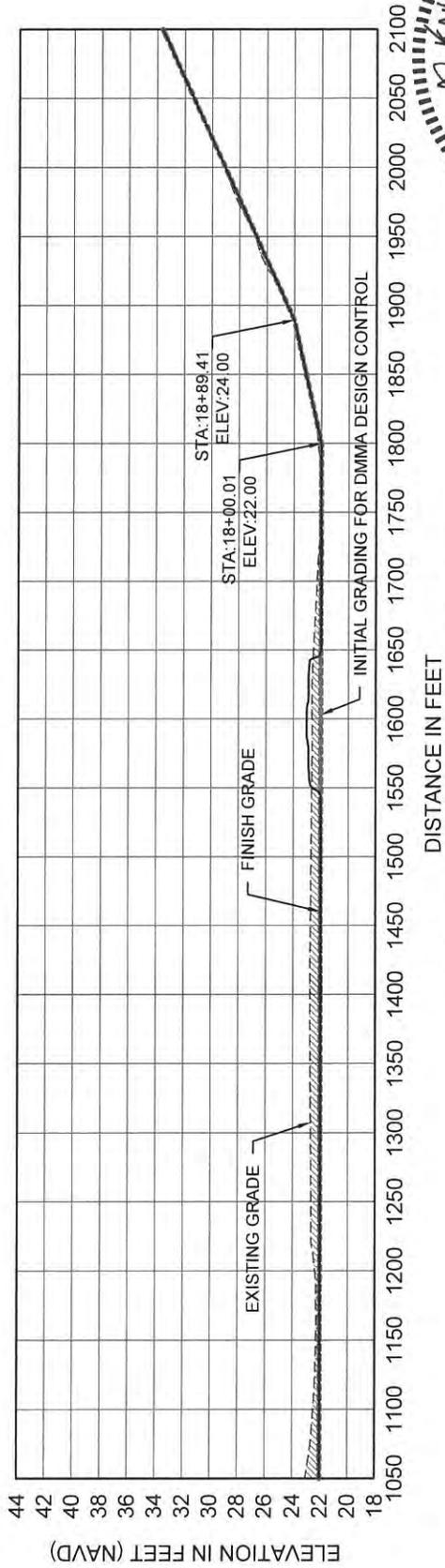
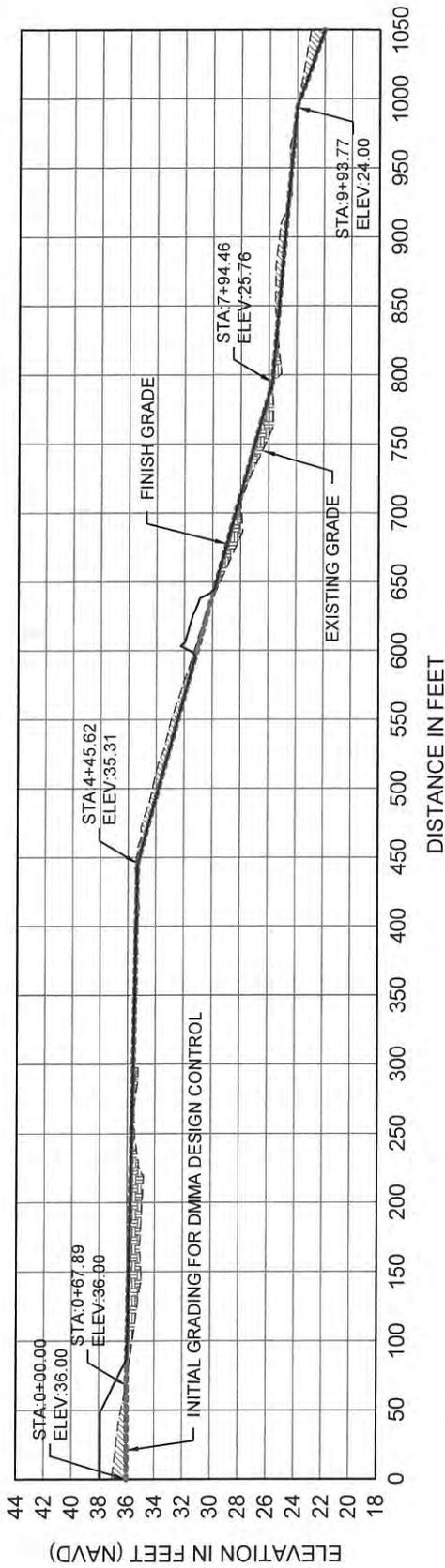
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

FIGURE 10
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT: C2016-053
 DRAWN BY: RLJ
 SHEET: 10 of 29
 DATE: JULY 2017



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



DMMA DESIGN CONTROL PROFILE

SCALE: 1" = 120'
V-SCALE: 1" = 12'



TAYLOR ENGINEERING INC.

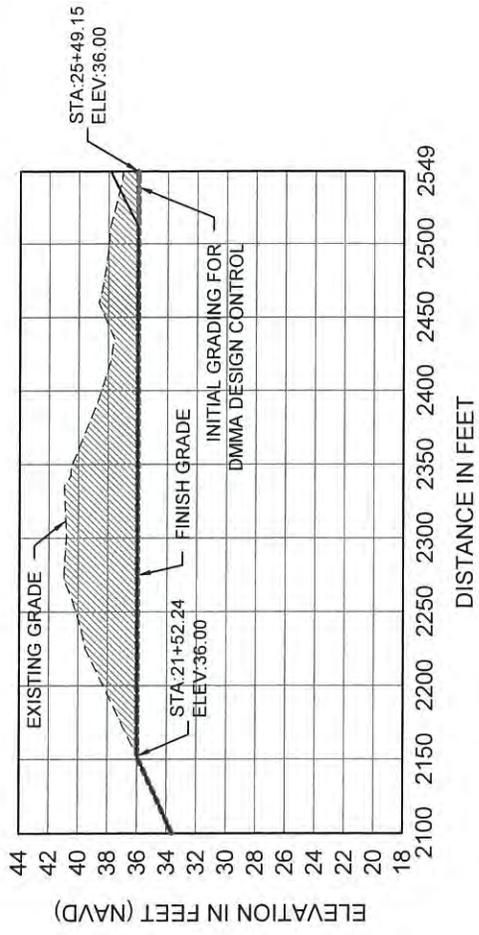
10151 DEERWOOD PARK BLVD
BLDG 300, SUITE 300
JACKSONVILLE, FLORIDA 32256
CERTIFICATE OF AUTHORIZATION # 4615

FIGURE 11
FIGURE TITLE
F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
ST. LUCIE COUNTY, FLORIDA

PROJECT: C2016-053
DRAWN BY: RLJ
SHEET: 11 of 29
DATE: JULY 2017



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



DMMA DESIGN CONTROL PROFILE

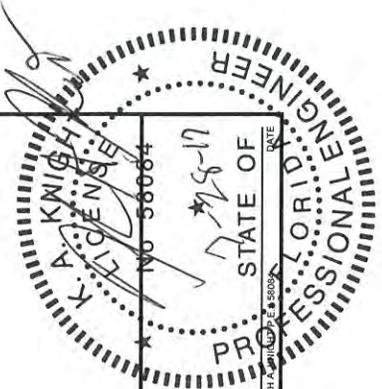
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 V-SCALE: 1" = 12'



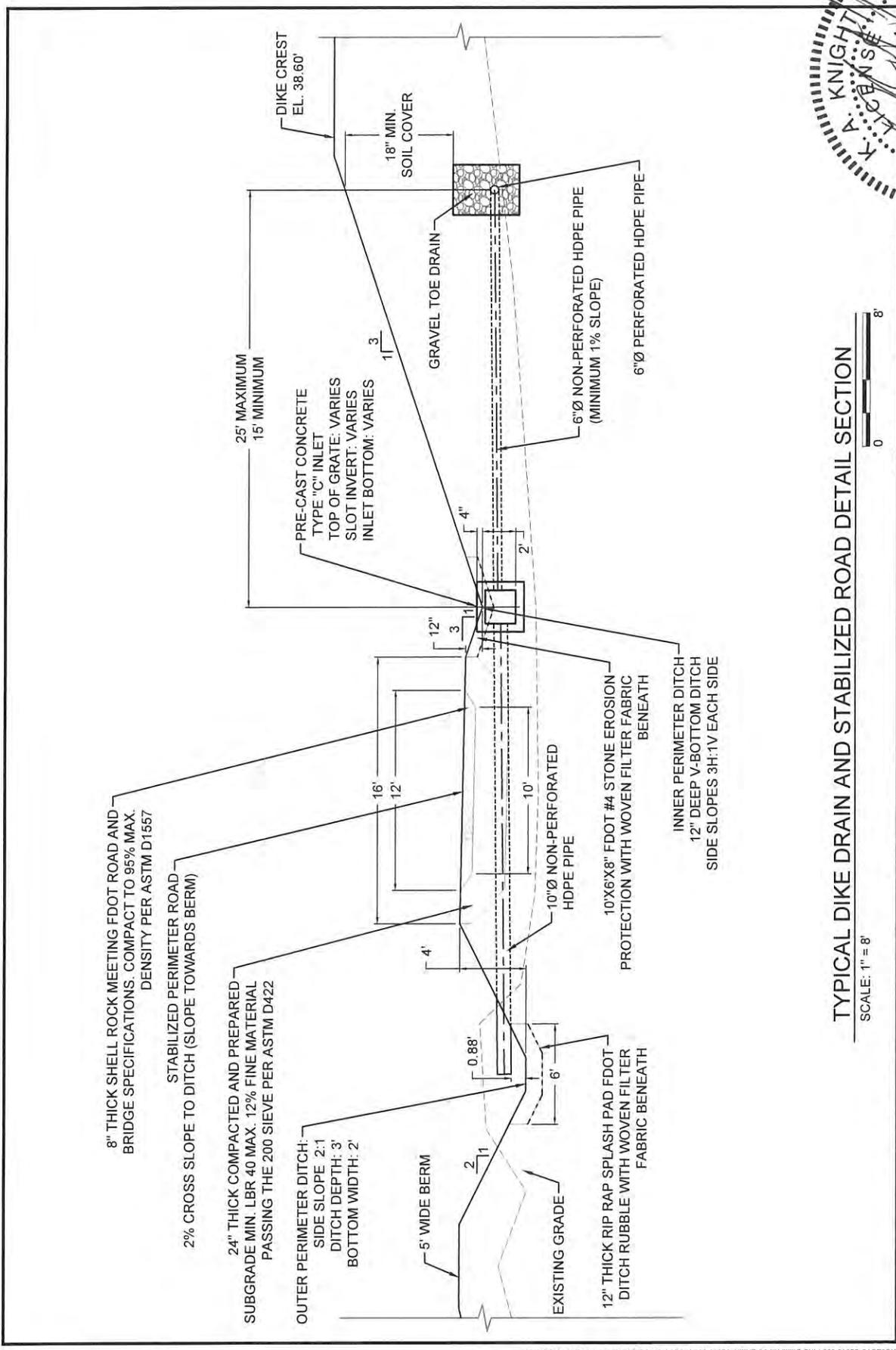
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615

FIGURE 12
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	C2016-053	SEAL
DRAWN BY	RLJ	
SHEET	12 of 29	
DATE	JULY 2017	



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



TYPICAL DIKE DRAIN AND STABILIZED ROAD DETAIL SECTION

SCALE: 1" = 8'

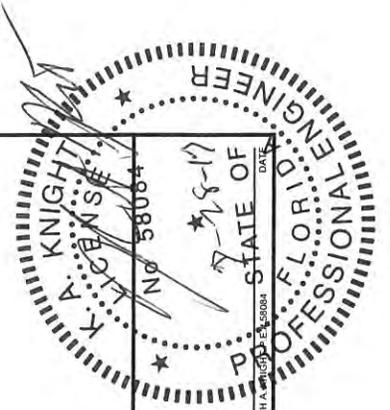


TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615

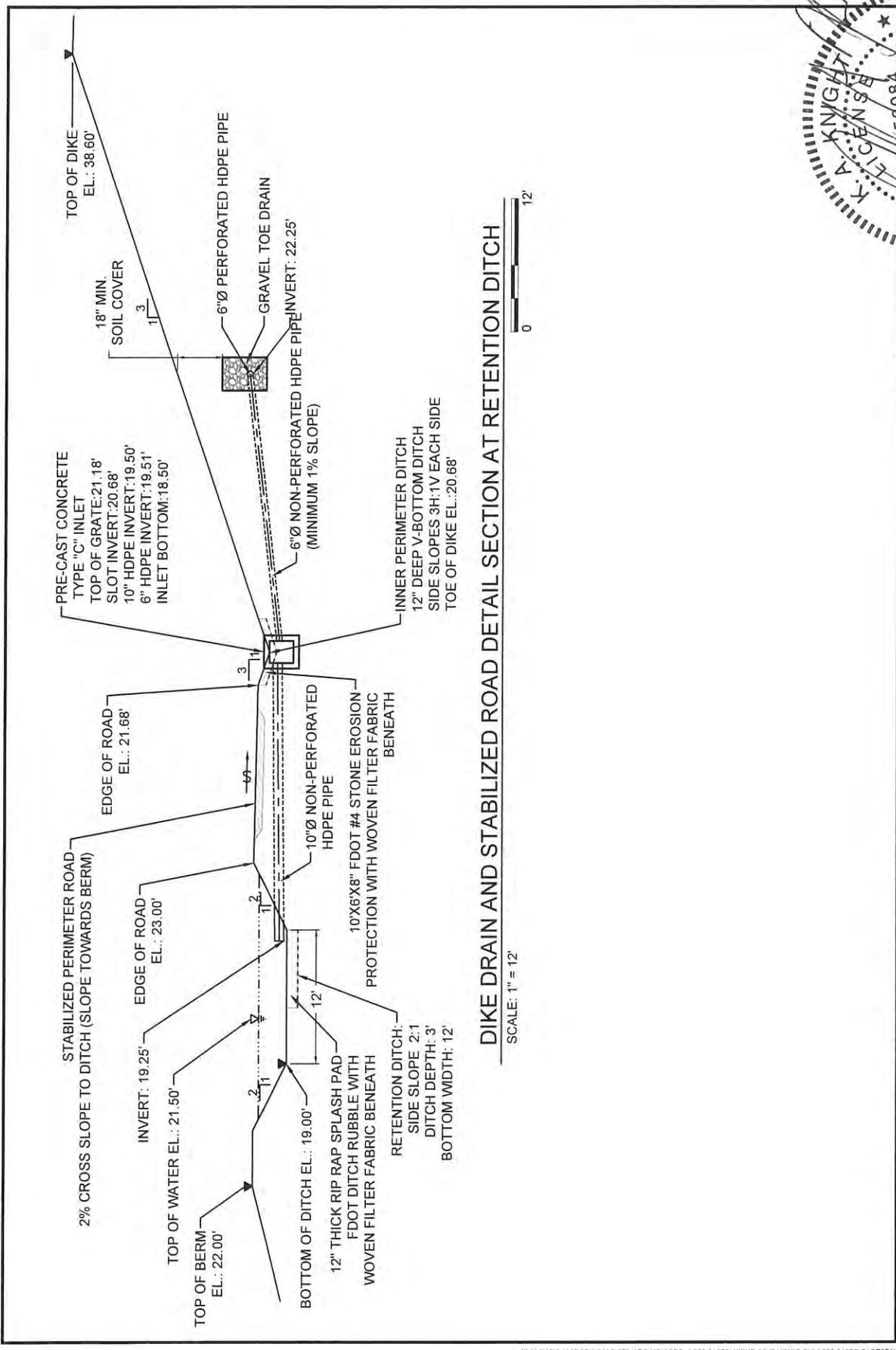
FIGURE 14
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT:	C2016-053
DRAWN BY:	RLJ
SHEET:	14 of 29
DATE:	JULY 2017

SEAL
 No 58064
 2-8-17
 STATE OF FLORIDA
 PROFESSIONAL ENGINEER
 KEITH A. KNIGHT, P.E. 30084



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



DIKE DRAIN AND STABILIZED ROAD DETAIL SECTION AT RETENTION DITCH

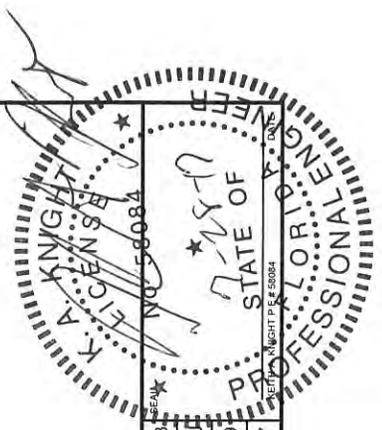
SCALE: 1" = 12'



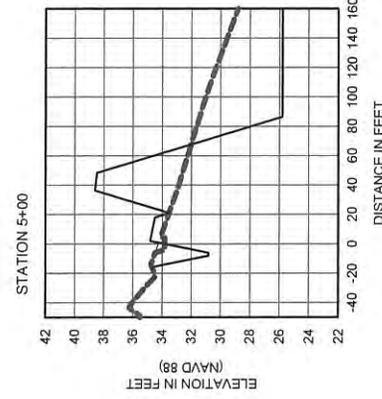
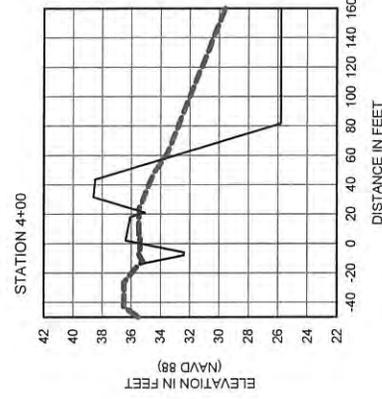
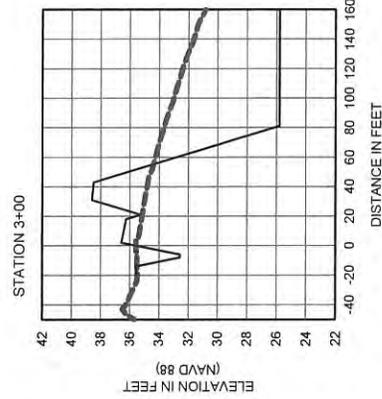
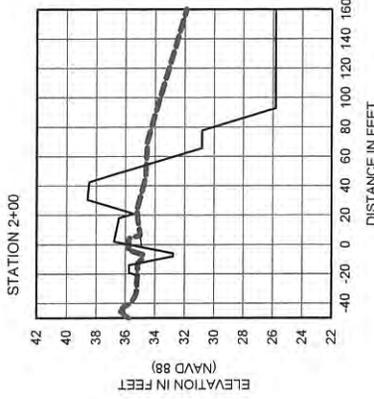
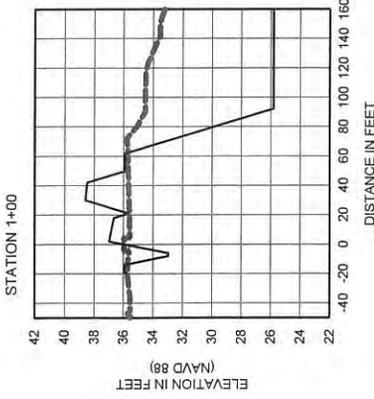
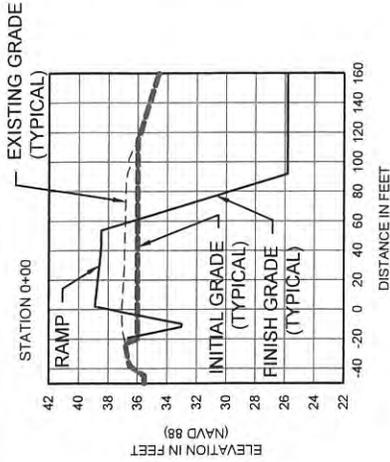
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615

FIGURE 15
 TYPICAL RETENTION DITCH SECTION DETAIL
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	C2016-053
DRAWN BY	RLJ
SHEET	15 of 29
DATE	JULY 2017



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615

FIGURE 16
 DMMA DIKE SECTIONS
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT: C2016-053
 DRAWN BY: RLJ
 SHEET: 16 OF 29
 DATE: JULY 2017

DMMA DIKE SECTIONS

SCALE: 1" = 120'
 V-SCALE: 1" = 20'

PROJECT NO. 5808401

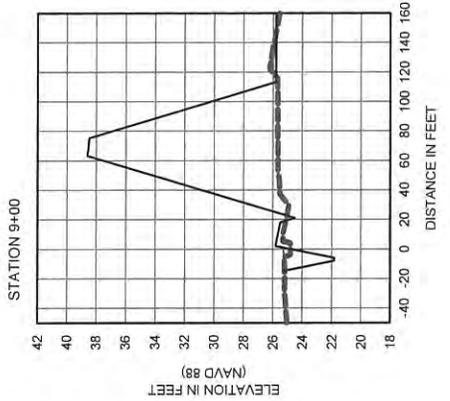
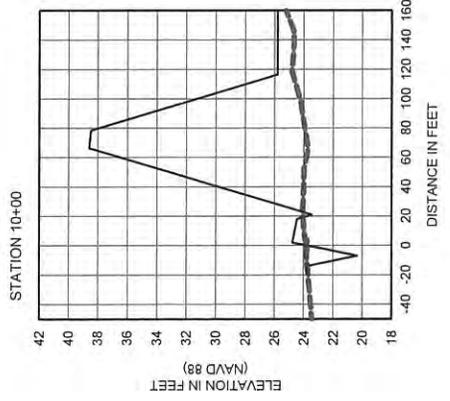
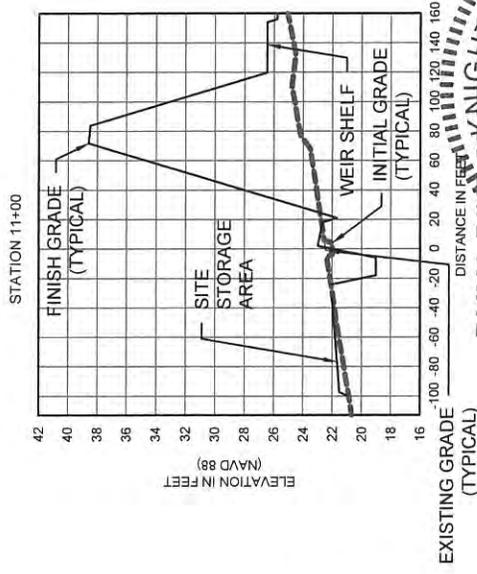
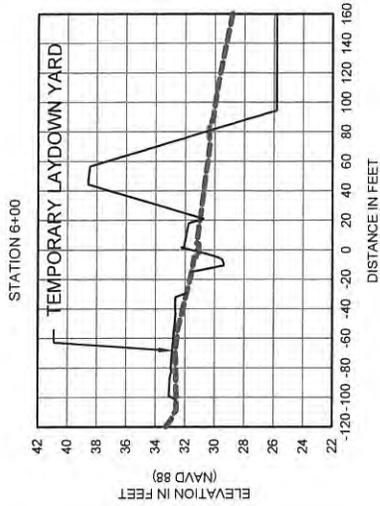
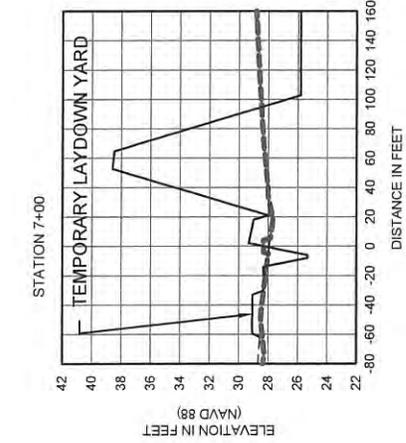
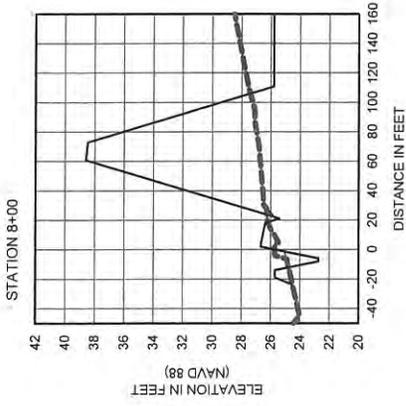
DATE: 7-28-17

STATE OF FLORIDA

PROFESSIONAL ENGINEER

KEITH A. KNIGHT, P.E.

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



DMMA DIKE SECTIONS
 SCALE: 1" = 40'
 V-SCALE: 1" = 12'

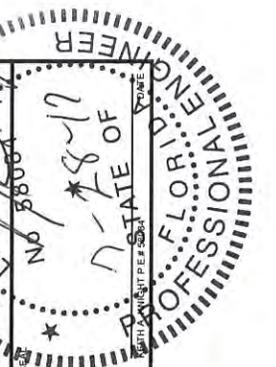
PROJECT	C2016-053
DRAWN BY	RLJ
SHEET	17 of 29
DATE	JULY 2017

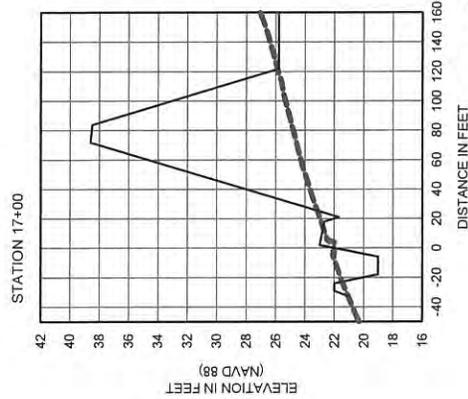
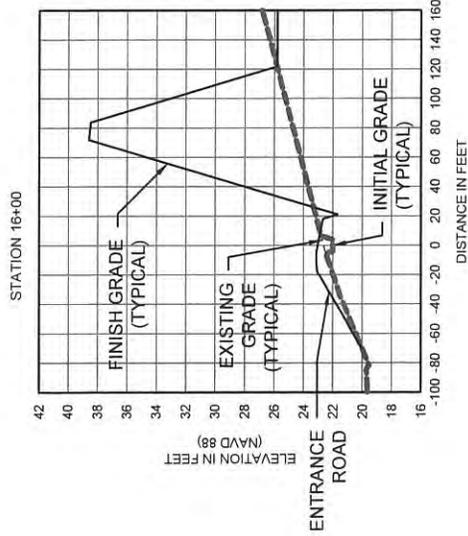
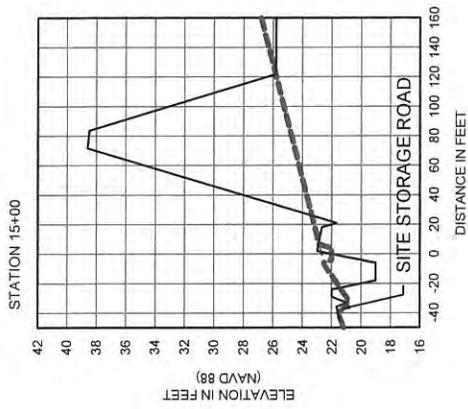
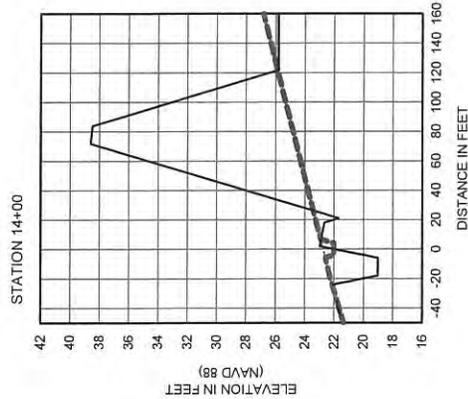
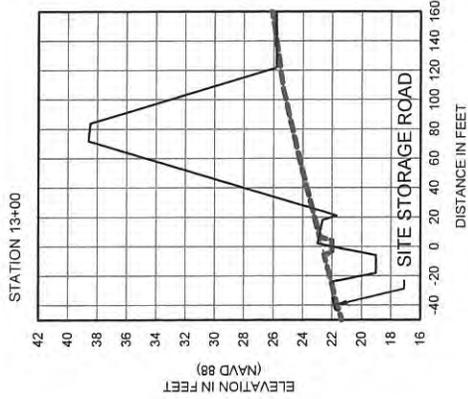
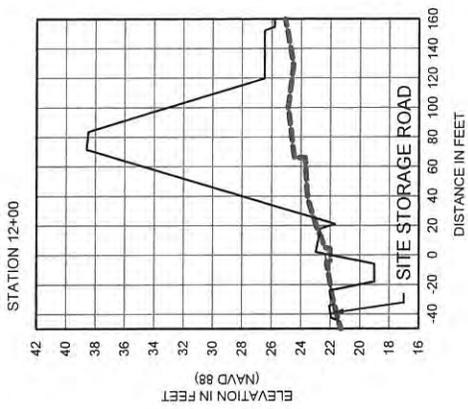
FIGURE 17
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.





DMMA DIKE SECTIONS
 SCALE: 1" = 120'
 V-SCALE: 1" = 12'

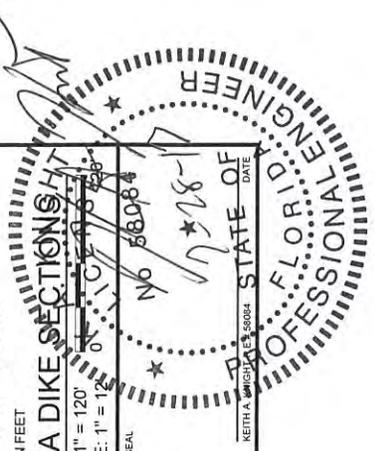
PROJECT: C2016-053
 DRAWN BY: RLJ
 SHEET: 18 of 29
 DATE: JULY 2017

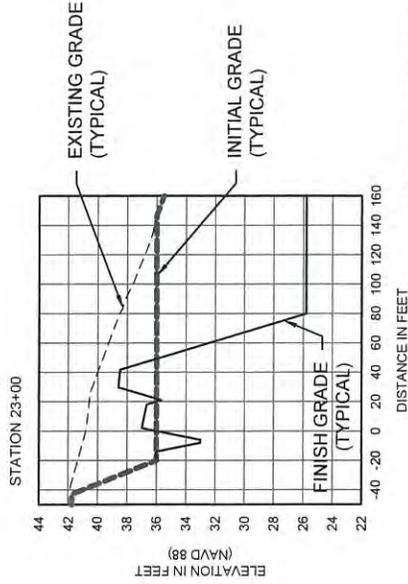
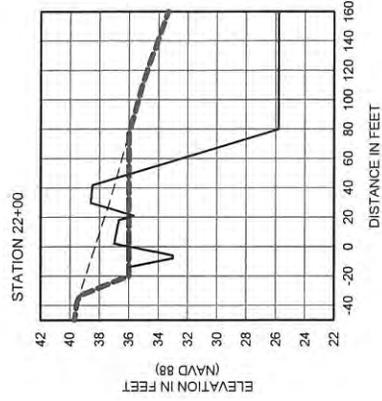
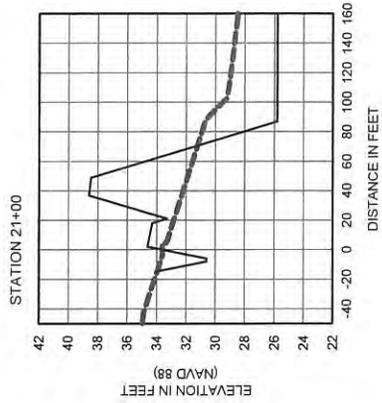
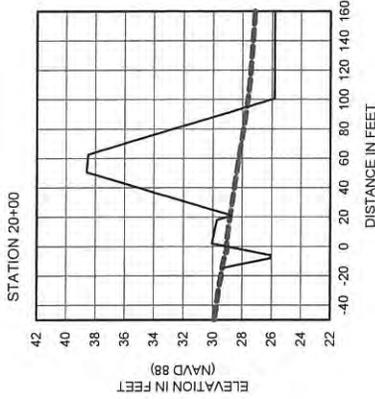
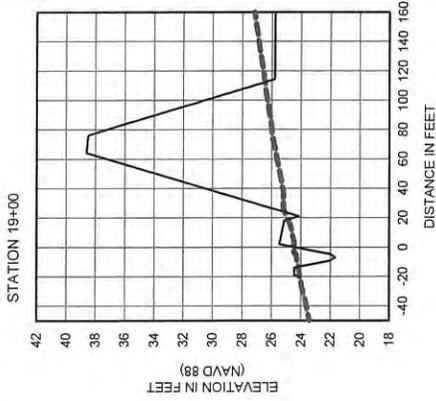
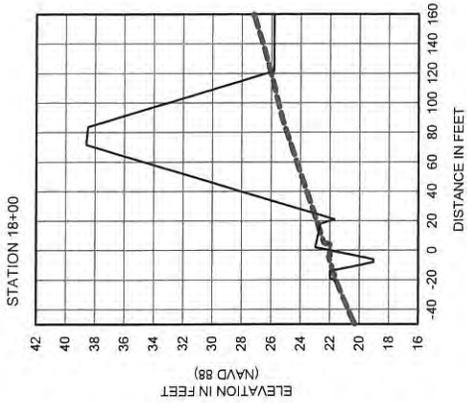
FIGURE 18
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.





DMMA DIKE SECTIONS

SCALE: 1" = 120'

V-SCALE: 1" = 12'

PROJECT: C2016-053

DRAWN BY: RLJ

SHEET: 19 of 29

DATE: JULY 2017

SEAL: No. 58084

STATE OF FLORIDA

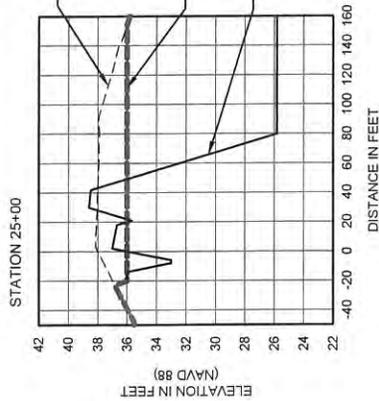
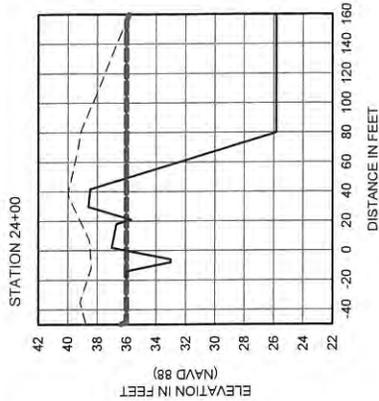
PROFESSIONAL ENGINEER

KEITH A. JUNG

TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615

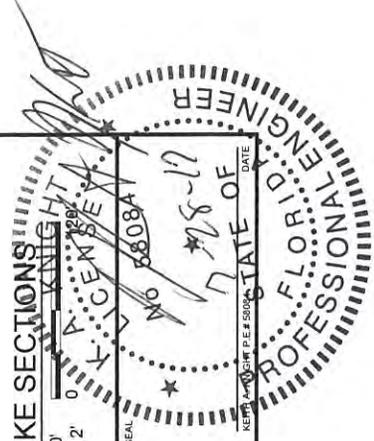
FIGURE 19
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



DMMA DIKE SECTIONS

SCALE: 1" = 120'
 V-SCALE: 1" = 12'



PROJECT	C2016-053
DRAWN BY	RLJ
SHEET	20 of 29
DATE	JULY 2017

FIGURE 20
 FIGURE TITLE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4815

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.

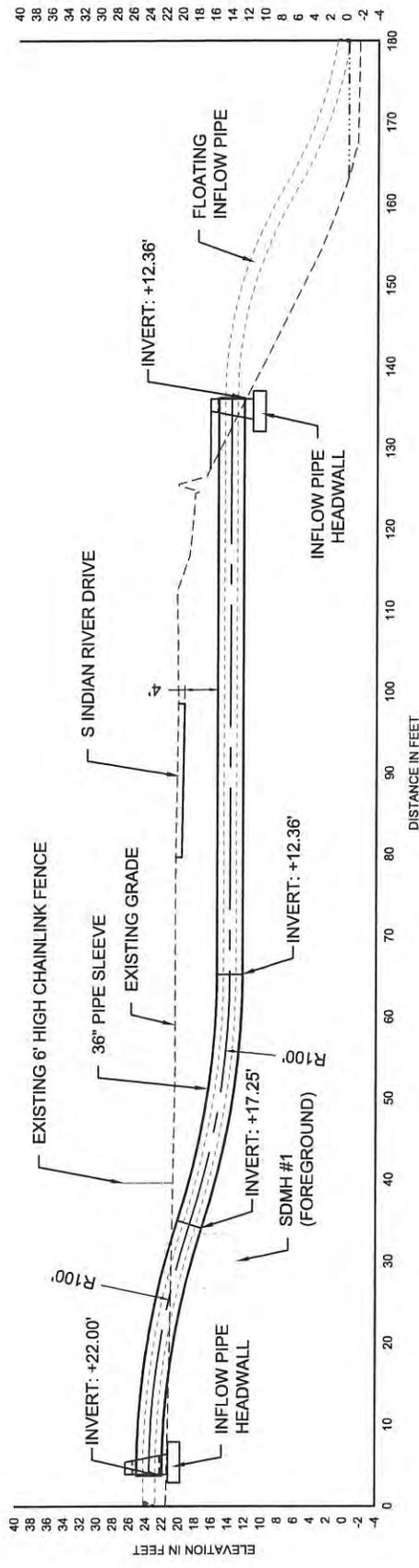
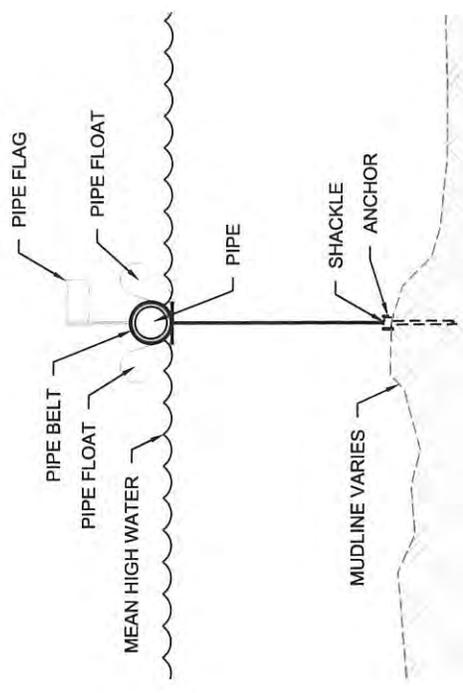


FIG 21
 D
 INFLOW PIPE SLEEVE PROFILE
 SCALE: 1" = 20'

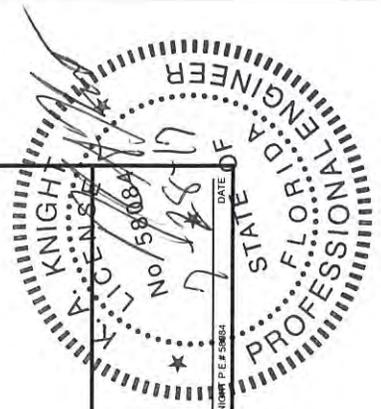


FLOATING PIPELINE DETAIL
 NOT TO SCALE

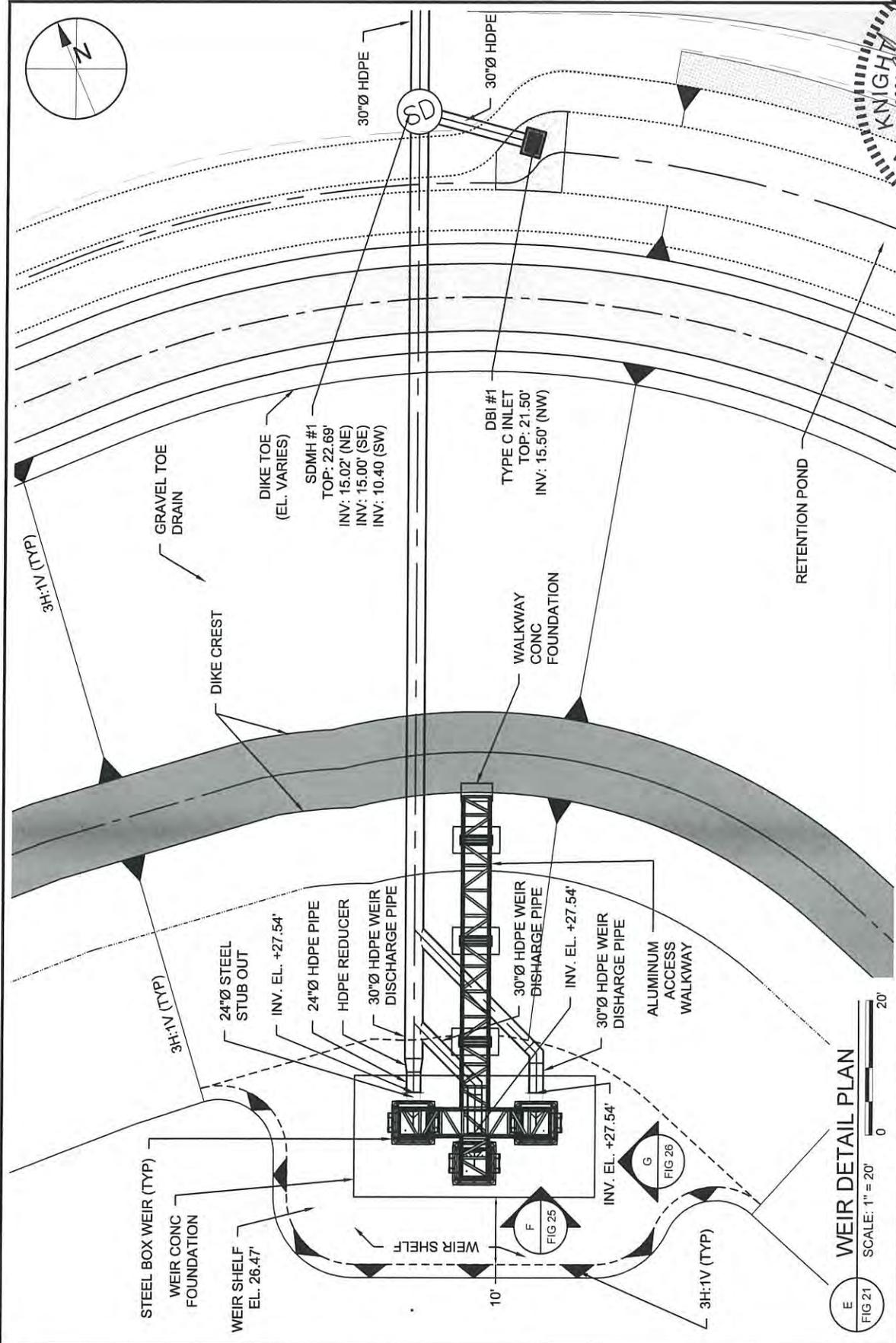
TAYLOR ENGINEERING INC.
 10151 DEERWOOD PARK BLVD
 BLDG 300, SUITE 300
 JACKSONVILLE, FLORIDA 32256
 CERTIFICATE OF AUTHORIZATION # 4615

FIGURE 23
 INFLOW PIPE SLEEVE PROFILE
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	C2016-053	SEAL
DRAWN BY	RLJ	
SHEET	23 of 29	
DATE	JULY 2017	



PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



PROJECT: C2016-053
DRAWN BY: RLJ
SHEET: 24 of 29
DATE: JULY 2017

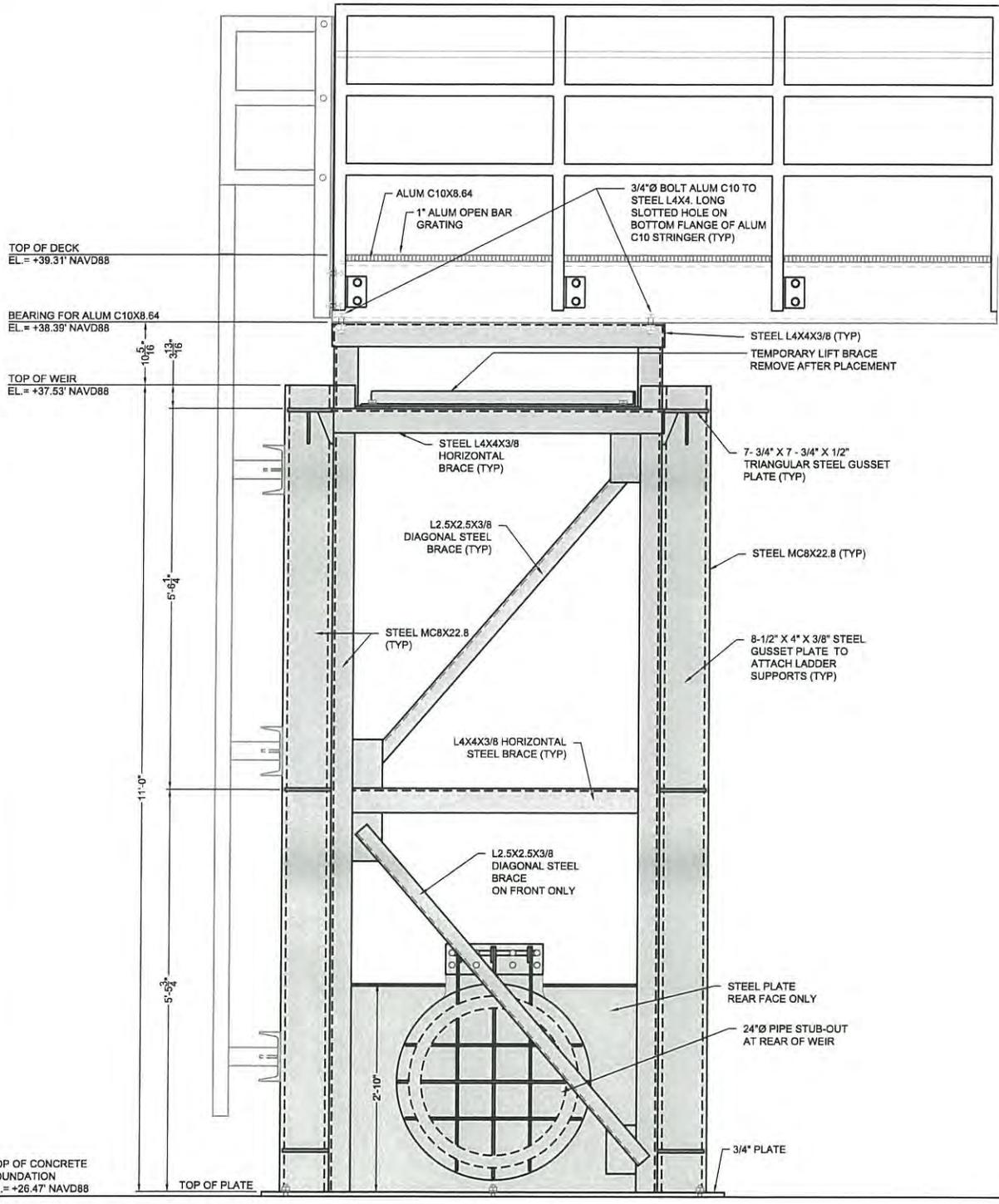
SEAL
No 58084
DATE 7-28

KNIGHT
LICENSED PROFESSIONAL ENGINEER
STATE OF FLORIDA
P.E. # 58084

FIGURE 24
WEIR DETAIL PLAN
F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
ST. LUCIE COUNTY, FLORIDA

TAYLOR ENGINEERING INC.
10151 DEERWOOD PARK BLVD
BLDG 300, SUITE 300
JACKSONVILLE, FLORIDA 32256
CERTIFICATE OF AUTHORIZATION # 4816

PRELIMINARY DRAWINGS: THESE DRAWINGS ARE NOT IN FINAL FORM, BUT ARE BEING TRANSMITTED FOR AGENCY REVIEW.



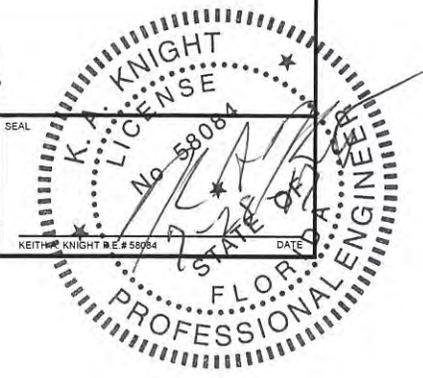
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 FIG 24 WEIR FRONT TYPICAL ELEVATION
 SCALE: 1/2" = 1'
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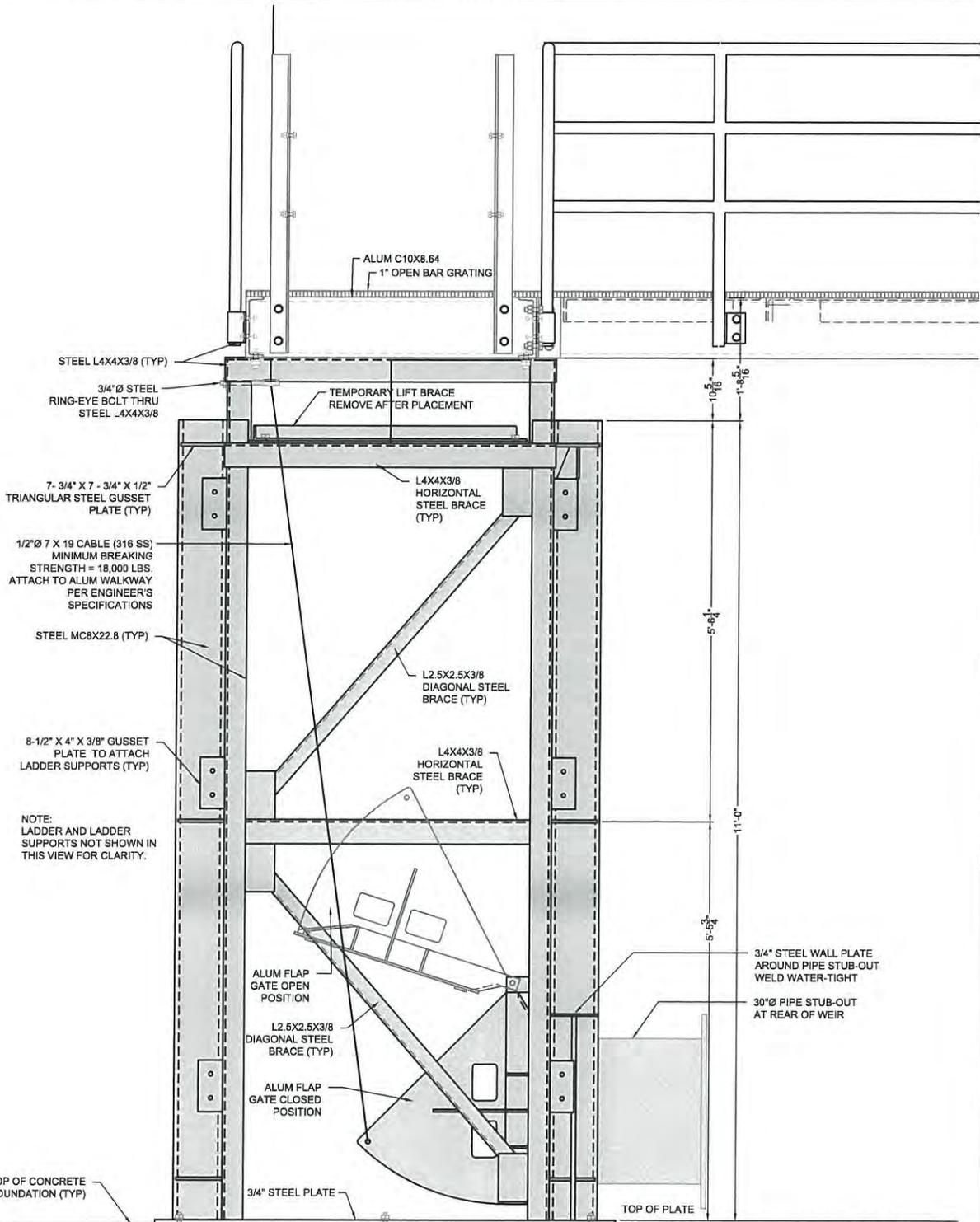
FIGURE 25
 STEEL WEIR TYPICAL FRONT ELEVATION DETAIL
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

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FIG 24

WEIR SIDE TYPICAL ELEVATION

SCALE: 1/2" = 1'



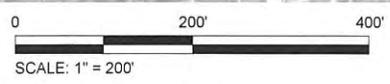
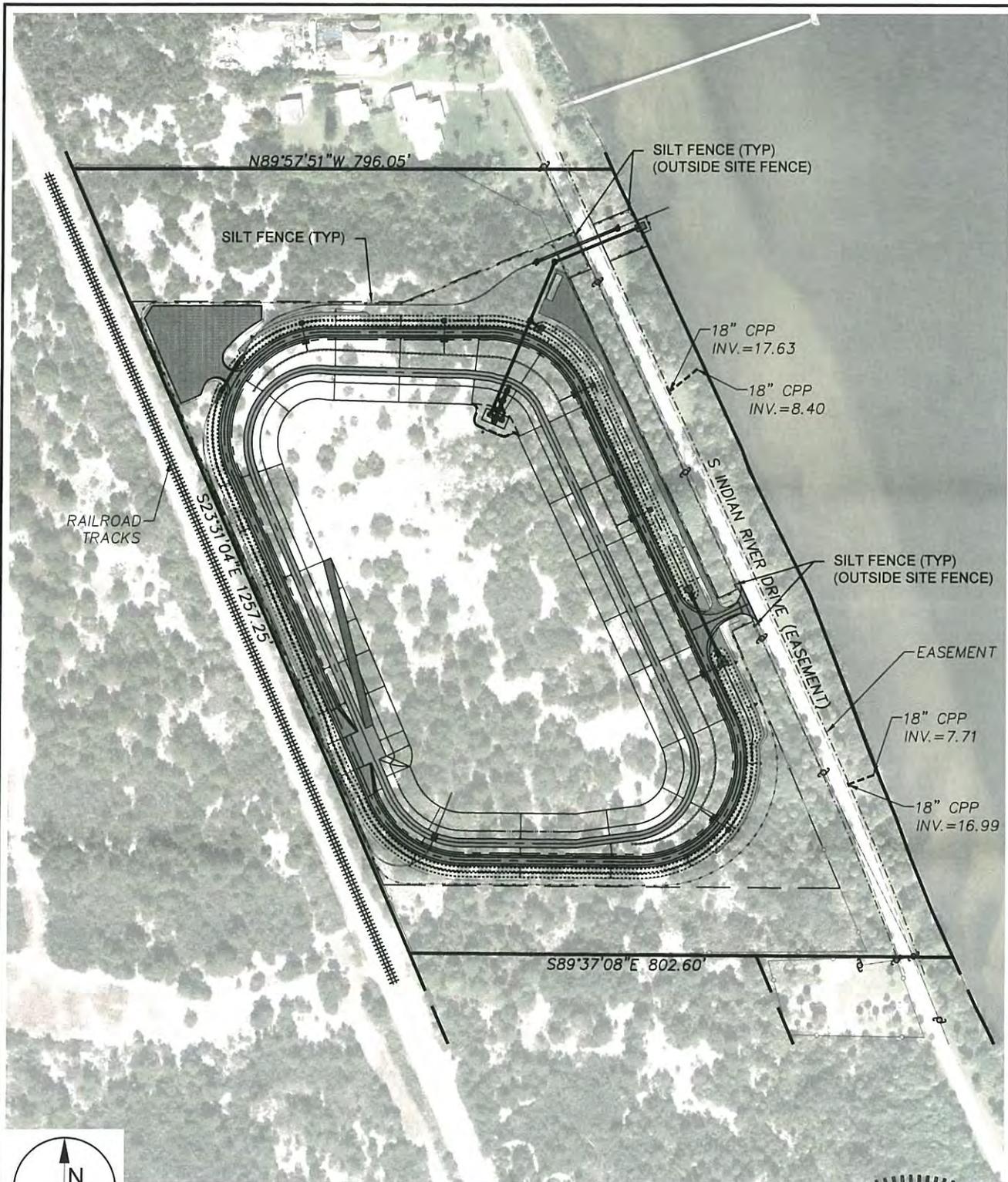
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FIGURE 26			
STEEL WEIR TYPICAL SIDE ELEVATION DETAIL			
F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA			
ST. LUCIE COUNTY, FLORIDA			
PROJECT	DRAWN BY	SHEET	DATE
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- REFERENCES:
1. AERIAL: FDOT 2016
 2. GEOTECHNICAL: ELLIS & ASSOCIATES, INC.
 3. SURVEY & TOPOGRAPHICAL: WHIDDEN SURVEYING & MAPPING, INC.

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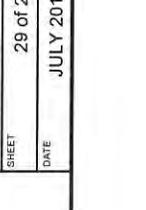
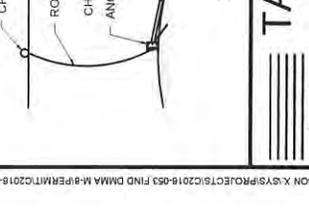
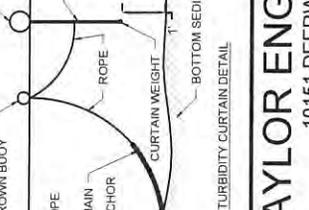
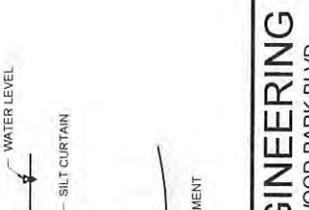
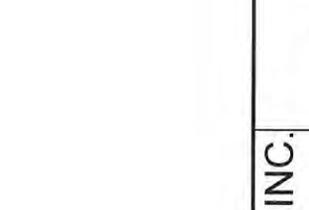
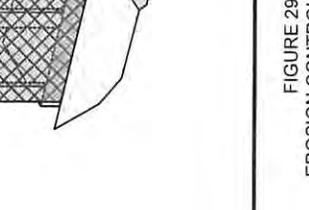
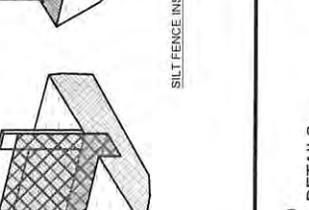
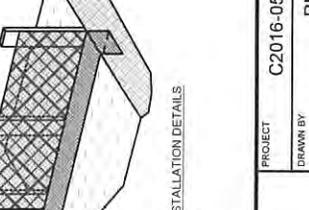
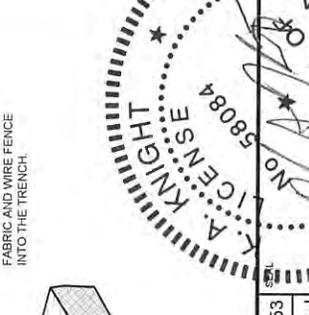
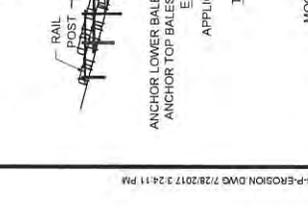
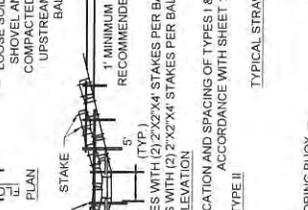
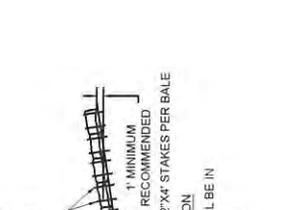
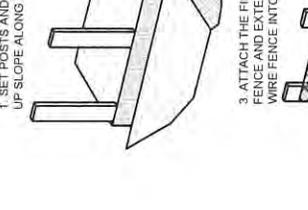
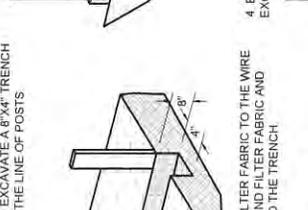
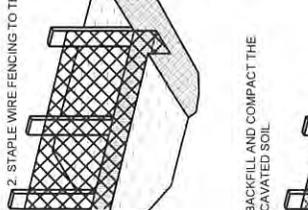
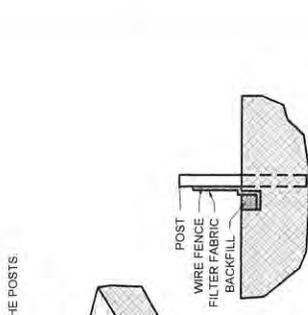
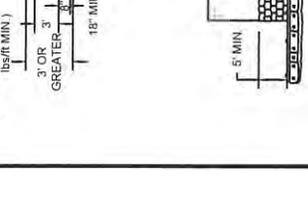
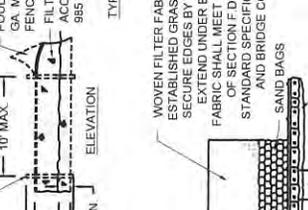
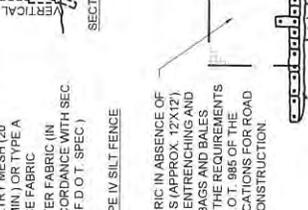
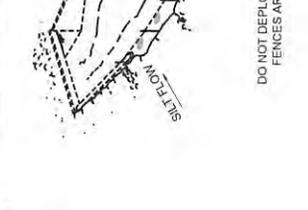
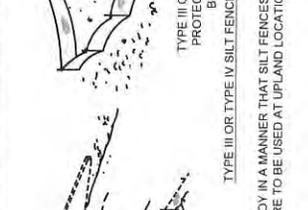
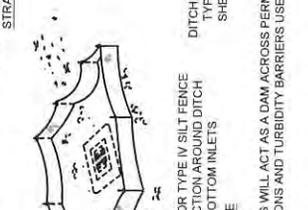
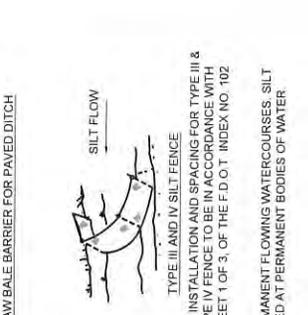
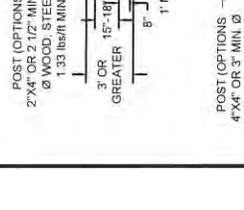
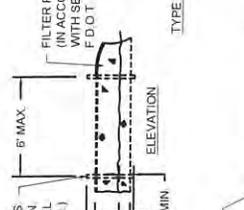
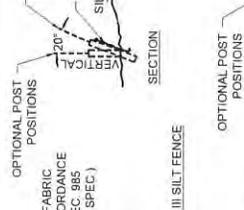
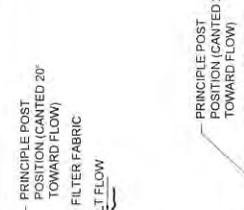
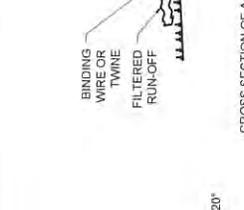
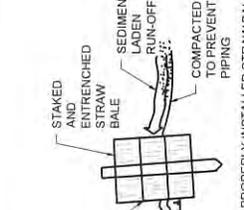
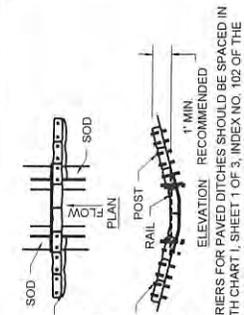
FIGURE 28
 EROSION CONTROL PLAN
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

PROJECT	DRAWN BY	SHEET	DATE
C2016-053	RLJ	28 of 29	JULY 2017

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 DRAWN BY: RLJ
 SHEET: 29 of 29
 DATE: JULY 2017

FIGURE 29
 EROSION CONTROL DETAILS
 F.I.N.D. M-8 DREDGE MATERIAL MANAGEMENT AREA
 ST. LUCIE COUNTY, FLORIDA

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STANDARD MANATEE CONDITIONS FOR IN-WATER WORK

2011

The permittee shall comply with the following conditions intended to protect manatees from direct project effects:

- a. All personnel associated with the project shall be instructed about the presence of manatees and manatee speed zones, and the need to avoid collisions with and injury to manatees. The permittee shall advise all construction personnel that there are civil and criminal penalties for harming, harassing, or killing manatees which are protected under the Marine Mammal Protection Act, the Endangered Species Act, and the Florida Manatee Sanctuary Act.
- b. All vessels associated with the construction project shall operate at "Idle Speed/No Wake" at all times while in the immediate area and while in water where the draft of the vessel provides less than a four-foot clearance from the bottom. All vessels will follow routes of deep water whenever possible.
- c. Siltation or turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. Barriers must not impede manatee movement.
- d. All on-site project personnel are responsible for observing water-related activities for the presence of manatee(s). All in-water operations, including vessels, must be shutdown if a manatee(s) comes within 50 feet of the operation. Activities will not resume until the manatee(s) has moved beyond the 50-foot radius of the project operation, or until 30 minutes elapses if the manatee(s) has not reappeared within 50 feet of the operation. Animals must not be herded away or harassed into leaving.
- e. Any collision with or injury to a manatee shall be reported immediately to the Florida Fish and Wildlife Conservation Commission (FWC) Hotline at 1-888-404-3922. Collision and/or injury should also be reported to the U.S. Fish and Wildlife Service in Jacksonville (1-904-731-3336) for north Florida or Vero Beach (1-772-562-3909) for south Florida, and to FWC at ImperiledSpecies@myFWC.com
- f. Temporary signs concerning manatees shall be posted prior to and during all in-water project activities. All signs are to be removed by the permittee upon completion of the project. Temporary signs that have already been approved for this use by the FWC must be used. One sign which reads *Caution: Boaters* must be posted. A second sign measuring at least 8 ½" by 11" explaining the requirements for "Idle Speed/No Wake" and the shut down of in-water operations must be posted in a location prominently visible to all personnel engaged in water-related activities. These signs can be viewed at MyFWC.com/manatee. Questions concerning these signs can be sent to the email address listed above.

CAUTION: MANATEE HABITAT

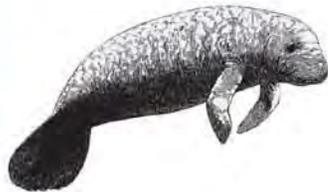
All project vessels

IDLE SPEED / NO WAKE

When a manatee is within 50 feet of work
all in-water activities must

SHUT DOWN

Report any collision with or injury to a manatee:



Wildlife Alert:

1-888-404-FWCC(3922)

cell *FWC or #FWC

**Recommended Management Practices
and Survey Protocols for Audubon's
Crested Caracara (*Caracara cheriway
audubonii*) in Florida**

TECHNICAL REPORT NO. 18

Joan L. Morrison



September 2001



Bureau of Wildlife Diversity Conservation
Florida Fish and Wildlife Conservation Commission
620 South Meridian Street
Tallahassee, FL 32399-1600

This report is the result of a project supported by the Florida Fish and Wildlife Conservation Commission's Nongame Wildlife Trust Fund. It has been reviewed for clarity, style, and typographical errors, but has not received peer review. Any opinions or recommendations in this report are those of the authors and do not represent policy of the Commission.

Suggested citation:

Morrison, J. L. 2001. Recommended management practices and survey protocols for Audubon's crested caracara (*Caracara cheriway audubonii*) in Florida. Technical Report No. 18. Florida Fish and Wildlife Conservation Commission, Tallahassee, Florida, USA.

**Recommended Management Practices
and Survey Protocols for Audubon's
Crested Caracara (*Caracara cheriway
audubonii*) in Florida**

TECHNICAL REPORT NO. 18

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Florida Fish and Wildlife Conservation Commission
Project NG96-021
Contract Number 96115

September 2001

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INTRODUCTION

This document was published and issued by the Florida Fish and Wildlife Conservation Commission (FWCC) but was prepared in consultation with experts on the crested caracara and with biologists from both the FWCC and the U.S. Fish and Wildlife Service. The purpose of this document is to provide recommendations for management practices that would benefit the caracara in Florida by developing, maintaining, and/or enhancing environmental conditions required for the species' survival and well being. The management practices recommended here are advisory in nature, to be used by a variety of constituents including private landowners and land managers who may have an interest in managing their lands in ways compatible with the caracara's survival. These management practices, if carried out, should avoid or minimize detrimental human-related impacts on crested caracaras and should foster persistence of the species in Florida. This document also provides general biological information about the species and protocols for surveying for nests and for monitoring known nest sites.

BIOLOGICAL INFORMATION ABOUT THE SPECIES

The crested caracara (*Caracara cheriway*; hereafter, caracara), is a unique raptor/scavenger from the family Falconidae that reaches the northern limit of its geographic range in the southern U.S. (Fig. 1). The subspecies occurring in the U.S. is Audubon's crested caracara (*C. c. audubonii*) (Brown and Amadon 1968, American Ornithologists' Union 1983). In Florida, this raptor occurs as an isolated population in the south-central region of the state.

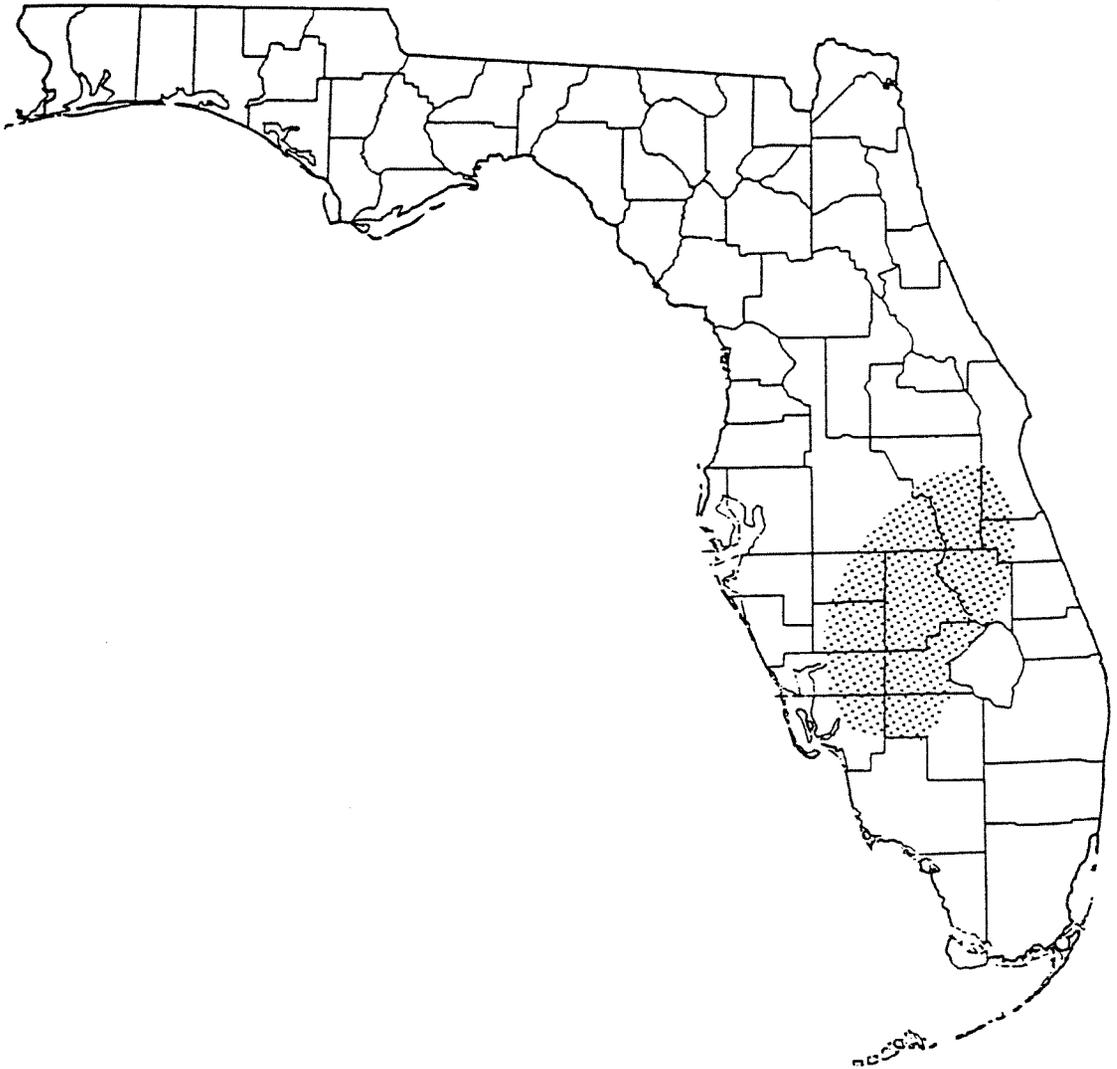


Fig. 1. Currently known breeding range of the crested caracara in Florida.

Caracaras in Florida were formerly documented to inhabit native prairie in Florida's central region. The species has been reported from the Kissimmee, Caloosahatchee, and upper St. Johns river basins, and the Kissimmee prairie (Bryant 1859, Scott 1892, Phelps 1912, Bailey 1925, Nicholson 1929, Howell 1932, Bent 1938, Sprunt 1954). Few historic nesting records are available, however. Notable changes in land use patterns have occurred throughout central Florida in recent years and, as a result, the status of this population has become a subject of concern. The caracara's range in Florida is now considerably smaller than was historically reported (Stevenson and Anderson 1994, Layne 1996), and this raptor apparently now occurs almost exclusively on privately owned cattle ranches in the south-central part of the state (Morrison and Humphrey 2001). The size of this population is unknown but is probably at least 500 (Layne 1996) or greater (J. Morrison, unpublished data). Populations comprised of 500 or fewer individuals may be more susceptible to extinction due to stochastic demographic or environmental events (Shaffer 1981).

All available evidence suggests that the most serious threat to Florida's caracara population is loss or degradation of nesting and feeding habitat. Such loss is most commonly due to conversion of pasture and other grassland habitats and wetlands to citrus, sugar cane, other agriculture, and urban development. Adult caracaras exhibit high site- and mate-fidelity; therefore, extensive loss of habitat within the home range, particularly of the nesting site itself, may cause the pair to abandon that home range, or at least the nesting site. Caracaras use some agricultural lands for foraging (J. Morrison, unpublished data); however, these habitats will not support resident, breeding caracaras if nesting habitat is not available. It is currently not known what degree of nesting or foraging habitat loss within a home range will cause permanent movement of a pair out of their home range.

Home Range

Florida's caracaras are resident, remaining year-round on home ranges that consist of the nesting territory and feeding habitat. Home ranges of caracaras in Florida average approximately 1,200 ha (3,000 acres) in size (Morrison 1997a) and represent an area within a radius of approximately 2–3 km (1.2–1.9 miles) from the nest. Adult caracaras typically forage throughout their home range during both nesting and non-nesting seasons. The nesting territory itself may be considered to be approximately the 25% core area of the home range, within an average radius of 1.0 km (0.6 mile) from the nest. This core area is where the resident pair spends most of its time during the nesting season (Morrison 1997a). The nesting territory is strongly defended by the pair during the nesting season. Adult caracaras spend more time farther from the nest and are rarely defensive around the nesting site during the non-nesting

season (Morrison 1997a). Other areas within the home range that are not near the nest itself are regularly used by the caracaras for collecting nesting material, roosting, loafing, and feeding.

Nesting

The crested caracara has a nesting ecology similar to that of bald eagles (*Haliaeetus leucocephalus*). Caracara pairs are generally monogamous and highly territorial, and exhibit strong fidelity to their breeding site, even nesting in the same tree year after year. Long-term observational data on occupancy of home ranges by caracaras in Florida indicate that as long as the nesting site and surrounding feeding habitat are not substantially altered, the home range will remain continuously occupied (J. Layne, unpublished data) and the pair will make an annual breeding attempt (Morrison 1999). Adult caracaras are highly intolerant of other adult caracaras within the nesting territory and particularly near the nest site, although caracaras of the juvenile age classes (fledgling to 3 years of age) may be tolerated at feeding areas that are not near the nest tree.

Timing.—Breeding activity can occur from September through June in Florida, with the primary season being November through April. Peak egg laying occurs from late December through early February, and incubation ranges from 31 to 33 days (Morrison 1999). The total breeding cycle (nest building, egg laying, incubation, nestling, and post-fledging dependency periods) is approximately 25 weeks in length, although sometimes up to 2 months elapse between completion of nest building and commencement of egg laying. The nestling period covers approximately 7–8 weeks, and the post-fledging dependency period is approximately 8 weeks (Morrison 1999).

Crested caracaras are capable of making more than 1 nesting attempt during a single breeding season. Pairs frequently produce a replacement clutch following nest failure in the incubation or early nestling stages (Morrison 1999). Early-season nesting pairs (those that lay their first clutch before March 1) may raise a second brood, but this occurs in less than 10% of the population, annually (Morrison 1998). Second-brood clutches may be laid as late as March and April. Second-brood young fledge as late as July and may remain with their parents through the rest of the summer and into the fall.

Nesting Habitat.—The crested caracara is primarily a bird of open habitats. Its nesting habitat in Florida consists of large expanses of pastures, grasslands, or prairies dotted with numerous shallow ponds and sloughs and single or small clumps of live oaks (*Quercus virginiana*), cabbage palms (*Sabal palmetto*), and cypress (*Taxodium* spp.). Cabbage palms are favored as

nest trees; equally chosen are single, isolated trees or trees within a group of 3–10. Caracaras nest only occasionally in oak and cypress trees. Most striking about caracara nesting habitat is the physical structure of the landscape—low, short, ground vegetation; scattered trees; and minimal or absent understory or shrub layer. Caracaras in Florida historically nested in native wet prairie habitat, particularly adjacent to marshes associated with the Kissimmee and St. Johns rivers (Nicholson 1929, Bent 1938). Caracaras are now found regularly in “improved” pastures, grasslands heavily managed for forage production for cattle (Morrison 1997a). Exotic forage grasses dominate these improved pastures, and regular mowing, burning, and high-density grazing maintain the low vegetative structure.

The Nest.—Caracara nests can generally be seen by looking up directly into the nest tree from alongside the trunk. Nests are bulky, loosely woven structures typically composed of long, slender, dried pieces of vines, weed stalks, briars, twigs, and fruiting clusters of palm. Nests are round or oval in shape and are about 2 feet in diameter. Nests typically face south to southeast within the nest tree.

Number of Nest Trees Used.—The nest site that originally attracts the pair of breeding caracaras is of critical importance. Pairs may use the same tree year after year, even if the old nest is lost. It is not uncommon for nests to be blown from trees by storms, after which the resident pair typically rebuilds a new structure in the same tree. If an old structure remains, the pair typically builds a new structure on top of it. Caracara pairs sometimes have 2 or 3 alternate nest trees that may be used in different years or for a second nesting effort within the same year. All nest trees used by a given pair are typically situated in the same general vicinity (usually within 0.5 km [0.3 mile] of each other). A new pair will often use one of the originally used nest trees when a member of a pair dies or is replaced (J. Morrison, unpublished data).

Feeding

Crested caracaras obtain their food from a variety of habitats, including improved pastures, newly plowed or burned fields, dairies, and around dwellings and farm buildings. They scavenge along roads and at slaughterhouses, poultry houses, and urban dumps. Caracaras also forage regularly in a variety of wetland habitats. The types of wetlands that provide good feeding conditions for caracaras include the extensive networks of drainage ditches and small ponds and wetlands found within improved pastures, drying marshes or stock ponds, shallow roadside or agricultural ditches, and marshes associated with river oxbows. Caracaras occasionally forage in agricultural lands including sod and cane fields and citrus groves but

do not spend most of their foraging time in these habitats (J. Morrison, unpublished data). Groups of up to 20 juvenile caracaras are often seen feeding in citrus groves during the fall, although the seasonality of this behavior is not understood.

The crested caracara is considered a scavenger because it is most easily observed feeding on carrion along roadsides. However, this raptor actually exhibits a broad diet, feeding on insects associated with carrion and dung in pastures as well as on a wide variety of vertebrate and invertebrate prey, much of which it captures live. Prey includes rats, mice, skunks, rabbits, squirrels, piglets, snakes, frogs, lizards, sirens, nestling birds, birds' eggs, turtles, fish, crayfish, beetles, grasshoppers, and worms.

Roosting

Adult caracaras frequently perch on the tallest trees or snags or on telephone poles within their home range. Breeding adult caracaras typically roost in trees near or within the nest stand. Groups of up to 50 or more juvenile caracaras roost in groups of palm and oak trees. These roosts occur on ranches or they may be near gathering areas (see below), particularly along the Kissimmee River floodplain. During the non-breeding season, roosts containing up to 30 juveniles may even be found within the home range of a nesting pair, although not generally within the nesting territory itself.

The Juvenile Period

Young caracaras fledge from January through July with the peak of fledging occurring in March and April. Juvenile caracaras have a long fledgling dependency period, remaining dependent on their parents for the first 2–3 months after fledging from the nest (Morrison 1996). Beginning about 3 months post-fledging, juveniles begin to explore locations outside the natal home range but continue to return to that home range. Following the exploratory phase, juveniles become nutritionally independent but are tolerated by the adults and may remain on their natal home range until the adults begin another breeding effort the following year. The home range used by juvenile caracaras until permanent departure mirrors that of their parents. Permanent departure from the natal home range can occur from 11 to 45 weeks post-fledging.

Age at first reproduction for Florida's crested caracaras is 3 years, although probably not all 3-year-olds attain a territory and begin breeding. Juvenile caracaras are characterized by a medium to dark brown and buffy white plumage (Wheeler and Clark 1995). They do not attain the black and

white adult plumage until about 4 years of age. Juvenile caracaras primarily use improved pasture and grassland habitats and associated wetlands for foraging.

Gathering Areas

After departing from their natal home ranges, young caracaras are nomadic throughout the population's range in south-central Florida, but they regularly use temporary settling areas called gathering areas. Juvenile caracaras typically travel between gathering areas and may remain for days to weeks at any one site (J. Morrison, unpublished data). Juvenile caracaras explore throughout the population's range, then return to spend varying lengths of time in the gathering areas. Even individuals from home ranges on the periphery of the population's range eventually find their way to these gathering areas. Because individuals move between areas it is difficult to monitor numbers at the gathering areas; therefore, the numbers of juveniles and floaters (adult non-breeders) in this population are not known.

Tolerance of Human Activity and Disturbance

Caracaras exhibit a wide range of tolerance of human activities. Some may be quite tolerant of buildings and of the occasional presence of people, livestock, machinery, and vehicles in their home range. Particular pairs may endure a wide range of potential impacts to their habitat resulting from altered patterns of human activity. The nature and extent of impacts on nesting and feeding habitat or on the birds themselves will depend largely on the current situation within each home range and on previous exposure of the resident pair to human activity. Whether or not a caracara pair will be affected by an activity generally depends on the patterns of activity. Some human influence may already be present in any particular home range. If the caracaras have been nesting successfully at these sites, it would be mainly altered patterns of activity that might impact their nesting behaviors and success.

Caracaras are most sensitive to human disturbance during the nesting season, particularly during the late incubation and early nestling stages, although pairs may abandon a nest if disturbed frequently during the nest-building stage. More nests fail during the last week of incubation and the first 2 weeks of the nestling stage than at any other time during the nesting cycle, at least prior to fledging (Morrison 1999). Nests may be abandoned if disturbed during hatching. Increased activity around the nest at hatching may also attract predators such as American crows (*Corvus brachyrhynchos*), which can take small chicks.

Nesting occurs during the winter months; therefore, eggs and small chicks may die quickly from exposure if adults are frequently forced off the nest or are kept off for long periods. Adults are more tolerant of human activity occurring near the nest after the chicks have hatched and become partially feathered than during the period between nest construction and the third or fourth week of the nestling stage. Adult caracaras are particularly sensitive to human disturbance when attempting to deliver food to nestlings. They will not approach the nest if human activity is occurring nearby. Prevention of food deliveries has the most potential for serious consequences when nestlings are very young and must be fed frequently.

Caracaras generally flush from nests during incubation or early nestling stages when the disturbance source is within 300 m (1,000 feet) of the nest (J. Morrison, unpublished data). Flushing occurs at greater distances as the amount and frequency of disturbance increases, for example with subsequent visits to the nest area. If certain activities occur within approximately 300 m of the nest during the nesting season (November through April), they may have detrimental impacts on caracara nesting activities and success. Significant changes in activity levels or in habitat near the nest could result in the breeding pair leaving that nest site and moving to another site, even if these activities occur during the non-breeding season. If habitat changes occur over a wide area within the overall home range, the breeding pair might abandon the home range altogether.

RECOMMENDED MANAGEMENT PRACTICES FOR CRESTED CARACARA HABITAT IN FLORIDA

Following are recommendations for management practices that would benefit the crested caracara in Florida. These practices could be used by landowners and land managers interested in developing, maintaining, and enhancing habitat suitable for caracaras, and they pertain to habitat both near the nest site and throughout the home range. Objectives of these management practices are to (1) protect the nest site itself, (2) minimize disturbance around the nest that might compromise the nest site, (3) conserve important feeding areas nearby and away from the nest site, (4) protect important areas of cover for the fledglings during the post-fledging dependency period, and (5) improve and enhance habitat, when possible.

- 1) Retain pasture and grassland habitats and natural and man-made wetlands (i.e., ditches and ponds) within pastures.
- 2) Do not remove nest trees or other live trees within 300 m (1,000 feet) of a nest tree. Harvest of palm trees for human consumption should occur farther than 300 m from a known nest tree.
- 3) Retain dead trees, which are often used for perching and roosting, within 300 m (1,000 feet) of a nest tree.
- 4) Planting palm trees in areas lacking potential nest trees might attract new caracara pairs into an area. Potential nest trees should be at least 5 m (16 feet) in height and have full, closed crowns. At least 3 trees should be planted close together in a group.
- 5) Retain ground vegetation within 300 m (1,000 feet) of a nest tree. Clumps of taller grasses and small shrubs are regularly used as cover by chicks after they fledge from the nest. Chicks are vulnerable for the first few weeks after fledging because they do not fly well. They spend most of their time on the ground hiding under vegetation and perching on low branches in trees. Limiting disturbance to ground vegetation near a nest tree will ensure adequate cover for fledglings.
- 6) Cattle grazing, burning, mowing, and roller chopping are land management activities that are compatible with caracara survival. These activities keep ground cover vegetation short, which allows the caracaras to easily walk through grassland habitats when foraging. Caracaras are quite terrestrial compared to other raptors and frequently walk in grassland and along wetland habitats in search of food. Caracaras frequently walk behind tractors during plowing and feed on insects disturbed by the activity. They follow the front of grass fires and remain at burned sites for several days, feeding on animals killed by the fire. Continuing the above

management activities will enhance foraging habitat by limiting growth of tall, thick, or shrubby ground vegetation that is not used as frequently by foraging caracaras. Reductions in these management activities may cause widespread growth of thick, tall, or shrubby ground vegetation.

- 7) Wetland maintenance and ditch cleaning are management activities compatible with caracara survival. Caracaras are attracted by ditch-cleaning operations and feed on fish, turtles, sirens, and other animals exposed by these activities. They also steal food from wading birds that feed along these ditches.
- 8) In a known home range, particularly near a nest site, care should be taken to avoid use of chemicals toxic to wildlife, including pesticides, fertilizers, or herbicides. Care should also be taken to keep these chemicals from being introduced into wetlands and waterways.
- 9) Construction activities (including increased vehicle traffic other than normal agricultural operations; earth stockpiling; vehicle parking; equipment or materials storage; or development of new agricultural, commercial, industrial, or residential sites) typically cause changes in human activity levels and in habitat that may affect nesting caracaras. Although roads, canals, and some agricultural lands may provide seasonal food resources, their construction near the nest, particularly during the early phases of the nesting cycle (nest building, egg laying, incubation, early nestling), could disturb the pair and cause them to abandon the nesting territory.
- 10) Some activities such as fence-building, moving cattle, and normal vehicle and agricultural operations can occur in the home range year-round. Careful timing of these activities within 300 m (1,000 feet) of the nest can minimize the impacts of such activities during the nesting season. These activities should be limited near the nest, particularly during nest building, incubation, and early nestling (first 2–3 weeks) stages.
- 11) Mortality of juvenile caracaras is particularly high along roads, which they frequent in search of carrion. Increasing the number of roads within a home range increases risk of collision with vehicles. Care should be taken along all roads to minimize mortality of caracaras by posting signs, lowering speeds, and watching for birds.

SURVEY PROTOCOL FOR FINDING CARACARA NESTS

As land use changes continue in south-central Florida, the need increases for a standardized and effective protocol for assessing the presence of nesting caracaras or of gathering areas at targeted project sites. Survey techniques for caracaras must provide accurate information on territorial occupancy and breeding. This protocol is intended for use by individuals required to survey new habitat for breeding pairs.

Caracaras are not often visible to a casual observer even in known occupied, active, nesting territories, particularly during certain times of the day and of the year. Casual roadside surveys can grossly underestimate occupancy rates for caracara territories. The probability of seeing a caracara on a roadside survey in a known occupied territory can be as low as 30%, even during the breeding season (Morrison 1995). This protocol is intended to assist individuals in maximizing opportunities for finding nesting pairs and determining breeding status. If possible, surveys should be conducted by a qualified biologist, hereby defined as one who has had previous experience with caracaras, including observations and, preferably, radio tracking. Ideally, this person will have been trained by a qualified caracara researcher in monitoring, observation, and data collection techniques for caracaras, so that surveys will be carried out in a standardize manner.

Timing of Surveys

The timing of nesting activity can vary greatly from year to year; nesting can occur any time during September through June. Surveys for territory occupancy or to find new breeding pairs are best conducted during the months of January, February, and March, when nesting within the overall population is at its peak and adults are most likely to be feeding nestlings. Surveys made earlier than January could unduly disturb the birds and result in nest abandonment. Caracaras are most sensitive during the nest building, incubation, and early nestling stages of the nesting cycle. Caracaras can also be easily observed in the territory after the chicks fledge from the nest. The peak of fledging for this population occurs during March and April.

Surveys are best conducted early in the morning or late in the afternoon. Caracaras are most actively nest building, foraging, and feeding young between sunrise and about 1100 hours, and again, between about 1600 hours and sunset. Caracaras are rarely active during the heat of midday, especially in the summer months. They roost in trees that are often far from the nest site; thus they are rarely visible. Surveys conducted from May through October, particularly in new habitat for the purpose of finding new breeding pairs, are

not likely to be productive because of the caracaras' reduced activity levels during these months. Nests from even the most recent nesting season may be hard to find because they may have blown out of the nest tree. Any rain that occurred after nesting season would likely destroy most signs of activity around the nest tree. Also, after the chicks fledge, the family spends less time near the nest site, making them more difficult to find and observe. Surveys conducted during November and December may be productive, but probably will be more so in known territories. Pairs are most likely to be building nests during these months, but do not spend as much time near the nest as they do after egg laying. Additionally, pairs are quite sensitive to disturbance during the nest building and incubation stages, so surveys conducted early in the breeding season have the potential to excessively disturb nesting pairs.

Duration of Surveys

When surveying for caracaras in areas where the nest site is not known, observers should remain in each area for 2–4 hours during each visit. Observers should remain in the vehicle and watch for caracaras over a wide area of suspected habitat. Observations may be made on consecutive days, but ideally should be conducted at least 2 weeks apart and during the months of January through March. Observations made in this manner will usually yield information on territorial occupancy and even the nest site after only 3 visits, if the site is active. If the entire territory cannot be surveyed from a road, areas containing palm trees should be searched by foot if access is feasible. Observations should be conducted in an area at least twice a month for at least 3 consecutive months before it is considered to be unoccupied by caracaras.

Searching for Nests

Caracaras are very site faithful, even to particular nest trees. Most caracaras nest in cabbage palms (Morrison 1997*b*). The nest structure can easily be seen by looking up directly into the palm from alongside the trunk. Signs that a suspected nest is active are feces and prey remains below the nest, chicks calling from the nest, or defensive behavior by the adults when the observer is near the tree. Nests will most likely be facing south to southeast within the nest tree. Nest trees are generally over 5 m (16 feet) in height; have large, full, closed crowns; and are typically on the southeastern to southwestern edge of a group of trees. Nests may also be in lone, free-standing palm trees, in groups of 2–10 palms, or (rarely) in tall, emergent palms in the middle of a large hammock. Oaks and cypress should be checked also, but these are likely to be used as nest trees only if few palms are available within a large area of otherwise suitable pasture and wetland habitat.

When searching for new breeding pairs, efforts should first concentrate on areas of large contiguous pasture habitat containing scattered palms and oaks and numerous wetlands. Observations should be conducted from a position where a large area of suitable habitat can be viewed. If possible, observations should also be made from cover, such as a vehicle, so that disturbance to the pair can be minimized. Searching should focus on observing adult behavior (e.g., carrying sticks or food) that would suggest nesting activity. Caracaras exhibit little size and no plumage dimorphism (Morrison and Maltbie 1999), and these behaviors are not gender specific.

Other behaviors of adults can be used to find nests. During incubation, the adult not currently incubating often will perch high and visibly in a tall tree within 300 m (1,000 feet) of the nest. Adult caracaras exhibit little defense behavior near their nest, but if the chicks are large (5–8 weeks), adults may remain close to the nest and exhibit rattle and cackle vocalizations and the head-throwback display (Morrison 1996). Nest searching using playback tapes, a technique used successfully for surveys of other raptors, is not likely to be effective for caracaras because they do not respond to such tapes. Their vocalizations do not carry far in open habitats. Most vocalizations are used in situations of immediate contact or proximity of individuals, such as copulation, aggression towards a nest predator, or when feeding alongside other caracaras or vultures.

When a nest is found, the contents can be checked using an extendible pole with a mirror attached or by direct observation. If a nest is not found immediately in an area where adult caracaras are known to occur, another visit should be made to that territory within 1 month after the first visit. Use of carrion as bait can also facilitate nest finding, determining territory occupancy, and determining the breeding status of a known pair. A carcass or other large piece of carrion can be set in a suspected area the night before a planned observation period. If caracaras are in the area, they will usually find and begin feeding upon the carcass just after sunrise the following morning. Individuals can then be observed when they return to the nest site.

Nest Monitoring

Subsequent to finding a caracara nest in a new area, monitoring of the nest may be required to obtain information on breeding chronology and reproductive success. If a monitoring program is initiated in conjunction with a land development program, refer to the monitoring protocol which follows.

MONITORING PROTOCOL FOR KNOWN CARACARA TERRITORIES

Because a major management goal is to monitor the status of Florida's caracara population, it is important to monitor known caracara territories as well as attempt to find new ones. Objectives of monitoring known territories are (1) determining whether territories remain occupied year after year, (2) determining whether the same individuals occupy and breed in the same territories year after year, (3) determining whether pairs successfully fledge young year after year, (4) determining how many young are fledged per pair per year, and (5) for long-term monitoring programs, evaluating any changes in habitat use by resident caracaras in conjunction with habitat changes in their home range. Procedures for monitoring in known territories are similar to those for surveying for nesting pairs in new habitat, but the difference is that monitoring occurs in areas where nest and foraging locations may already be known.

For any monitoring program for crested caracaras in Florida, a qualified biologist should visit the territory on a regular basis (i.e., at least once per month). A qualified biologist is one who has had previous experience with caracaras, including observations and, preferably, radio tracking. Ideally, this person would be trained by a qualified caracara researcher in monitoring, observation, and data collection techniques for caracaras, so that any monitoring program initiated in conjunction with a land development project would be standardized with respect to other ongoing long-term monitoring of crested caracaras in south-central Florida.

Nest Finding and Monitoring Reproductive Success

Timing of Monitoring to Determine Territorial Occupancy and Breeding Status.—Monitoring at known caracara territories is best conducted during January, February, and March, when nesting within the overall population is at its peak and adults are most likely to be feeding nestlings. Caracaras can also be easily observed in the territory after chicks fledge from the nest, which peaks for this population during March and April.

Monitoring is best conducted early in the morning or late in the afternoon. Caracaras are most actively nest building, foraging, and feeding young between sunrise and about 1100 hours and again between about 1600 hours and sunset. Caracaras are rarely active during the heat of midday, especially during the summer months. They roost in trees and often far from the nest site, thus they are rarely visible. Monitoring conducted from May through October may be more difficult because of the caracaras' reduced activity levels during

these months. After the chicks fledge, the family spends less time near the nest site so the observer may have to visit more areas within the home range to find and observe the caracaras. Whereas surveying for new nests is not likely to be as productive in November and December, monitoring during these times may be productive in territories with known nest locations. Pairs are most likely to be building nests during these months.

Duration of Monitoring Sessions.—To find active nests in known territories, all known nest trees should be checked first. If a nest is not immediately found, observers should position themselves where known nest trees can be observed and then remain in the vehicle while watching for caracaras over a wide area of suspected habitat. Observations made in this manner will usually yield information on territorial occupancy and even the nest site after only 3 visits, if the site is active. When a nest is found, nest contents can be checked using an extendible pole with a mirror attached or by direct observation.

Additional monitoring sessions may be needed if the nest is not found during the first monitoring session. Each session should span approximately 2–4 hours and ideally should be conducted at least 2 weeks apart from December through March. During the second visit, the search area for the nest should be broadened to include all potential nest sites within 0.5 km (0.3 mile) of the traditional site. Sometimes a pair moves its nest site, particularly if habitat degradation has occurred within the nesting territory or near the traditional nest site, or if one member of the pair dies. Usually, however, if the home range remains occupied, adults will be seen within 3 visits to the nesting territory. A third visit should be made, if necessary, within 2 weeks of the second visit. If no adults are seen or no nest is found after 3 visits, with at least 1 visit made in each of 3 consecutive months from November through April, the home range may be considered temporarily unoccupied. However, if both members of a pair die, the site would likely be taken over by another pair if no habitat degradation occurs, so an apparently unoccupied site should be monitored the following breeding season.

Monitoring for Habitat Use

To evaluate habitat use by caracaras in known territories, monitoring sessions should occur at least monthly year-round for a minimum of 3 years when associated with habitat conversion or a land development project. Because caracaras are site faithful, responses to habitat changes or noticeable changes in nesting behaviors or success may not become apparent within only 1, 2, or even 3 years of observation. During each visit the biologist should remain in the territory for at least 4 hours beginning at sunrise, or beginning in

late afternoon and extending into early evening, but before dark. Any radio-tagged individuals should be tracked during this period and foraging activity, habitats used, and locations recorded. If no individuals are radio tagged, the observer should search for caracaras within the project area. These individuals should be followed and observed during the monitoring period and their foraging activity, habitats used, and locations recorded.

Other Monitoring Considerations

The major limitation to finding new nesting territories and monitoring known nests is the fact that most caracaras in Florida now occur on privately owned land. Permission must always be obtained from the landowner before entering the property of interest. Private lands and the requests of landowners, such as not driving in certain areas and observing gate closures, must always be respected. Less restricted access facilitates nest searching on public lands, but searching may be more difficult because of habitat differences such as smaller areas of short-grass pasture habitats and larger areas of thick, tall, or shrubby ground vegetation, which caracaras typically do not use.

Reporting Banded Individuals

Sightings of banded caracaras made during any survey or monitoring period provide valuable information regarding individual survival and habitat use. Sightings, along with supporting information, may be reported to the Florida Fish and Wildlife Conservation Commission or the U.S. Fish and Wildlife Service. If a banded caracara is found dead, the band number and color combination should be reported to the U.S. Fish and Wildlife Service.

CURRENT STATUS OF THE CRESTED CARACARA IN FLORIDA

Currently, Florida's population of Audubon's crested caracaras is listed as Threatened both federally (U.S. Fish and Wildlife Service 1987) and by the state of Florida (Logan 1997). This listing was afforded primarily because this population is believed to be isolated from any other caracara populations and of small size, therefore is of evolutionary and conservation concern, and because suitable caracara habitat in Florida has been declining rapidly in recent years. Under this listing, the caracara is protected from activities that would directly harm an individual or its habitat.

Persons with further interest in the legal statutes that afford protection for Florida's crested caracaras should review the federal Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.); the federal Migratory Bird Treaty Act (16 U.S.C. 703-711); and Rules 68A-4.001 and 68A-27.011 of the state of Florida Wildlife Code.

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