Technical Specifications

120th Avenue South & Lake Worth Road Intersection Roundabout Improvements

Wellington, Florida

BID SET SUBMITTAL

Tyler Thompson, P.E.
Fla. P.E. No. 86558

Date

Mock•Roos
5720 Corporate Way
WPB, FL 33407
Registry No. 48

MOCK • ROOS
CONSULTING ENGINEERS

(Reproductions are not valid unless signed, dated and embossed with an Engineer's Seal)

PA# WE041.00

November 21, 2025

This Page Intentionally Left Blank

DIVISION 1: GENERAL REQUIREMENTS

01000	General Requirements	5
01010	Summary of Work	2
01025	Measurement and Payment	3
01060	Permits and Notifications	2
01200	Project Meetings and Reports	3
01300	Submittals	8
01410	Testing Laboratory Services	3
01720	Record Documents	3

DIVISION 2: SITE WORK

02016	Existing Utilities and Underground Structures	2
02101	Subsurface investigation	1
02108	Video-Recording of Site Conditions	2
02110	Site Clearing	2
02210	Grading	2
02220	Excavating, Backfilling, and Compacting	4
02230	Rock Base Course	2
02233	Asphalt Base Course	2
02271	Geotextile Fabric	2
02274	Rock Rip Rap	2
02514	Type SP Asphaltic Concrete Paving	3
02523	Sidewalks, Driveways and Curbs	4
02580	Pavement Marking	2
02606	Manholes and Inlets	2
02611	Concrete Pipe	3
02612	Corrugated and Spiral Rib Metal Pipe	4
02831	Chain Link Fences and Gates	5
02938	Sodding	2

DIVISION 16: ELECTRICAL

16000	Electrical General Requirements	8
16050	Basic Materials and Methods	9
16345	Short-Circuit, Coordination Study and Arc Flash Hazard Study	12
16527	Outdoor Lighting Systems	5

END OF TABLE OF CONTENTS

APPENDICES

Appendix A Geotechnical Report

SECTION 01000

GENERAL REQUIREMENTS

PART 1 GENEERAL

1.01 REFERENCE POINTS, GRADES, DIMENSIONS, AND ELEVATIONS

A. Horizontal and vertical controls data, as available, has been provided in the Contract Drawings. Written dimensions have preference over scaled dimensions. All elevations are based on the vertical datum shown on construction drawings. Contractor shall be responsible for any necessary surveying services, including construction layout, staking and final project record drawings in alignment with the land survey control points. All survey work shall be performed by an independent, third party surveyor licensed to practice in the State of Florida, hired by Contractor and surveys shall be signed and sealed.

B. Contractor shall locate and layout all work from datum and dimension points given on the Construction Drawings. Contractor shall establish and verify lines and grades, levels, elevations and dimensions, as required. Contractor shall take measurements and verify dimensions of existing and new work. Contractor is responsible for the preservation of all lines, points, and elevations furnished and shall bear the expense of resetting same if Contractor or any of its subcontractors move or destroy or render inaccurate any such lines, points and elevations.

C. If Contractor, in the course of the work finds any discrepancy between the Contract Drawings and the physical conditions of the Work Site, or any errors or omissions in the Specifications or in the layout as given, Contractor shall immediately inform Engineer and Owner, in writing, and Engineer will review the same and provide corrective instructions, if any are necessary. Any of the Work done after such discovery, until authorized, will be done at Contractor's risk.

1.02 CONTRACT DOCUMENT ORDER OF PRECEDENCE

A. The Contract Documents are complementary, and wherever possible the provisions of the documents shall be construed in such manner as to avoid conflicts between provisions of the various documents. In the event of a conflict between or among any of the terms of the Contract Documents, the order of precedence for deciding which document shall control shall be as follows:

First Priority: Approved Change Orders, Addendums or Amendments

Second Priority: Specifications (quality)

Third Priority: Drawings (location)

Fourth Priority: Supplemental Conditions or Special Terms

Fifth Priority: Contract

Sixth Priority: General Conditions

Seventh Priority: Invitation to Bid

B. Any labor, services, materials, supplies, equipment or documentation that may reasonably be inferred from the Contract Documents or trade usage or prevailing custom as being required to produce the indicated result shall be provided by the Contractor whether or not specifically called for at no additional cost to Owner.

C. In any event of inconsistency, however, the latest, and more stringent, or technical, or the lesser quantity requirements shall control the Work to be performed by Contractor, as determined by Engineer.

D. Unless otherwise stated in the Contract Documents, words that have well-known conventional or technical or construction-industry meanings are used in the Contract Documents in accordance with such meanings.

E. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to laws or regulations, unless otherwise specifically stated, shall mean the standard, specification, manual, code, or laws, or regulations in effect at the time of bid opening or on the Contract date if there were no bids.

1.03 ELECTRONIC DATA

A. Construction of the Project shall be in accordance with official Contract Documents (which include signed/dated/sealed construction Drawings and these Specifications) and not in accordance with any electronic data file.

B. When another professional uses information electronically transmitted by the Engineer, they shall be responsible for following their licensing board laws, rules, and regulations with regard to the use or reuse of work prepared by another professional. Any use of the data provided will be at the user's sole risk without liability or legal exposure to the Engineer. The use of transmitted data in any manner indicates the strict understanding and acceptance of those laws, rules, and regulations.

C. The use of AutoCAD versions other than that used for the information electronically transmitted by the Engineer may result in a loss of some functionality within the data.

1.04 MAINTENANCE OF TRAFFIC

A. In the Contractor's use of streets and highways for the Work to be done under these Specifications, conform to all Municipal, County, State and Federal laws and regulations as applicable. Contractor shall schedule Work to cause minimum disturbance of normal pedestrian and vehicular traffic and be responsible for providing suitable means of access to all public and private properties during all stages of the construction. No road shall be closed prior to receiving approval from the Owner. Contractor shall provide written notification to emergency, police fire and other appropriate agencies at least 24 hours in advance of new work or changed work.

B. The Contractor is to prepare a traffic control plan for each phase of construction. The Contractor shall maintain traffic in accordance with Section 102 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction (Latest Edition) except as follows.

1. Contractor is responsible for preparing a Maintenance of Traffic (MOT) plan. Submit plan to applicable agency for approval.

2. The MOT plan must be prepared by a person who is certified by an FDOT certified school or an engineer licensed in the State of Florida.

C. The Contractor shall provide, erect and maintain equipment, services and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow around the construction area. Traffic control devices shall meet or exceed FDOT certification standards and

the Manual of Uniform Traffic Control Devices. All traffic signs shall have high intensity face material. Provide qualified and suitably equipped flagmen when construction operations encroach on traffic lanes, as required for regulation of traffic. Provide Electronic Variable Message Boards (VMBs) for project duration as stated in Special Provisions Section. Provide boards as required depending on the Contractor's schedule and phasing of construction.

1.05 CONSTRUCTION SEQUENCE

A. Contractor shall submit a Construction Schedule and Project Phasing and Temporary Facilities Plan to the Owner and/or Engineer. Plan shall include coordination and timeframes for implementation of the various elements of the Work and shall be coordinated with, and adhere to, Contractor's MOT Plan. The Contractor shall provide an updated progress construction schedule with each Application of Payment.

1.06 PLACING EQUIPMENT INTO SERVICE

A. Do not operate or place into service or energize, electrical and mechanical equipment until approved by the Owner and/or Engineer. Such approval may be granted only after all interested parties have been duly notified, have given approval for placing the equipment into service, and all interested parties are present or waived their right to be present. Contractor shall provide, in writing, seventy-two (72) hour notification for all items and equipment startups.

1.07 CONTRACTOR'S RESPONSIBILITIES

A. Supervise and direct the Work competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to perform the Work in accordance with the Drawings and these Specifications. Be solely responsible for the means, methods, techniques, sequences and procedures of construction. Be responsible to see that the finished Work complies accurately with the Drawings and Specifications.

B. Provide competent, suitably qualified personnel to perform construction as required by the Drawings and these Specifications.

C. Commencing on the date of the Notice to Proceed and continuing until final acceptance of the Work by Owner, Contractor shall take all necessary precautions for the protection of all persons involved in the Work, the public, and all employees or representatives of Owner. Contractor shall be solely responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor will provide to each worker on the Work Site the proper safety equipment, materials and equipment for the duties being performed by the worker and will not permit any worker on the Work Site who fails or refuses to use the safety equipment. All Work and all equipment, machinery, materials and tools shall be in compliance with and conform to all applicable laws, ordinance, rules and regulations.

D. All Work shall be open and subject to inspection by authorized personnel of Owner and Engineer, all involved utility companies, and all regulatory agencies. The Contractor shall provide notification, 48-hours (min.), prior to any required field reviews or inspections and shall supply all necessary equipment, labor, and materials for inspection and/or testing.

D. Keep one record copy of all Specifications, Drawings, Addenda, Modifications, Shop Drawings and samples at the site, in good order and annotated to show all changes made during the

construction process. These items are to be available to Owner and Engineer for examination and be delivered to Engineer for Owner upon completion of the Work.

1.08 ENGINEER AND RESIDENT PROJECT REPRESENTATIVE

A. The Engineer may furnish a Resident Project Representative (RPR) to assist Engineer in observing performance of the Work of the Contractor. The Engineer and/or RPR may make visits to the site to observe the progress and the general conformance of the executed Work and to determine, in general, if the Work is proceeding in accordance with the Contract Documents. The Engineer and/or RPR will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Engineer and/or RPR's efforts will be directed toward providing the Owner with a greater degree of confidence that the completed Work will conform to the Contract Drawings and these Specifications and inform the Owner of the progress of the Work.

B. The Engineer and RPR shall not supervise, direct, or have control or authority over, nor be responsible for, Contractor's or any Subcontractor's means, methods, techniques, sequences, or procedures of construction, or the safety precautions and programs incident thereto, or for any failure of Contractor or any Subcontractor to perform the Work in accordance with the Contract Drawings and Specifications or to comply with laws and regulations applicable to the performance of the Work.

C. The Engineer and RPR will not be responsible for the acts or omissions of Contractor or of any Subcontractors, or of the agents or employees of any Contractor or Subcontractor, or of any other persons at the site or otherwise performing any of the Work.

D. Limitations of the RPR shall further include:

1. Shall not authorize any deviation from the Contract Documents or substitution of materials or equipment, unless authorized in writing by the Engineer.

2. Shall not exceed limitations of the Engineer's authority as set forth in the Contract Documents.

3. Shall not advise on, issue directions regarding or assume control over safety precautions and programs in connection with the Work.

1.09 STORAGE SITES

A. The Contractor may furnish, at his expense, properly zoned areas suitable for field offices, material storage and equipment service, and storage. The Contractor shall maintain these areas in a clean, orderly condition so as not to cause a nuisance in the area. The Contractor shall restore the storage area to its original or better condition, with all its appurtenances, in kind, to the satisfaction of the Engineer. Contractor is responsible for security of storage site.

1.10 MISCELLANEOUS

A. All bolts, nuts, washers, etc. and miscellaneous hardware shall be 316 stainless steel, unless otherwise indicated.

1.11 INDEMNIFICATION

A. To the fullest extent permitted by Laws and Regulations, Contractor shall indemnify and hold harmless Owner and Engineer, and the officers, directors, partners, employees, agents, consultants and subcontractors of each and any of them from and against all claims, costs, losses, and damages (including but not limited to all fees and charges of engineers,

architects, attorneys, and other professionals and all court or arbitration or other dispute resolution costs) arising out of or relating to the performance of the Work, provided that any such claim, cost, loss, or damage is attributable to bodily injury, sickness, disease, or death, or to injury to or destruction of tangible property (other than the Work itself), including the loss of use resulting therefrom but only to the extent caused by any negligent act or omission of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work or anyone for whose acts any of them may be liable.

B. In any and all claims against Owner or Engineer or any of their respective consultants, agents, officers, directors, partners, or employees by any employee (or the survivor or personal representative of such employee) of Contractor, any Subcontractor, any Supplier, or any individual or entity directly or indirectly employed by any of them to perform any of the Work, or anyone for whose acts any of them may be liable, the indemnification obligation under Paragraph A shall not be limited in any way by any limitation on the amount or type of damages, compensation, or benefits payable by or for Contractor or any such Subcontractor, Supplier, or other individual or entity under workers' compensation acts, disability benefit acts, or other employee benefit acts.

C. The indemnification obligations of Contractor under Paragraph A shall not extend to the liability of Engineer and Engineer's officers, directors`, partners, employees, agents, consultants and subcontractors arising out of:

1. The preparation or approval of, or the failure to prepare or approve, maps, Drawings, opinions, reports, surveys, Change Orders, designs, or Specifications; or

2. Giving directions or instructions, or failing to give them, if that is the primary cause of the injury or damage.

1.12 CONTRACTOR'S LIABILITY INSURANCE

A. Contractor shall meet all contract insurance requirements providing coverage for not less than the amount specified in the contract or greater where required by Laws and Regulations including but not limited to providing Comprehensive General Liability Insurance, Umbrella or Excess Liability Insurance, and Contractual Liability Insurance.

B. Prior to beginning work, Contractor shall provide Owner and Engineer with its certificates of Insurance and endorsements naming Owner and Engineer as additional insureds.

END OF SECTION

SECTION 01010

SUMMARY OF WORK

PART 1 GENERAL

1.01 PURPOSE

A. The purpose of this section is to provide the potential bidder with a general overall project description of the Scope of Work for consideration in bidding the project. The following description in no manner alleviates the bidder (and ultimately the awarded Contractor) from meeting all of the requirements of the Contract Documents.

B. The Contractor shall be solely responsible for estimating properly the difficulty and cost of successfully performing the Work. Prior to bidding the project, as well as again prior to commencement of construction, Contractor shall be responsible for taking steps reasonably necessary to ascertain the nature and location of the Work, and investigate and satisfy oneself as to the general and local conditions which may affect its cost, progress, performance or successful furnishing of the work. Further, the Contractor is solely responsible to make or obtain such project specific examinations, investigations, explorations, tests and studies and obtain any additional information and data which pertain to the physical conditions (surface, subsurface and underground facilities) at or contiguous to the project Site or otherwise determined by the Contractor which may affect its cost, progress, performance or successful furnishing of the work. Owner shall not be responsible for any conclusions or interpretations made by the Contractor based on the information made available by the Owner.

1.02 LOCATION OF WORK

A. All of the work is located in Lake Worth Road, from approximately 400 feet west and 600 feet east of 120th Avenue South; and from 120th Avenue South, from approximately 500 feet south and 500 feet north of Lake Worth Road in Wellington, Florida, as shown on the Project Construction Drawings.

1.03 PROJECT CONSTRUCTION DRAWINGS AND TECHINCAL SPECIFICATIONS

A. Construction Drawings: "120th Ave S & Lake Worth Rd Intersection Roundabout Improvements Construction Drawings", prepared by Mock•Roos and C&W Engineering, Inc., Mock•Roos Drawing No. 44-41-22-5, dated November 2025.

B. Construction Drawings: "120th Wellington Streetscape" prepared by Kimley-Horn & Associates, Inc., Kimley-Horn Project No. 044218013, dated November 2025.

C. Technical Specifications. "120th Avenue South & Lake Worth Road Intersection Roundabout Improvements Technical Specifications", prepared by Mock • Roos and C&W Engineering, Inc., dated November 2025.

1.04 PROJECT DESCRITPION

A. Contractor shall furnish and assume full responsibility for all labor, materials, construction equipment and machinery, transportation, tools, appliances, fuel, power, light, telephone, water, sanitary facilities, permitting and compliance, inspections and testing, temporary facilities (including temporary bypass pumping systems and dewatering systems) and all other facilities, taxes, bonds and insurance, permitting fees, traffic control, security,

miscellaneous costs, FPL and Utility Owner coordination, warranties, general conditions, overhead and profit and other incidentals, services and facilities of every nature whatsoever necessary to construct, complete, deliver and place in operation the subject Project as shown on the Construction Drawings and/or as herein described in these Specifications. The Contractor will be required to completely restore all disturbed areas as a result of the construction work.

B. The Contractor shall perform the work complete, in place, perform tests where applicable, and ready for continuous services, and shall include repairs, replacements, and restoration required as a result of damages caused during this construction.

C. The Contractor shall furnish and install all materials, equipment, and labor, which is reasonably and properly inferable and necessary, for the proper completion of the Work, whether specifically indicated in the Contract Documents or not.

D. The major project components generally consist of, at a minimum, the construction of a roadway system including a paved roadway section of Lake Worth Road, 120th Avenue South, paved roundabouts at Lake Worth Road & 120th Avenue South intersection, curb and gutter, guardrail end treatments, concrete sidewalks and shoulders, signing and markings, outdoor lighting, landscaping, irrigation, and a surface water management system generally described as roadway drainage structures and drainage pipe and connecting elements to the Acme surface water management system.

1.05 REFERENCES

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to laws or regulations, unless otherwise specifically stated, shall mean the standard, specification, manual, code, or laws, or regulations in effect at the time of bid opening or on the Contract date if there were no bids.

B. When no reference is made to a code, standard, or specification, the standard specifications of ASTM (American Society of Testing Materials), ANSI (American National Standard Institute), ASME (American Society of Mechanical Engineers), IEEE (Institute of Electrical and Electronics Engineers, Inc.) NEWA (National Electrical Manufacturers Association) shall govern.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SECTION INCLUDES

A. General explanation of Measurement and Payment for the Contract lump sum and unit cost items has established in the Schedule of Bid Items.

1.02 GENERAL LIMITATIONS

A. This specification is provided for general information and guidance. The Contractor shall include each work item in the appropriate bid items on the bid form. The omission of reference to any item in this description shall not, however, alter the intent of the bid form or relieve the Contractor of the necessity of furnishing and installing all aspects necessary to complete the Work as part of the Contract.

1.03 BASIS FOR PAYMENTS

A. The various major items of Work will be paid for in the lump sum or unit cost amounts listed in the Schedule of Bid Items. A description of the Work listed in the Schedule of Bid Items is presented below and is not intended to be complete and all-inclusive of the required work items. The Work shall include all miscellaneous and ancillary items necessary to construct a complete and functional Project.

B. Payment shall be made for the items listed on the Schedule of Bid Items on the basis of the Work actually performed, installed, operational and completed.

C. Work for each bid item on the Schedule of Bid Items shall include full compensation for, but not limited to, the furnishing of all required labor, materials, products, tools, equipment, transportation, storage, services and incidentals, cleanup, erection and all other appurtenances to complete construction and installation of the Work to the configuration and extent as shown on the Drawings and described in the Specifications as necessary to complete the various items of the Work all in accordance with the requirements of the Contract Documents, including all appurtenances thereto, and including all costs of compliance with the regulations of public agencies having jurisdiction, including Safety and Health Requirements of the Occupational Safety and Health Administration of the U.S. Department of Labor (OSHA). Such compensation shall also include payment for any loss or damages arising directly or indirectly from the Work.

D. It is intended that all overhead, profit, insurance, bonds, license, security, taxes, warranties, general conditions and other miscellaneous administrative costs and other incidentals, and all other costs to the Contractor not specifically identified in the following item descriptions be distributed among and included in the bid items stated in the bid form. No additional payment shall be made for transportation, communication, office maintenance, project signs and other incidental work or services, and no further payment shall be made for remobilization unless all of the work is suspended by the Engineer for a period in excess of three months and through no fault of the Contractor.

E. Measurement methods delineated in the individual Specification sections are intended to complement the criteria of this Section. In the event of conflict, the requirements of the individual Specification section will govern.

F. The Contractor shall assist Engineer take all measurements and compute quantities. The Contractor shall provide all necessary equipment, workers, and survey personnel as required.

G. All required manufacturer testing and certification shall be included in the unit prices shown in the Schedule of Bid Items. Density testing required for compacted backfilling, and concrete strength and materials testing, etc. required at the time of construction shall be arranged for by the Contractor and paid for directly by the Contractor.

1.04 VOLUME MEASUREMENT

A. Measured by cubic dimension using mean length, width, and height or thickness.

B. For excavation of water storage areas, lakes, canals, swales, retention areas, etc. material will be measured in its original position by a Professional Land Surveyor who is licensed in the State of Florida. The Surveyor will be retained by the Contractor. Quantities will be based on before and after cross-sections determined by the Surveyor. Payment will not be made for excavation beyond the lines shown on the Drawings.

1.05 AREA MEASUREMENT

A. Measured by square dimension using mean length and width or radius.

1.06 LINEAR MEASUREMENT

A. Measured by linear dimension, at the item centerline or mean chord.

B. For pipelines, the length will be measured from the center of the structure or fitting to the center of structure or fitting.

1.07 DEFECT ASSESSMENT

A. Replace the Work, or portions of the Work, not conforming to specified requirements, with no additional compensation.

1.08 NON-PAYMENT FOR REJECTED PRODUCTS

Payment will not be made for any of the following:

A. Products wasted or disposed of in a manner that is not acceptable.

B. Products determined as unacceptable before or after placement.

C. Products not completely unloaded from the transporting vehicle.

D. Products placed beyond the lines and levels of the required Work.

E. Products remaining on hand after completion of the Work.

F. Loading, hauling and disposing of rejected Products.

G. Used Products and Materials.

PART 2 PRODUCTS

Not Used.

PART 3 EXECUTION

3.01 PAY ITEM #1: MOBILIZATION & GENERAL CONDITION

A. Payment for this item shall be made at the Contract lump sum price. Pay item includes full compensation for all work related to mobilization and demobilization and the work items listed below, and any and all other related work, except for any work designated to be paid for separately or to be specifically included in the costs of other work under the Contract.

B. The Contractor's lump sum price shall include, but not be limited to, furnishing all materials, labor, and equipment for the preparatory work and operations in mobilizing for beginning work on the project, including those operations necessary for the movement of personnel, equipment, supplies and incidentals to the project site, establishment of temporary provisions and controls, temporary facilities, utilities, permits that are required to be obtained by the Contractor, compliance with Owner-obtained permits and permit conditions, Trench Safety Compliance, adherence to state and local laws and regulations, utility protection and coordination, locating all existing utilities within the project area, supporting power poles, light poles, structures, underground structures, pipes, conduits and cables as may be required, maintaining service, repairing any utilities or facilities damaged by the construction, including replacement of sod, landscaping, trees, utility and drainage facilities, signs, repairs to affected irrigation systems, repairs to sidewalks, paved pedestrian trails, equestrian trails, parking areas, roadways, or any other existing feature damaged by the Contractor during construction, and attendance at project meetings and general correspondence with the Owner and Engineer. Utilization and restoration of any portion of the project site for staging and storage of equipment and materials is covered under this item.

C. The items specified in this bid item consist of the costs of any pre and post construction expenses necessary for the start and completion of the project, excluding the cost of construction materials. The sum of mobilization/demobilization shall be paid in increments in proportion to the total work completed. Partial Payments for mobilization/demobilization shall be as follows:

Construction Percent Complete	Allowable (5%) Percent of Lump Sum for Mobilization
5%	25%
10%	50%
25%	75%
100%	100%

3.02 PAY ITEMS #2 - #79

A. Payment for these items shall be in accordance with FDOT Standard Specifications for Road and Bridge Construction (Latest Edition) when applicable.

END OF SECTION

SECTION 01060

PERMITS AND NOTIFICATIONS

PART 1 GENERAL

1.01 GENERAL REQUIREMENTS

A. The Contractor shall obtain and pay for all permits and licenses as required for construction of the project and shall comply with all conditions specified in each of the permits and licenses, including agency required notifications.

B. The Contractor shall comply with all conditions specified in all Owner-obtained permits. If the Contractor anticipates deviation from any proposed methodologies included as part of any Owner-obtained permit, the Contractor must obtain permit modification from applicable agency prior to construction.

C. The Contractor shall keep a copy of all permits and easements complete with conditions, attachments, exhibits, and modifications at the work site and provide copies of the permits to the appropriate subcontractors. The Contractor is responsible for ensuring that the permit conditions are explained to the appropriate construction personnel.

D. The Contractor shall provide ongoing advance notifications during the project. Notifications may include, but are not limited to, notifications to the Owner, Engineer, Utility Companies, Permitting Agencies, residents, stakeholders, etc.

1.02 PERMITS

A. The Contractor shall conform to the conditions of the following Owner-obtained permits:

1. South Florida Water Management District (SFWMD)

    a. Environmental Resource Permit (ERP)

    b. Water Use Permit (WUP)

B. Contractor shall secure and comply with the following permits:

1. Contractor shall prepare, submit and obtain the appropriate right-of-way and Building Department permit(s), as necessary, from the Village of Wellington. The Contractor shall conform to the conditions of these permits as part of this contract.

2. If applicable, the Contractor shall submit a Notice of Intent (NOI, DEP Form 62-621.300(4)(b)) to obtain coverage under the Construction Generic Permit (GCP) for Stormwater Discharge from Large and Small Construction Activities. Contractor shall use construction methods and devices such as turbidity curtains, silt fences and floating silt barriers where necessary in order to comply with the State and Local water quality standards and National Pollution Discharge Elimination System (NPDES) requirements. All erosion control measures shall be installed in accordance with FDOT Standard Specifications for Road and Bridge Construction (Latest Edition) Section 104. Any devices depicted on the Drawings are a minimum. A soil tracking prevention device (STPD) shall be constructed at all unstabilized construction access points, and maintained as necessary to ensure no soil is tracked offsite.

3. If applicable, the Contractor shall submit and obtain a SFWMD Dewatering Permit. Contractor shall be responsible for obtaining a project specific Dewatering Permit with an engineered dewatering system.

1.03 NOTIFICATIONS

A. Utility Companies. Contractor shall notify the Sunshine State One Call of Florida (SSOCF) service at 811, 48 hours prior to digging for direct bury and 10 days prior to digging or initiating construction of underwater construction activities, as required by Florida Statutes Chapter 556 throughout the duration of the construction project.

B. Commencement of the Work. Contractor shall give the Engineer and Owner not less than seven (7) calendar days' notice of the time and place (or places) where the Contractor will start the Work.

C. Inspections. Contractor shall provide notification, 48-hours (min.), prior to any required field reviews or inspections and shall supply all necessary equipment, labor, and materials for inspection and/or testing.

D. No Contractor Personnel On Site. Contractor shall provide the Engineer and Owner 24-hour notification if, at the sole discretion of the Contractor, no personnel from the Contractor or subcontractors will be on site any given typical work day.

E. Operating or Placing Electrical and Mechanical Equipment into Service. Contractor shall provide, in writing, 72-hour notification for all temporary bypass system and new equipment installation startups.

F. Residents. Contractor shall provide ongoing coordination and communication with affected residents within close proximity to the project limits. The Contractor may also be required to provide advance notifications to residents via door hangers and/or other means to communicate Contractor's forthcoming scheduled Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01200

PROJECT MEETINGS AND REPORTS

PART 1 GENERAL

1.01 SCOPE

A. Summary of Work: This Section includes the following administrative and procedural requirements.

1. Project Meetings.

a. Pre-construction Conference.

b. Progress Meetings.

2. Schedules and Reports.

a. Initial Coordination Submittals.

b. Construction Schedules.

c. Special Reports.

1.02 PROJECT MEETINGS

A. Pre-Construction Conference.

1. The Engineer and Owner will administer a Pre-construction Conference following the Effective Date of the Agreement, to review items stated in the following agenda and to establish a working understanding between the parties as to their relationships during conduct of the Work.

2. The Pre-construction Conference shall be attended by:

a. The Contractor and his Project Superintendent.

b. Representatives of Principal Subcontractors and Suppliers.

c. Engineer and his Resident Project Representative, if any.

d. The Owner or its Representative.

e. Other Affected Parties Determined by the Owner.

3. Agenda may include the following:

a. Projected Construction Schedules.

b. Critical Work Sequencing.

c. Designation of Responsible Personnel.

d. Project Coordination.

e. Hours of Work.

f. Procedures and Processing Of:
i. Field Decisions.
ii. Substitutions.
iii. Submittals.

iv. Change Orders.
v. Applications for Payment.

a. Procedures for Testing.

b. Procedures for Maintaining Record Documents.

c. Use of Premises.
   i. Office, Work, and Storage Areas.
   ii. The Owner's Requirements.

d. Construction Facilities, Controls, and Construction Aids.

e. Temporary Utilities.

f. Contractor's Safety Plan

g. Contractor's Site Security.

h. Requirements of any Permits Obtained by the Owner and/or the Contractor.

4. Location of Meeting. To be Determined by Owner Prior to the Scheduled Meeting.

5. Reporting: After each meeting, minutes of the meeting will be prepared and distributed by the Engineer to each party present and to parties who should have been present.

B. Progress Meeting.

1. The Engineer will administer a progress meeting a minimum of twice each month (every two (2) weeks) and at other times required by the Owner. The Contractor, Engineer, and all Subcontractors active on the Site shall be represented at each meeting. The Contractor may request attendance by representatives of his Suppliers and other Subcontractors, or other entities concerned with the Project or involved with the planning, coordination, or performance of future Project activities. All participants in the meeting shall be familiar with the Project and authorized to conclude matters relating to the Work.

2. The Contractor and each Subcontractor shall be prepared to report on and discuss the current construction progress, any anticipated future changes to the Construction Schedule, and advise if their current progress, and anticipated future schedules are compatible with the Work. The Contractor shall provide a "2-week" look ahead of major activities anticipated.

3. If one Subcontractor is delaying another, the Contractor shall direct such changes as are necessary for those involved to mutually agree on the Construction Schedule changes in the best interest of construction progress.

4. Agenda may include the following:

   a. Review of construction progress since previous meeting.

   b. Field observations, interface requirements, conflicts.

   c. Issues which may impede the Construction Schedule.

   d. Off-Site Fabrication.

   e. Delivery Schedules.

f. Submittal Schedules and Status.

g. Site Utilization.

h. Temporary Facilities and Services.

i. Housekeeping.

j. Documentation of Information for Payment Request.

k. Corrective Measures and Procedures to Regain Projected Schedule, if necessary.

l. Revisions to the Construction Schedule.

m. Progress and schedule during the succeeding Work period.

n. Review proposed changes for:
   i. Effect on the Construction Schedule and on the Completion Date.
   ii. Effect on the other contracts of the project.

5. Location of Meetings: To be determined by Owner prior to the scheduled meeting.

6. Reporting: After each meeting, minutes of the meeting will be prepared and distributed by the Engineer to each party present and to parties who should have been present.

C. Special Reports.

1. When an event of an unusual and/or significant nature occurs at the Site, a special report shall be prepared and submitted by the Contractor to the Owner. List the chain of events, persons participating, the response by Contractor's personnel, an evaluation of the results or effects, and similar pertinent information.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.01 SCOPE

A. Summary of Work. This Section includes definitions, descriptions, transmittal, and review of "Compliance" and "Miscellaneous" Submittals.

1.02 GENERAL INFORMATION

A. Definitions.

1. Compliance Submittals include Shop Drawings, product data, and samples which are prepared by the Contractor, Subcontractor, Manufacturer, or Supplier and submitted by the Contractor to the Owner as a basis for approval of the use of Equipment and Materials proposed for incorporation in the Work or needed to describe installation, operation, maintenance, or technical properties.

a. Shop Drawings include custom-prepared data of all types including drawings, diagrams, performance curves, material schedules, templates, instructions, and similar information not in standard printed form applicable to other projects.

b. Product data includes standard printed information on materials, products, and systems not custom-prepared for this Project, or other than the designation of selections from available choices.

c. Samples include both fabricated and unfabricated physical examples of materials, products, and Work; both as complete units and as small portions of units of Work; either for limited visual inspection or (where indicated) for more detailed testing and analysis. Mock-ups are a special form of samples which are too large to be handled in the specified manner for transmittal of sample Submittals.

2. Miscellaneous Submittals include, but are not limited to, Requests for Information, Change Orders, Work Change Directives, Field Orders, Daily Reports, Applications for Payment and other schedule related submittals, Technical Reports, Administrative Submittals, Certificates and Warranties not defined as Shop Drawings, Product Data, or samples.

a. Request for Information, Change Orders, Work Change Directives, Field Orders, as defined in the Section 00700 – General Terms and Conditions.

b. Application for Payment as per the Contract Documents.

c. Technical Reports include laboratory reports, test, technical procedures, technical records, Contractor's design analysis and Contractor's survey field notes for construction staking, before cross-sections and after cross-sections, and similar type submittals.

d. Administrative Submittals are those submittals required by the Contract Documents or deemed necessary for administrative records. These submittals include, but are not limited to, maintenance agreements, workmanship bonds, Project photographs, physical work records, statements of applicability, copies of

industrial standards, as-constructed data, security/protection/safety data, and similar type submittals listed in the Contract Documents.

e. Certificates and warranties are those Submittals on Equipment and Materials where a written certificate or guarantee from the Manufacturer or Supplier is called for in the Specifications.

f. Reports as required by Contract describing Contractor's means and methods for items such as dewatering, temporary sheeting, earth and water retaining, erosion/turbidity control, safety plans, and similar type Submittals.

3. Refer to ARTICLE 1.03 and 1.04 of this Part for detailed lists of documents and specific requirements.

B. Quality Requirements. Submittals such as Shop Drawings and product data shall be of high enough digital quality so that they are legible and reproducible. Every line, character, and letter shall be clearly legible. Documents submittal to the Engineer that do not conform to these requirements shall be subject to rejection by the Engineer, and upon request by the Engineer or Owner, the Contractor shall resubmit conforming documents. If conforming submittals cannot be obtained, such document shall be retraced, redrawn, or photographically restored as necessary to meet such requirements. The Contractor's (or its Subcontractor's) failure to initially satisfy the legibility quality requirements will not relieve the Contractor (or it Subcontractors) from meeting the required schedule for submittal of Shop Drawings and product data.

C. Language and Dimensions.

1. All words and dimensional units shall be written in the English language.

2. United States customary units shall be used.

D. Submittal Completeness.

1. Submittals shall be complete with respect to dimensions, design criteria, materials of construction, and other information specified to enable the Engineer and Owner to review the information effectively.

2. Where standard drawings are furnished which cover variations of the general class of equipment, each such drawing shall be individually annotated to describe exactly which parts of the drawing apply to the equipment being furnished. Use hatch marks to indicate variations that do not apply to the Submittal. The use of "highlighting" is not an acceptable means of annotating Submittals. Such annotation shall also include proper identification of the Submittal permanently attached to the drawing.

3. Reproduction or copies of Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. The Contractor may use a reproduction of the Engineer-prepared Drawings for erection drawings such as to indicate information on erection or to identify detail drawing references. Where the Drawings are revised to show this additional Contractor information, the Engineer's title block shall be replaced with a Contractor's title block and the Engineer's professional seal shall be removed from the Drawing. The Contractor shall revise these erection drawings for subsequent Engineer and/or Owner revisions to the Drawings.

1.03 COMPLIANCE SUBMITTALS

A. Items shall include, but not be limited to, the following:

1. Manufacturer's specifications.
2. Catalogs, or parts thereof, or manufactured equipment.
3. Shop fabrication and erection drawings.
4. General outline drawings of equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates.
5. Details equipment installation drawings, showing foundation details, anchor bolt sizes and locations, baseplate sizes, location of Owner's connections, and all clearances required for erection, operation, and disassembly for maintenance.
6. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams, and one-line diagrams.
7. Bills of material and spare parts list.
8. Instruction books and operating manuals.
9. Material lists or schedules.
10. Performance tests on equipment by manufacturers.
11. Concrete mix design information.
12. Samples and color charts.
13. All drawings, calculations, catalogs, or parts thereof, Manufacturer's specifications and data, samples, instructions, and other information specified or necessary.
    a. For the Engineer and Owner to determine the Equipment and Materials conform with the design concept and comply with the intent of the Contract Documents.
    b. For the proper erection, installation, operation and maintenance of the Equipment and Materials which the Engineer and Owner will review for general content but not for substance.

B. Compliance Submittal Action Stamps or Designation. The Engineer's review action stamp or designation, appropriately completed, will appear on all Compliance Submittals of the Contractor when returned by the Engineer. Review status designations listed on the Engineer's action designation are defined as follows.

1. "NO EXCEPTIONS TAKEN": Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the Work. The Contractor is to proceed with fabrication or procurement of the items and with related Work.
2. "EXCEPTIONS AS NOTED": Signifies Equipment and Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the Work subject to the condition that as constructed it shall be in accordance with all notations and/or corrections indicated. The Contractor is to proceed with fabrication or procurement of the items and with related Work in accordance with the Engineer's notations.

3. "REVISE AND RESUBMIT": Means that deviations from the requirements of the Contract Documents exist in the Submittal. The Contractor is to resubmit revised information responsive to the Engineer's annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related Work is not to proceed until the Submittal is approved.
4. "REJECTED" (SUBMIT ANEW): Signifies Equipment and Material represented by the Submittal does not conform with the design concept or comply with the intent of the Contract Documents and is disapproved for use in the Work. The Contractor is to resubmit Compliance Submittals responsive to the Contract Documents.
5. "RETURNED WITHOUT REVIEW FOR REFERENCE ONLY": Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to the Engineer and Owner in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. The Engineer and Owner reviews such Submittals for general content but not for substance.

C. Schedule and Log of Compliance Submittals.

1. The Contractor shall prepare a schedule and log for submission of all Compliance Submittals specified or necessary for the Engineer and Owner's review of the use of Equipment and Materials proposed for incorporation in the Work or needed for proper installation, operation or maintenance. Submit the schedule and log with the procurement schedule and Work progress schedule. Schedule submission of all Compliance Submittals to permit review, fabrication, and delivery in time to not cause a delay in the Work of the Engineer and Owner or their Subcontractors or any other contractors as described herein.
2. In establishing schedule for Compliance Submittals, allow a minimum of fifteen (15) working days in the Engineer's office for reviewing original Submittals that have been deemed complete and a minimum of ten (10) working days for reviewing resubmittals of previously reviewed submittals.
3. The schedule shall indicate the anticipated dates of original submission, and shall be prepared to reflect the Contractor’s plans, means and methods, techniques and sequencing for performing the Work and submitted in accordance with this Section.
4. Schedule as required to achieve full compliance of all Compliance Submittals required prior to fabrication or manufacture for submission. Schedule Compliance Submittals pertaining to storage, installation and operation at the Site for the Engineer and Owner's acceptance prior to delivery of the Equipment and Materials.

D. Transmittal of Compliance Submittals.

1. All Compliance Submittals of Equipment and Materials furnished by Subcontractors, Manufacturers, and Suppliers shall be submitted to the Engineer by the Contractor in electronic PDF format. After checking and verifying all field measurements, transmit all compliance Submittals to the Engineer and Owner for acceptance as follows:
   a. Check and certify Compliance Submittals of Subcontractors, Suppliers, and Manufacturers with Contractor's approval prior to transmitting them to the Engineer.

The Contractor's certification of approval shall constitute a representation to the Engineer and Owner that the Contractor has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or they assume full responsibility for doing so, and that they have coordinated each Compliance Submittal with the requirements of the Work and the Contract Documents.

b. At the time of each submission, call to the attention of the Engineer in the Contractor's Letter of Transmittal any deviations from the requirements of the Contract Documents.

c. Provide all Submittals in electronic format, compatible with Adobe Professional, Version 8 (or higher), and submitted as a single file, using PDF bookmarks and/or chapters to identify divisions within the Submittal package ("PDF File Format"). At the Owner's request, and/or with the Owner's prior approval, the Contractor shall submit native format files when, in the opinion of the Owner, doing so will facilitate the Engineer's review of the Submittal information.

d. Make all modifications noted or indicated by the Engineer and return revised copies, or samples until accepted. Revised Submittals must be complete and conformed, including all pages/sheets with the required revisions and any additional or replacement pages/sheets. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by the Engineer on previous Submittals. Subsequent review cycles for returned or revised Submittals shall replicate the process described in items c. above.

e. If the Engineer's review action is "EXCEPTIONS AS NOTED", the Submittal will be designated such, and electronically transmitted back to the Contractor. Upon receipt of this notification from the Engineer, the Contractor shall resubmit one (1) conformed electronic copy in PDF File Format to the Engineer for final distribution. The Engineer may reject, without review, conformed copy Submittals for which the Contractor does not provide a narrative including, in numbered list format, (a) the Engineer's comment/note, (b) the Contractor's resolution of each comment/note and the location of the resolution (i.e.: page number(s), drawing number(s)) that addresses the respective comment/note, and (c) the statement: "Other than revisions listed on herein, this conformed copy is the identical information as was provided in the Engineer's response dated [enter date]." In addition, if the Submittal is required to be signed and sealed by a Professional Engineer registered in the State of Florida, this version of the submittal shall be signed and sealed. Submittal will not be considered final until all copies have been received by the Engineer and Owner. Submittal will be designated "DISTRIBUTION COPY (PREVIOUSLY ACCEPTED)" by the Engineer and Owner. Accepted Submittals transmitted for final distribution will not be further reviewed and are not to be revised. If errors are discovered during manufacture or fabrication, correct the Submittal, and resubmit for review.

f. Work requiring a Compliance Submittal shall not be commenced or shipped until the Submittal has been designated "NO EXCEPTIONS TAKEN," "EXCEPTIONS AS NOTED," or "RETURNED WITHOUT REVIEW FOR REFERENCE ONLY" by the Engineer.

2. Copies of the equipment Contractor's erection drawings and other Compliance Submittals required for the installation of equipment furnished by others under separate

Contract for installation under this Contract will be transmitted to the Contractor by the Engineer in the final distribution of such Submittals.

E. The Engineer and Owner's Review.

1. The Engineer will review and return Compliance Submittals to the Contractor with appropriate notations. The Owner may also review and provide Engineer with comments to be included in the returned Compliance Submittals to Contractor. Instruction books and similar Submittals will be reviewed by the Engineer and Owner for general content but not for substance.

2. The Engineer's acceptance of Compliance Submittals will not relieve the Contractor from his responsibility as stated in General Terms and Conditions on the Contract Documents.

F. Instruction Books / Operation & Maintenance Manuals.

1. Equipment instruction books and manuals shall be prepared by the Manufacturer and shall include the following.

   a. Index and tabs.

   b. Instructions for installation, start-up, operation, inspection, maintenance, parts lists and recommended spare parts, and data sheets showing model numbers.

   c. Applicable drawings.

   d. Name of contact person, phone number, and address of the nearest authorized service facility.

   e. Attached to the above shall be a notice of the exact warranty effective dates, beginning and ending.

   f. All additional data specified.

2. Information listed above shall be submitted electronically in a pdf File Format.

   a. Instruction Books/Operation & Maintenance Manuals shall contain the following.
      i. Equipment Name.
      ii. Manufacturer's Name.
      iii. Project Name.
      iv. Contract Number.
      v. Reference to Applicable Drawing No. & Technical Specifications Section.

   b. Format: The overall manual should be constructed around certain types of structures or equipment in the Project, and not merely assembled by technical specification section, so that all pertinent data needed by personnel to operate or maintain the equipment or structure is in one (1) manual (as far as is practical). The Contractor shall coordinate with the Engineer and Owner as to how the manuals are to be assembled (Bookmarked).

3. For every piece of installed equipment (electrical and mechanical) provide a written Lockout/Tagout (LOTO) procedure and checklist to follow to place the equipment in a zero-energy state per 29CFR 1910.147, The Control of Hazardous Energy (Lockout/Tagout). Electrical equipment that is either cord and plug connected or hard wired with a single energy isolating device installed for which the exposure to hazardous energy is controlled by the unplugging of the equipment from a single energy source or

the opening of the energy isolating device need not be included. The written Lockout/Tagout (LOTO) procedure and checklist shall be included in the Instruction Books/Operation & Maintenance Manuals.

G. Samples: Office samples shall be of sufficient size and quantity to clearly illustrate the following.

1. Functional characteristics of the product, with integrally related parts and attachment devices.

2. Full range of color, texture, and pattern.

1.04 MISCELLANEOUS SUBMITTALS

A. Miscellaneous Submittals are comprised of Daily Reports, technical reports, administrative Submittals, and warranties which relate to the Work, but do not require the Engineer or Owner's approval prior to proceeding with the Work.

B. Transmittal of Miscellaneous Submittals.

1. All Miscellaneous Submittals furnished by Subcontractors, Manufacturers, and Suppliers shall be submitted to the Engineer by the Contractor in an electronic PDF File Format, unless otherwise specified.

a. Check and certify Miscellaneous Submittals of Subcontractors, Suppliers, and Manufacturer with the Contractor's approval prior to transmitting them to the Engineer. The Contractor's certification of approval shall constitute a representation to the Engineer and Owner that the Contractor has either determined and verified all information, or they assume full responsibility for doing so, and that they haves coordinated Miscellaneous Submittals with the requirements of the Work and the Contract Documents.

b. At the time of each submission, call to the attention of the Engineer and Owner in the Contractor's Letter of Transmittal any deviations from the requirements of the Contract Documents.

c. Make all modifications noted or indicated by the Engineer and return revised copies until accepted. Direct specific attention in writing, or on revised Submittals, to changes other than the modifications called for by the Engineer on previous Submittals.

2. Test Reports: Responsibilities of the Contractor and the Engineer and Owner regarding tests and inspections of Equipment and Materials and completed Work are set forth elsewhere in these Contract Documents.

C. The Engineer and Owner's Review.

1. The Engineer and Owner will review Miscellaneous Submittals for indications of Work or material deficiencies within a minimum of fifteen (15) working days in the Engineer's office for original Submittals and a minimum of ten (10) working days for reviewing resubmittals.

2. The Engineer will respond to the Contractor on those Miscellaneous Submittals which indicate Work or material deficiency.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 SUBMITTAL LOG.

A. The Contractor shall maintain an accurate Submittal Log and a Distribution List for the duration of the Work, showing current status of all Submittals required for the complete Project and Distributes at all times in a form acceptable to the Engineer and Owner. The Contractor shall make the Submittal Log available to the Engineer and Owner for review on request and shall bring a copy of the Submittal Log to all Progress Meetings.

END OF SECTION

SECTION 01410

TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

A. All tests and analyses and inspections, which are required in the Specifications and/or Drawings and required in connection with the performance of the Work, are to be performed by a qualified independent testing laboratory and shall be at the Contractor's expense, unless otherwise specified.

B. Inspection, Sampling, Testing and Reporting is required, at a minimum for:

1. Densities and Proctors (for soil compaction).
2. Bacteriological Clearance.
3. Concrete Strength.
4. Any water quality monitoring as required by the project permits.
5. Other operations specified in these specifications or as required by the Engineer or Owner.

C. Owner may employ and pay for the services of a separate third-party independent testing laboratory to perform certain specified testing in addition to what is called for in the Contract Documents.

1. Contractor shall cooperate with the laboratory to facilitate the execution of its required services.
2. Employment of a laboratory by the Owner shall in no way relieve Contractor's obligations to perform the work of the Contract.

1.02 RELATED REQUIREMENTS

A. Drawings and general provisions of the Contract, including the General Conditions and Terms and Division 1 Specification sections, apply to this section.

B. General Conditions of the Contract. Inspections and testing required by laws, ordinances, rules, regulations, orders, or approvals of public authorities. See the General Conditions and Terms.

1.03 QUALIFICATIONS OF LABORATORY

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the Owner. The laboratory shall be staffed with experienced technicians, and shall be properly equipped, ACI certified, and fully qualified to perform the tests in accordance with the specified standards.

B. All tests, analyses and inspections performed by the independent testing laboratory shall be conducted under direct charge of a Registered Professional Engineer in the State of Florida.

1.04 LABORATORY DUTIES

A. Cooperate with Engineer and Contractor, provide qualified personnel after due notice.

B. Perform specified inspections, sampling, and testing of materials and methods of construction.

1. Comply with specified standards.

2. Ascertain compliance of materials with requirements of Contract Documents.

C. Promptly notify Engineer and Contractor of observed irregularities or deficiencies of work or products.

D. Promptly submit written report of each test and inspection. One copy each to Engineer, Owner, and Contractor. Each report shall include:

1. Date issued.

2. Project title and number.

3. Testing laboratory name, address, and telephone number.

4. Name and signature of laboratory inspector.

5. Date and time of sampling or inspection.

6. Record of temperature and weather conditions.

7. Date of test.

8. Identification of product and specification section.

9. Location of sample or test in the Project.

10. Type of inspection or test.

11. Results of test and compliance with Contract documents.

12. Interpretation of test results, when requested by Engineer.

E. Perform additional tests as required by Engineer or the Owner.

1.05 CONTRACTOR'S RESPONSIBILITIES

A. The Contractor shall be responsible for scheduling the independent testing laboratory's visit and for the coordination of the testing with the independent testing laboratory and Engineer, as required.

B. Secure and deliver to the laboratory adequate quantities of representative samples of materials proposed to be used and which require testing.

C. Provide to the laboratory the preliminary design mix proposed to be used for concrete , and other material mixes which require control by the testing laboratory.

D. Provide to the laboratory a representative proctor samples of the materials to be used for backfilling through the project.

E. Furnish copies of product test reports as required.

F. Furnish incidental labor and facilities.

G. Pay for services of the independent testing laboratory to perform additional inspections, sampling and testing required.

1. For Contractor's Convenience.
2. When initial tests indicate Work does not comply with Contract Documents.

Such Payment shall be made directly by the Contractor.

H. Contractor will be responsible for payment for all failing tests.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01720

RECORD DOCUMENTS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Onsite maintenance of Record Documents

B. Required record information.

1.02 MAINTENANCE

A. Maintain on site, one set of the following Record Documents; record actual revisions to the Work:

1. Drawings.

2. Specifications.

3. Addenda.

4. Change Orders and other modifications to the Contract.

5. Shop Drawings, product data, and samples.

B. Store Record Documents separate from documents used for construction.

C. Record information concurrent with construction progress.

D. In the interest of timely detection of non-conforming Work, all Record Drawing information must be furnished to the Engineer prior to submitting for payment of that particular item. No progress payment application requests will be approved by the Engineer without satisfactory record drawings for that particular item(s).

E. Under no circumstances will roadway paving Work be allowed to start until the Engineer has reviewed the Record Drawing information for Work constructed within the roadway area that will be paved.

F. All Record Drawing information such as elevations, distances, location of underground utilities, lake cross-sections, and road cross-sections must be obtained by a Professional Surveyor and Mapper, who is licensed in the State of Florida. The Surveyor will be retained by the Contractor. Information must be signed and sealed.

G. Record Documents must be available to Engineer for examination at any time during the progress of the Work.

H. Submit completed Record Documents upon completion of the Work and prior to application for final payment.

I. Show record information in bold or boxed out to stand out from rest of Drawing.

J. Record actual revision dates of the Work.

1.03 REQUIRED RECORD DRAWING INFORMATION

A. All elevations and horizontal locations shown on the Drawings must be verified. Verification or deviation must be clearly indicated on the Drawings.

B. Drainage

1. Flow line elevation of pipe at headwalls, outfalls and structures.

2. Top elevation of headwalls, structures, and concrete caps.

3. Drainage Control Structures, Baffles, and Weirs. Obtain horizontal dimensions and vertical elevations.

4. Horizontal locations of headwalls, structures, and concrete caps.

5. Location of utilities and miscellaneous structures encountered which are different from or not shown on the Drawings.

C. Lakes, Canals, and Pump Station Intake Channels

1. Cross section at each design cross section shown on the Drawings and at a minimum 100 foot intervals. Obtain elevations at all grade breaks and across bottom from 20 foot beyond top of bank (each side).

2. Determine side slopes.

3. Locate top of bank and the edge of water at the control elevation and plot location on a drawing at the same scale as the construction drawings.

D. General Site

1. Spot elevations shall be taken at a reasonable grid interval for finished grade verification. Obtain spot elevations at all grade or contours (as shown on the Drawings), grade breaks, property lines, and limits of construction.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.01 CONTRACTOR'S SURVEYOR RESPONSIBILITIES

A. Engineer will provide the Contractor with electronic files of the construction drawings at the pre-construction conference. One copy of the electronic files will be provided on CD/DVD media in AutoDesk Civil 3D 2025 format. No warranty of the usability of the electronic files provided is expressed or implied. The cost of any required conversion or duplication of the electronic files from the format specified herein shall be the responsibility of the Contractor.

B. The Owner and Engineer will advise the Contractor at the pre-construction conference of the acceptable method and file format by which the interim and final Record Drawing information will be provided to the Owner and/or Engineer.

C. Record Drawing information shall be prepared electronically. The Record Drawing information shall be placed on a separate layer so that it is isolated from all other layers in the drawing file. This layer must be prepared in such a manner that it can be exported as a separate AutoCad file and subsequently inserted into an AutoCad drawing containing the approved design information. The AutoCad file shall be accompanied by an Adobe Acrobat portable document format (.pdf) file of the Record Drawings.

D. Place information in the Drawings in a manner that indicates which elevations and dimensions have been checked. This is to be done by crossing through the design elevation or dimension and placing the Record information next to it. If an elevation or dimension has not changed, the same procedures should be followed to confirm that it has been checked. Add new information in a manner to indicate that it is Record information and not design information.

E. Each Record Drawing sheet must include the surveyor's name, company, address, license number, and date of field survey.

F. Signed and sealed Record Drawings shall be submitted with all pay applications and at the conclusion of the Project.

3.02 CONTRACTOR RESPONSIBILITIES

A. Record document information not required to be obtained by a Professional Surveyor and Mapper must be obtained by the Contractor.

B. Mark Record information on one clean set of prints of the Contract Documents.

C. Each Drawing must be stamped indicating that the information has been reviewed by the Contractor.

D. Contractor's Surveyor will transfer Contractor supplied information to the record drawing.

END OF SECTION

SECTION 02016

EXISTING UTILITIES AND UNDERGROUND STRUCTURES

PART 1 GENERAL

1.01 GENERAL

A. All known utilities have been shown on the Construction Drawings according to the best information available. The locations of those facilities (horizontal and/or vertical) may be based on survey information, Utility Atlas and Record Drawings provided by the applicable Utility Owners, and, if provided in the Appendix, a limited amount of utility soft dig information.

B. Guarantee is not made that all existing underground utilities are shown or that the location of those shown are entirely accurate. Finding the actual location of any existing utilities is the Contractor's responsibility and shall be done before ordering any materials or commencing any Work in the vicinity. Furthermore, the Contractor shall be fully responsible for any and all damages due to the Contractor's failure to exactly locate and preserve any and all underground utilities.

1.02 CONTRACTOR'S RESPONSIBILITIES

A. Contractor shall notify the Sunshine State One Call of Florida (SSOCF) service at 811, 48 hours prior to digging for direct bury, as required by Florida Statues Chapter 556 throughout the duration of the construction project.

B. Contractor is responsible to identify and locate all underground and overhead utility lines or equipment affecting or affected by the Project. Engineer and Owner shall not be responsible for the accuracy or completeness of any information or data provided regarding underground utilities or facilities, whether shown on the drawings or not. No additional payment will be made to the Contractor because of discrepancies in actual and plan location of utilities, and additional costs suffered as a result thereof.

C. It is the Contractor's responsibility to contact all owners of structures or utilities above ground, on the surface, or below the ground, within the Project area so that said owners may stake or otherwise mark or protect their facilities. The Contractor must provide facilities and be responsible for the protection of all structures, buildings and utilities, underground, on the surface, or above ground against trenching, dewatering, or any other activity connected with the Work throughout the entire Contract Time.

D. Contractor shall schedule the work in such a manner that the work is not delayed by the relocating or supporting of utilities. No compensation will be paid to the Contractor for any loss of time or delay.

E. The Contractor shall notify Engineer of any substantial changes and/or conflicts that would require a deviation in the plans. The Contractor shall provide as-built information and written notification of all conflicts with the Work to the Engineer. The Contractor shall not proceed with any Work until all conflicts have been resolved. Late discovery of existing underground utilities does not constitute "required" deviations should early discovery prevent them.

F. All overhead, surface or underground structures and utilities encountered are to be carefully protected from injury or displacement. All damage to such structures is to be completely

repaired within a reasonable time; needless delay will not be tolerated. Owner reserves the right to remedy such damage by ordering outside parties to make such repairs at the expense of the Contractor. All such repairs made by the Contractor are to be made to the satisfaction of the utility owner. All damaged utilities must be replaced or fully repaired. All repairs are to be inspected by the utility owner prior to backfilling.

G. Should the Work require repairs, changes or modifications of the Owner's utilities as well as other utilities, it is the responsibility of the Contractor to provide for the maintenance of continuous water, sewage, electric, telephone and other utility services to all present customers of such utilities, unless approval in writing is secured from the applicable utility company or Owner for interruption of such service.

H. All Asbestos cement pipe that is not abandoned in place shall be removed and properly disposed of off-site in a legal manner.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 02101

SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.01 RESPONSIBILITY

A. Subsurface explorations utilized by Engineer for their design, if attached at the end of these Specifications or included in the Construction Drawings, are provided solely for the Contractor's information only. Data on indicated subsurface conditions is not intended as representative or a warranty of accuracy or continuity between soil borings. It is expressly understood that Owner and Engineer will not be responsible for interpretations or conclusions drawn by Contractor from any soils investigation report. Data is made available only for convenience of Contractor. No claim for extra compensation or for extension of time will be allowed on account of subsurface conditions inconsistent with the data shown. Additional test borings and other exploratory operations may be performed by Contractor, at the Contractor's option; however, no change in the Contract Sum will be authorized for such additional exploration.

B. Soft-dig data and reports, if attached at the end of these Specifications or included in the Construction Drawings, are provided solely for the Contractor's information only. Conditions are not intended as representations or warranties of accuracy or continuity of pot-hole locations. The Owner and Engineer will not be responsible for interpretations or conclusions drawn from this data by Contractor. The Contractor is required to provide pot-holding in order to field verify vertical and horizontal locations of all utilities prior to construction of the proposed work.

PART 2 PRODUCTS

2.01 SOIL BORNINGS

A. Copies of the following are included herein.

1. The geotechnical report, Lake Worth Road / 120th Avenue Intersection Improvements Project, by Wirx Engineering dated May 14, 2025.

2.02 THIS SPACE INTENTIONALLY LEFT BLANK

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 02108

VIDEO-RECORDING OF SITE CONDITIONS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Video-recording the pre-construction conditions of the surface features within the construction area.

1.02 SUBMITTALS

A. Submit two completed copies on Blu-ray, DVD or USB media to Engineer at least seven calendar days prior to commencing construction and delivery of any materials and/or equipment. The video will be in high definition format minimum 1080p.

1.03 QUALITY ASSURANCE

A. Video-recording must be done by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction video documentation.

PART 2 PRODUCTS

2.01 MATERIALS

A. Blu-ray, DVD or USB Media: Standard name-brand high quality write-once media. New, not previously used.

PART 3 EXECUTION

3.01 VIDEO-RECORDING

A. Video-recording shall be performed and submitted at least seven calendar days prior to the commencement of construction and delivery of any materials and/or equipment. Upon review by the Engineer, and prior to commencement of construction and delivery of any materials and/or equipment, additional video-recording of any portions of the construction areas that are not adequately documented on the initial video-recording may be required. The audio video recording shall be digitally-recorded in High Definition and saved as in Windows Media Video (.wmv) format, be clearly recorded in color, have clear audio commentary, and include the date and real-time on the screen, as well as on-screen captions (documenting the structure, location, unit number and/or component).

B. Video-record the pre-construction conditions of the surface features within the construction area.

C. The video-recording will serve as a record of the pre-construction conditions for disputes arising from restoration, and should, therefore, be taken within the construction area in sufficient detail as necessary to clearly depict pre-construction conditions.

D. Indicate the date and time (hour, minutes and seconds) on which the video was recorded.

E. Video shall record video with simultaneous audio to assist viewer orientation with any needed identification, differentiation, clarification, or objective description of the features being shown with audio recording of commentary by the camera operator. The audio recording shall be free of any conversations between the camera operator and other production technicians.

F. Camera Height and Stability: Do not exceed 10 feet vertical distance between camera lens and the ground when conventional wheeled vehicles are used as conveyances for the recording system.

G. Camera Control: Control camera pan, tilt, zoom-in and zoom-out rates such that recorded objects can be clearly viewed during video playback. Control or adjust camera and recording system controls such as lens focus, aperture, light, and white balance to maximize picture quality. The person video taping the site conditions shall use good photographic procedures and practices, such as steady handling of the video recorder, taping with their back to the position of the sun, refraining from taping in poor lighting, rain or other adverse weather conditions or moving the video camera too quickly.

H. Viewer Orientation Techniques: Use existing landmarks including but not limited to, all visible house and business addresses, to maintain viewer orientation.

I. Video Log: Provide a written log of each video's contents including but not limited to, the names of the streets or easements, coverage beginning and ending, directions of coverage, and the date upon which the recording was made.

J. All Blu-ray's become the property of the Owner.

END OF SECTION

SECTION 02110

SITE CLEARING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Clearing and grubbing.

B. Removal of pavement and structures.

1.02 REGULATORY REQUIREMENTS

A. Comply with all applicable federal, state, and local laws and regulations for the prevention, control, and abatement of all forms of pollution and the protection of soil, vegetation, wildlife, fish, and water courses.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.01 PREPARATION

A. Verify that existing plant life designated to remain is tagged or identified.

B. Protect utilities that are to remain, from damage.

C. Protect trees, plant growth, and features to remain as final landscaping.

D. Protect benchmarks, survey control points, and existing structures from damage or displacement.

3.02 CLEARING AND GRUBBING

A. Remove and dispose of timber, brush, stumps, roots, rubbish and debris, and all other obstructions resting on or protruding through the surface of the existing ground and the surface of areas to be excavated.

B. Unless otherwise shown on the Drawings, clearing and grubbing is to be done in the following areas:

1. All areas where excavation and/or grading is to be done.

2. All areas where structures will be constructed, including pipe culverts and other pipelines.

3. In pavement areas and within roadway right of way.

4. Any other areas requiring clearing and grubbing to complete the Work.

C. In pavement areas, remove roots and other debris to a depth of at least one foot below the ground surface. The surface must then be plowed to a depth of at least six inches and all roots thereby exposed are to be removed to a depth of at least one foot.

D. All stumps within pavement areas and road right of way are to be completely removed and disposed of.

E. Where excavation is done, all roots protruding through or appearing on the surface of the completed excavation must be removed to a depth of at least one foot below the excavation surface.

3.03 REMOVAL OF PAVEMENT

A. Remove and dispose of existing concrete pavement, concrete sidewalk, slope pavement, ditch pavement, asphalt pavement, pavement base course, curb, and curb and gutter, where designated on the Drawings or where required to be removed because of the construction operations.

3.04 REMOVAL OF STRUCTURES

A. Remove and dispose of those structures, or portions of structures specified on the Drawings or those structures or portions of structures which need to be removed in order to construct new structures, and other appurtenances or obstructions which are designated on the Drawings.

3.05 DISPOSAL

A. All removed items, including but not limited to, those indicated in Articles 3.02, 3.03, and 3.04 of this Specification are to be disposed of at an appropriate legal site.

END OF SECTION

SECTION 02210

GRADING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Cutting, filling, grading, and rough contouring site.

B. Compaction requirements.

C. Finish grading.

1.02 REFERENCES

A. AASHTO T-180/ASTM D1557-78 – Moisture Density Relations of Soils and Soil Aggregate Mixtures, Using 10 lb. Rammer and an 18 inch Drop.

B. ASTM D422-63 – Particle-Size Analysis of Soils.

C. ASTM D2922-81 – Density of Soil-Aggregate in Place by Nuclear Methods.

PART 2 PRODUCTS

2.01 MATERIALS

A. Fill: Clean, granular materials that are free of debris, cinders, combustibles and organic matter. The fines content (i.e., material passing U.S. Standard No. 200 sieve) should not be more than ten (10) percent by weight, no particle sizes larger than one (1) inch in any direction and the organic content should not exceed three (3) percent by dry weight. Organic ladened soils are not suitable for use as Fill.

2.02 SOURCE QUALITY CONTROL

A. Engineer to review and approve fill material at the source prior to hauling material onsite.

PART 3 EXECUTION

3.01 PREPARATION

A. Identify required lines, levels, contours, and datum.

B. Identify known below and above grade utilities. Stake and flag locations.

3.02 GRADING

A. Fill/cut and grade Project site in a neat and uniform manner to conform to the grades detailed on the Drawings. If grades are not specified, grade in a neat and uniform manner to the grades which were existing prior to construction.

3.03 COMPACTION

A. Refer to SECTION 02220 EXCAVATING, BACKFILLING, AND COMPACTING.

3.04 PROTECTION

A. Protect trees, shrubs, lawns, and other features remaining as a part of the final landscaping.

B. Protect benchmarks.

C. Protect existing structures, fences, roads, sidewalks, paving and curbs.

D. Protect above and below grade utilities which pass through Work area.

3.05 TESTING

A. Density tests for verifying compaction will be performed by an independent testing laboratory in accordance with Division 1: General Requirements. Contractor is responsible for scheduling density tests and for the coordination of the testing with the testing laboratory and Engineer. Tests are to be paid for as specified in the Division 1: General Requirements.

3.06 FIELD OBSERVATIONS

A. Owner's representative to review finished grades prior to seeding or placement of sod.

END OF SECTION

SECTION 02220

EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Excavation for structures, pipelines, lakes, canals, ditches, etc.

B. Backfilling of structures and pipelines.

C. Dewatering.

D. Compacting.

E. Abandonment using Flowable Fill.

1.02 REFERENCES

A. ASTM D2487 – Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System)

B. ASTM D698 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort

C. ASTM D1557 – Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort

D. ASTM D6938 – Standard Test Methods for In-Place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

E. ASTM D2974 – Standard Test Methods for Determining the Water (Moisture) Content, Ash Content, and Organic Material of Peat and Other Organic Soils

F. ASTM D6913: Standard Test Methods for Particle-Size Distribution (Gradation) of Soils Using Sieve Analysis

G. ASTM D1140-17: Standard Test Methods for Determining the Amount of Material Finer than 75-µm (No. 200) Sieve in Soils by Washing

H. AASHTO T 99 – Standard Method of Test for Moisture-Density Relations of Soil Using a 2.5-kg (5.5-lb) Rammer and a 305-mm (12-in.) Drop

I. AASHTO T 180 – Standard Method of Test for Moisture-Density Relations of Soil Using a 4.54-kg (10-lb) Rammer and a 457-mm (18-in.) Drop

J. Florida Statutes Chapter 553 Part III: Trench Safety Act

K. FDOT Department of Transportation - Standard Specifications for Road and Bridge Construction (Latest Edition) herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

1.03 REGULATORY REQUIREMENTS

A. Contractor is responsible for the provisions of the Occupational Safety and Health Administration's excavation safety standards, 29 C.F.R.s. 1926.650 Subpart P, which requires excavations exceeding five (5) feet in depth to be shored or sloped to the angle of repose.

1.04 PREVENTION, CONTROL AND ABATEMENT OF EROSION AND WATER POLLUTION

A. Contractor shall provide for and be responsible for the prevention, control, and abatement of erosion and water pollution until completion of the Project.

B. Contractor shall provide all temporary erosion control features necessary to prevent, control, and abate erosion and water pollution.

C. Contractor shall comply with the water quality requirements of the State of Florida. The Contractor is cautioned that during the execution of the Work, creation of turbidity in excess of 29 Nephelometric Turbidity Units (NTU's) above the natural background level and/or directly or indirectly affecting the water quality in the waters of the State in such a manner as to exceed the limitations on the concentration of various constituents for such water as prescribed in Chapter 62-302 of the Florida Administrative Code, is a violation of the water quality standards of the State of Florida.

PART 2 PRODUCTS

2.01 BACKFILL MATERIAL

A. Fill shall consist of clean, granular materials that are free of debris, cinders, combustibles and organic matter. The fines content (i.e., material passing U.S. Standard No. 200 sieve) should not be more than ten (10) percent by weight, no particle sizes larger than one (1) inch in any direction and the organic content should not exceed three (3) percent by dry weight. Organic ladened soils are not suitable for use as Fill.

PART 3 EXECUTION

3.01 PREPARATION

A. The Contractor shall perform site clearing as specified in Section 02110 – Site Clearing.

B. Identify required lines, levels, contours, and datum.

C. Identify known below and above grade utilities. Stake and flag locations.

D. Maintain and protect existing utilities remaining which pass through Work area.

E. Verify stockpiled fill is approved.

3.02 EXCAVATION

A. Perform the excavation of all substances(s) encountered for construction as shown on the Drawings and/or as specified herein, or as approved by the Engineer by hand dredge methods only. Contractor shall dispose of all substances encountered at an appropriate legal site.

B. When a masonry or concrete structure rests on an excavated surface other than rock, special care must be taken to avoid disturbing the bottom of the excavation. Final removal of the existing material to foundation grade is not to be started until just before the masonry or concrete foundation is to be placed.

C. Excavate pipe trenches to a depth as shown on the Drawings. If over-excavation occurs, place a layer of fine crushed rock or compacted coarse sand to secure a firm foundation for the lower one-third of the pipe.

D. The maximum width of the trench at the top of the pipe must not be greater than 2 feet more than the nominal diameter of the pipe, unless otherwise specified. If this maximum is exceeded, it will be the Contractor's responsibility to provide adequate support (concrete cradle or crushed rock and compacted coarse sand) at the location of the trench width over excavated.

E. Keep pipe laying operations as close to the excavation as practical during the execution of the Work.

F. If rock is encountered at the foundation grade of a masonry or concrete structure, excavate the rock in such a manner as to allow the solid rock to be exposed. Prepare in horizontal beds for receiving the masonry or concrete. Remove all loose and disintegrated rock or thin strata. Cut back roots to 12 inches below the foundation grade.

G. If rock is encountered at the grade line of a pipe line, remove the rock so that at no place will it be closer than 6 inches to the finished pipe line. After the excavation is completed, place and tamp a bed of selected backfill (coarse sand and fine crushed rock) to at least 6 inches deep. Cut back roots to 12 inches below pipe grade.

H. Remove any water accumulated in the pipe trench and/or structure excavation and keep the excavation de-watered until the bedding is complete. Accomplish in a manner so as to not create any nuisance to adjacent property or public thoroughfare. Do not use the pipeline being installed as a drain for such water. Meet all laws, codes, ordinances, and government regulations when dewatering.

I. Provide all bracing, sheeting, and shoring necessary to perform and protect all excavations, as required for safety, or in accordance with governing laws. Remove all sheeting during backfilling operations except as otherwise noted herein or approved by the Engineer. Remove bracing, sheeting, and shoring in such a manner as not to disturb the completed work.

   Whenever bracing or shoring is driven to a depth below the top of pipe elevation, that portion of the sheeting below the top of the pipe must not be disturbed or removed. Whenever bracing or sheeting is driven for protection of trench walls in a water-bearing soil, no portion of such sheeting is to be removed below existing ground water table level unless otherwise approved by the Engineer.

J. Unsuitable Foundation – In case the soil conditions encountered at the grade line of the pipe trench or structure excavation are found to be unsuitable, the Engineer must be notified to review the character of the foundations prior to continuing the Work. If any pipes or manhole structures are founded in or within 2 feet of any organic soils, over excavated 24 inches under the pipe/manhole and 12 inches on each side of the pipe/manhole to remove the organic soils. The excavation is to be maintained dewatered, if needed, to allow the placement of the given appurtenance and the compaction of the backfill. The resulting excavation may then be backfilled with clean sand or gravel (FDOT No. 57 coarse aggregate) placed in uniform layers, not exceeding 12 inches in loose thickness, individually compacted with a heavy vibratory rammer or vibratory plate compactor.

3.03 BACKFILLING AND COMPACTION

A. Backfilling of structure (manholes, pump stations, sidewalks, etc.) excavations and required fill under structure slabs are to be done in horizontal lifts not exceeding six (6) inches in depth (compacted thickness), and compacted to a density of not less than 95 percent of the maximum dry density determined by AASHTO T-180.

B Place backfill material for pipe excavation evenly and carefully around and over pipe and under lower sections of pipe in 6-inch maximum lifts. Hand-tamp backfill around the pipe. Each lift is to be thoroughly and carefully rammed until one foot of cover exists over the pipe. The remainder of the backfill is to be placed in eight inch lifts (compacted thickness), moistened, and mechanically compacted to a density of not less than 95 percent of the maximum density as determined by AASHTO T-180., unless otherwise noted. Water settling may be utilized at the option of the Contractor, however, the dewatering system must remain in service until all required density determinations are performed.

C. For structures and rigid pipelines where the backfill lies within a pavement subgrade, the backfill must be compacted to a density not less than 95 percent of the maximum density determined by AASHTO T-180.

D. For flexible pipe lines (i.e. PVC pipe or corrugated metal pipe)where the backfill lies within a pavement subgrade, the subgrade backfill to 6 inches above the top of the pipe must be compacted to a density not less than 95 percent of the maximum density determined by AASHTO T-180. The remaining backfill to grade is to be compacted to a density not less than 98 percent of the maximum density determined by AASHTO T-180.

L. Compact the upper one (1) foot of undisturbed subgrade or foundation grade disturbed during construction to a density of less than 98 percent of the maximum density as determined by AASHTO T-180.

3.04 PIPELINE ABANDONMENT OR TRENCH FILL USING FLOWABLE FILL AND EXCAVATABLE FILL

A. Pipelines where noted on the drawings to be grouted and abandoned in place shall be filled with excavatable flowable fill(grout) per Section 121, FDOT Specifications.

B. Contractor shall locate his setups and weep points to assure that the pipe has been completely filled and furnish documentation to that effect in the form of logs, photographs, grout truck delivery tickets and such like.

3.05 TOLERANCES

A. Top Surface: Plus or minus 0.1 foot.

3.06 FIELD OBSERVATIONS

A. All structures, pipelines, pipeline joints, and other construction are subject to field observation by the Engineer and Owner prior to backfilling.

END OF SECTION

SECTION 02230

ROCK BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Compacted Subgrade.

B. Stabilized Subgrade.

C. Rock Base Courses: Limerock (LBR 100), Cemented Coquina (LBR 100), Shell Rock (LBR 100), Bank Run Shell (LBR 100), Calcarenite (LBR 100), Recycled Concrete Aggregate (RCA) (LBR 150)

1.02 REFERENCES

A. Florida Department of Transportation – Standard Specifications for Road and Bridge Construction (Latest Edition), herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

B. ASTM C136-01 – Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D2922-96 – Density of Soil-Aggregate in Place by Nuclear Methods.

D. AASHTO T 180/ASTM D1557-00 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

1.03 TESTS

A. Testing of the rock for compliance with this specification will be performed when it is delivered to the project site by an independent testing laboratory. Contractor is responsible for scheduling tests and for the coordination of the testing with the testing laboratory and Engineer. Tests are to be paid for as specified in the Section 01000: General Requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Compacted Subgrade: Local sands approved in advanced by the Engineer. Free from large clods, rocks larger than one inch, organic material or other extraneous material.

B. Subgrade Stabilization Materials: In accordance with Section 914 of the FDOT Specifications.

C. Limerock Base: In accordance with Section 911 of the FDOT Specifications.

D. Cemented Coquina Base: In accordance with Section 911 of the FDOT Specifications.

E. Shell Rock Base: In accordance with Section 911 of the FDOT Specifications.

F. Bank Run Shell: In accordance with Section 911 of the FDOT Specifications.

G. Calcarenite: In accordance with Section 911 of the FDOT Specifications.

H. Recycled Concrete Aggregate: In accordance with Section 911 of the FDOT Specifications.

I. Prime Coat: Meets Sections 300-2.1 and 916 of the FDOT Specifications.

J. Tack Coat: Meets Section 300-2.3 and 916 of the FDOT Specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare, compact, and grade Compacted Subgrade in accordance with Section 120 of the FDOT Specifications.

B. Prepare, compact, and grade Stabilized Subgrade in accordance with Section 160 of the FDOT Specifications.

C. Prepare, compact, and grade Rock Base Courses in accordance with Section 200 of the FDOT Specifications.

C. Clean subgrade surface of all foreign matter.

D. Verify gradients and elevations of subgrade are correct.

3.02 PLACING BASE MATERIAL

A. Spread base material over prepared subgrade to a total compacted thickness as shown on the Drawings.

B. Place in 6 inch maximum lifts. Compact to 98 percent of maximum density per AASHTO T-180, Method D.

C. Check finished surface with a template cut to the required crown and with a 15 foot straight edge laid parallel to the centerline of the pavement. Correct all irregularities greater than ¼ inch by scarifying, and removing or adding base material as may be required. Re-compact area to meet specified density requirements.

3.03 PRIME COAT APPLICATION

A. Apply prime coat in accordance with Section 300-7 of the FDOT Specifications except Contractor to apply prime coat at a rate of 0.15 gallons per square yard over a base course free of all loose and foreign materials which may prevent proper bond. The moisture content of the base must not exceed the optimum moisture content of the material.

3.04 FIELD OBSERVATIONS

A. Engineer to review the subgrade prior to placing base course.

B. Engineer to review the finished base prior to application of the prime coat and paving.

3.05 PROTECTION

A. Any roadway base damaged, disturbed, or destroyed in excess of maximum pipe trench widths detailed on the Drawings must be replaced in accordance with the Drawings and Specifications at no additional expense to the Owner.

END OF SECTION

SECTION 02233

ASPHALT BASE COURSE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Compacted Subgrade.

B. Stabilized Subgrade.

C. Superpave Asphalt Concrete Base Course.

1.02 REFERENCES

A. Florida Department of Transportation – Standard Specifications for Road and Bridge Construction (Latest Edition), herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

B. ASTM C136-01 – Sieve Analysis of Fine and Coarse Aggregates.

C. ASTM D2922-96 – Density of Soil-Aggregate in Place by Nuclear Methods.

D. AASHTO T180/ASTM D1557-00 – Laboratory Compaction Characteristics of Soil Using Modified Effort.

1.03 SUBMITTALS

A. Submit the asphalt base job mix formula per Section 331-4.3. of the FDOT Specifications.

1.04 TESTS

A. Density tests are to be performed by an independent testing laboratory. Contractor is responsible for scheduling density tests and for the coordination of the testing with the testing laboratory and Engineer. Tests are to be paid for as specified in the Section 01000: General Requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Compacted Subgrade: Use local sands approved in advance by the Engineer. Free from large clods, rocks larger than one inch, organic material or other extraneous material.

B. Subgrade Stabilization Materials: In accordance with Section 914 of the FDOT Specifications.

C. Superpave Asphalt Concrete Base Course: Type B-12.5 Superpave Asphalt Base in accordance with Section 234-2 of the FDOT Specifications.

PART 3 EXECUTION

3.01 PREPARATION

A. Prepare, compact, and grade compacted subgrade in accordance with Section 120 of the FDOT Specifications.

B. Prepare, compact, and grade Stabilized Subgrade in accordance with Section 160 of the FDOT Specifications.

C. Prepare, compact, and grade Superpave Asphalt Concrete Base Course in accordance with Section 234 of the FDOT Specifications.

C. Clean subgrade surface of all foreign matter.

D. Verify gradients and elevations of subgrade are correct.

3.02 PLACING BASE MATERIAL

A. Place base material in accordance with Section 234 of the FDOT Specifications.

B. Correct deficient base in accordance with Section 330 of the FDOT Specifications.

3.03 FIELD OBSERVATIONS

A. Engineer to review the subgrade prior to placing base course.

B. Engineer to observe base course placement activities.

END OF SECTION

SECTION 02271

GEOTEXTILE FABRIC

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Geotextile fabric material and placement for slope protection, pipe joints and drainage applications.

1.02 REFERENCES

A. Florida Department of Transportation – Standard Specifications for Road and Bridge Construction (Latest Edition), herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

1.03 SUBMITTALS

A. Submit geotextile fabric data sheets.

1.04 DELIVERY, STORAGE AND HANDLING

A. Wrap fabric in a protective covering which is sufficient to protect it from sunlight, dirt and other debris during shipment and storage.

PART 2 PRODUCTS

2.01 MATERIALS

A. Geotextile (filter) Fabric for Slope Protection

1. Non-Woven fabric, 12 ounce per square yard, needle punched geofabric which allows the passage of water.

2. Fabric conforming to the following properties:

Criteria	Minimum Average Roll Value
Permittivity (sec^{-1})	0.7 (<15% passing 200 Sieve) 0.2 (>15% to <50% passing 200 Sieve)
Minimum Grab Tensile Strength	1.3 kN
Minimum Puncture Strength	0.8 kN
Minimum CBR Puncture Resistance	3.7 kN
Minimum Trapezoidal Tear	0.5 kN
UV Resistance	50% in 500 hours

B. Geotextile Fabric for pipe joints and drainage applications shall be per FDOT Specifications Section 985.

PART 3 EXECUTION

3.01 PLACEMENT – SLOPE PROTECTION

A. The CONTRACTOR shall clear the subgrade of sticks, stones, debris and other materials that could puncture the overlying filter fabric.

B. Slopes to be uniform, reasonably smooth, free from mounds and wind rows, and free of any debris or projections which could damage the filter material to be placed upon it.

C. Material to be loosely laid (not stretched). Overlap adjacent strips a minimum of 24 inches. Overlaps may be eliminated if all fabric sections are either factory or field sewn.

D. Anchor in place with plastic securing pins (as recommended by the filter material manufacturer) inserted through the fabric along, but not closer than two inches to, each edge and to the extent necessary to prevent displacement before or during placement of the fabric or other material.

E. Stagger vertical laps at least five feet. Use full rolls wherever possible in order to minimize the number of vertical laps. Lengths and widths of individual sheets to be at the Contractor's option. Grommets are not required.

F. Toe-in geotextile fabric at the top of the slope and at the bottom in accordance with the detail on the Drawings.

G. Any fabric damaged or displaced before or during placement of overlying layers must be replaced or repaired to the satisfaction of the Engineer and at the Contractor's expense.

H. Place the fabric so that the upstream strip of fabric overlaps the downstream strip.

3.02 PIPE JOINTS AND DRAINGE APPLICATIONS

A. Place in accordance with FDOT Specifications Sections 514.

END OF SECTION

SECTION 02274

ROCK RIP RAP

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Rock rip rap material and placement.

1.02 QUALITY CONTROL

A. Control of gradation will be by visual inspection. Provide a sample of rip rap of at least 5 tons or 10 percent whichever is less, meeting the gradation specified. The sample may be a part of the finished rip rap covering. This sample will be used as a frequent reference for judging the gradation of the rip rap supplied.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rock: Sound and durable quality weighing not less than 143 pounds per cubic foot (surface – dry natural state). Free from cracks, seams and other defects that could increase deterioration of the stone from natural causes. Rock to be compact, roughly angular in shape of which the least dimension to be not less than 1/3 its greatest dimension. Flat rocks are not acceptable.

B. The riprap shall be graded as follows:

Type B (12-inch Average Size)		
Sieve Size		Percent Passing by Weight
Maximum	Minimum	
21”	15”	100
14”	12”	50
11”	8”	15

C. Control of gradation shall be by visual inspection. The CONTRACTOR shall furnish a sample of the proposed gradation of at least 5 tons or 10 percent of the total riprap weight, whichever is less. If approved, the sample may be incorporated into the finished riprap at a location where it can be used as a frequent reference for judging the gradation of the remainder of riprap. Any difference of opinion between the OWNER and the CONTRACTOR shall be resolved by dumping and checking the gradation of two (2) random truckloads of stones. Arranging for and the costs of mechanical equipment, a sorting site, and labor needed in checking gradation shall be the CONTRACTOR’s responsibility.

D. The acceptability of the stones will be determined by the OWNER prior to placement. Any visual variability and deviation in the test results of the individual rocks is unacceptable.

E. Bedding stone shall be placed within the limits shown on the Drawings and shall be reasonably well graded in accordance with FDOT Section 901. The bedding stone shall be ASTM C33 No. 1 or 2.

F. Geotextile fabric per SECTION 02271.

PART 3 EXECUTION

3.01 PLACEMENT

A. The CONTRACTOR shall prepare the subgrade to the lines, slopes and elevations indicated on the Drawing. The CONTRACTOR shall clear the subgrade of sticks, stones, debris and other materials that could puncture the overlying filter fabric. The finished subgrade shall not vary from design grade by more than two (2) inches at any location.

B. Place rip rap on prepared slope or area in a manner which will produce a reasonably well-graded mass of stone with the minimum practicable percentage of voids.

C. Do not drop riprap on a prepared slope or area from a height greater than 3 feet.

C. Place full course thickness in one operation and in a manner as to avoid displacing the underlying material.

D. Large accumulations of either the larger or smaller sizes of rip rap will not be permitted.

E. Hand placing or rearranging of rip rap by mechanical equipment may be required to the extent necessary to secure the results specified.

F. Place rip rap protection in conjunction with the construction of the embankment with only sufficient lag as may be necessary to allow for proper construction of the portion of the embankment protected and to prevent mixture of embankment and rip rap.

G. Distribute small pieces so that they fill the voids between the larger pieces.

END OF SECTION

SECTION 02514

TYPE SP ASPHALTIC CONCRETE PAVING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Materials, surface preparation, and placement of Type SP asphaltic concrete pavement.

1.02 REFERENCES

A. Florida Department of Transportation – Standard Specifications for Road and Bridge Construction (Latest Edition), herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

1.03 SUBMITTALS

A. Submit a mix design for each asphaltic paving mixture in accordance with Section 334-3 of the FDOT Specifications. Submittal shall include documentation for each asphaltic paving mixture showing that the production facility is currently on FDOT's Production Facility Listing and includes the mix design number.

PART 2 PRODUCTS

2.01 MATERIALS

A. Tack Coat: Meets Section 300 of the FDOT Specifications.

B. Type SP Asphaltic Concrete: Meets the requirements of Section 334 of the FDOT Specifications. Requirements for mixing temperature must conform to those specified in Section 320 of the FDOT Specifications. Obtain Superpave Asphalt Concrete from a plant that is currently on the Department's Production Facility Listing.

PART 3 EXECUTION

3.01 MILLING

A. Where Milling is specified in the plans, perform Milling in accordance with Section 327 of the FDOT Specifications.

B. Perform Milling operations to the average depth shown in the plans.

C. Where cross slope correction is specified in the plans, provide Milling in the lines, grades and slopes show in the plans to correct any cross slope deficiencies.

3.02 PREPARATION

A. Adjust manhole rims and valve boxes to finished grade. Cost of Work to be at the unit prices on the Bid Form. If there is no separate bid item for these adjustments, the cost is to be included in the cost of the asphalt.

B. Apply an asphaltic tack coat to existing asphaltic concrete surfaces to be repaved and to new asphalt base courses. Remove all loose and foreign material from the paved surface. Apply in accordance with Section 300-8 of the FDOT Specifications.

C. Clean surface of all sand and debris prior to placing surface course.

3.02 PLACING ASPHALT PAVEMENT

A. Place in accordance with Section 330-6 of the FDOT Specifications.

B. Compact asphalt in accordance with Section 330-10 of the FDOT Specifications.

C. Prepare joints in accordance with Section 330-8 of the FDOT Specifications. Maintain a smooth transition between existing pavement and new pavement.

D. Maintain all pavement cuts to the approval of the Engineer until the Project is complete.

E. Surface course cut during construction must have all edges saw cut prior to replacement.

3.03 SURFACE REQUIREMENTS

A. The finished surface must be of uniform texture and compaction. Any pulled, torn, or loosened asphalt, or any areas with open pores, segregation, sand streaks, sand spots, or ripples must be corrected.

B. Check finished surface with a 15-foot rolling straightedge. Correct deficiencies in excess of 3/16-inch.

C. Correct deficiencies in accordance with Section 330-9.5 of the FDOT Specifications.

3.04 THICKNESS ALLOWANCES

A. The maximum allowable deficiency from the layer thickness specified on the Drawings is as follows:

1. For pavement of a specified thickness of 2-1/2 inches or more: 1/2 inch.

2. For pavement of a specified thickness of less than 2-1/2 inches: 1/4 inch.

B. Correct deficiencies either by replacing the full thickness for a length extending at least 50 feet beyond each end of the deficient area for the full width of the paving lane.

3.05. LEVELING COURSE REQUIREMENTS

A. Prepare in accordance with Section 330-4 of the FDOT Specifications.

B. Place mixture in accordance with Sections 330-6 of the FDOT Specifications.

C. Compact per Section 330-7 of the FDOT Specifications.

D. Method of Measurement will be per Section 334-7 of the FDOT Specifications. Engineer and Contractor will agree and physically mark in the field all locations to have a level course applied. Engineer will collect tonnage tickets at the time of placement and note that the material placed was a leveling course.

3.06 FIELD OBSERVATIONS

A. Engineer to observe paving activities and finished surface.

3.07 PROTECTION

A. Any roadway surface damaged, disturbed, or destroyed in excess of maximum trench widths detailed on the Drawings must be replaced in accordance with the Drawings and Specifications at no additional expense to the Owner.

END OF SECTION

SECTION 02523

SIDEWALKS, DRIVEWAYS, AND CURBS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete sidewalks, driveways, curbs, and gutters.

1.02 RELATED SECTIONS

A. Section 02210 - Grading.

1.03 REFERENCES

A. AASHTO T 180/ASTM D1557-00 - Laboratory Compaction Characteristics of Soil Using Modified Effort.

B. ACI 347R-94 – Guide to Formwork for Concrete.

C. ASTM A185-97 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

D. ASTM A615-01 - Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

E. ASTM C33-01 - Concrete Aggregates.

F. ASTM C39-01 - Compressive Strength of Cylindrical Concrete Specimens.

G. ASTM C42-99 - Obtaining and Testing Drilled Cores and Sawed Beams of Concrete.

H. ASTM C94-00 - Ready-Mixed Concrete.

I. ASTM C143-00 - Slump of Hydraulic Cement Concrete.

J. ASTM C150-00 - Portland Cement.

K. ASTM C260-01 - Air-Entraining Admixtures for Concrete.

L. ASTM C309-98 - Liquid Membrane - Forming Compounds for Curing Concrete.

M. ASTM D1751-99 - Preformed Expansion Joint Filler for Concrete Paving and Structural Construction.

N. ASTM D2922-01 - Density of Soil and Soil-Aggregate in Place by Nuclear Methods.

O. Florida Department of Transportation - Standard Specifications for Road and Bridge Construction (Latest Edition) herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

1.04 SUBMITTALS

A. Concrete mix design indicating the proportions of cement, coarse aggregate, fine aggregate, water, and admixtures. Mix design sheet must also indicate slump, design strength, and water-cement ratio.

PART 2 PRODUCTS

2.01 MATERIALS

A. Forms: Conform to ACI 347.

B. Reinforcing Steel: ASTM A615, Grade 60, new deformed billet steel.

C. Welded Steel Wire Fabric: Plain type, ASTM A185.

D. Expansion Joints: 1/2 inch thick preformed non-extruding joint filler meeting ASTM D1751.

E. Concrete: Cement (ASTM C150, Type I), aggregates (ASTM C33), and potable water mixed in accordance with ASTM C94. Minimum of 470 lbs. of cement per cubic yard of concrete. Water-cement ratio less than or equal to 0.55. Slump of 0-5 inches. 3000 psi minimum compressive strength at 28 days.

F. Air-Entraining admixture to be from two to six percent.

G. Curing Compound: ASTM C309, Type 1 or 1-D, Class A.

PART 3 EXECUTION

3.01 SUBGRADE PREPARATION

A. Prepare subgrade in accordance with Section 02210.

B. Compacted density to be at least 98 percent of the maximum density determined by AASHTO T180.

C. Verify gradients and elevations of subgrade are correct.

D. Just prior to placing concrete, moisten subgrade and forms to provide a uniform dampened surface at the time concrete is placed.

3.02 CONCRETE PLACEMENT

A. Maintain concrete temperature at time of placement below 90 degrees Fahrenheit.

B. Deposit concrete on the subgrade in a manner which will minimize rehandling.

C. Do not disturb expansion joints.

D. Consolidate concrete against and along the faces of all forms, and along the full length on both sides of all joint assemblies.

3.03 JOINT CONSTRUCTION

A. Contraction Joints for Sidewalks and Driveways: Sidewalk joints are to be spaced 5 feet on center unless noted otherwise on Drawings. Driveway joints are to be spaced 15 to 18 feet on center unless noted otherwise on Drawings. Use saws equipped with shatterproof abrasive or diamond rimmed blades. Cut joints into concrete as soon as the surface will not be ravelled or otherwise damaged by the cutting action. Cut slot, 3/16 inch wide and not less than 1 1/2 inches deep. Joints must be completed between four (4) and twelve (12) hours after placing concrete.

B. Contraction Joints: The maximum joint spacing to be 15 feet. Depth no less than one-fourth (1/4) the pavement thickness. Width, one-eighth (1/8) inch to one-fourth (1/4) inch. Joints must be continuous across the slab unless interrupted by a full depth joint and must extend completely through any integral curbs. Alignment may be skewed or warped where necessary to reach points of stress concentration. Form using saws

equipped with shatterproof abrasive or diamond rimmed blades. Cut joints into concrete paving as soon as the surface will not be ravelled or otherwise damaged by the cutting action. Joints must be completed between four (4) and twelve (12) hours after concrete has been placed. Zip strips may be used in appropriate locations.

C. Construction Joints: Place full depth construction joints at the end of concrete pours and at locations where placement operations are stopped for a period of thirty (30) minutes or more except where such pours terminate at expansion joints.

D. Expansion Joints for Sidewalks and Driveways: Construct at 100 foot intervals (unless noted otherwise on Drawings), between sidewalk and driveways, at sidewalk intersections, and around all other fixed objects within the sidewalk or driveway. Joints must contain preformed joint filler for the full depth. Edges must be finished with a 1/4 inch radius.

E. Expansion Joints for Curbs: Construct at all inlets and radius points, where new curb abuts an existing fixed object, and at intervals of 500 feet. Joints must contain 1/2 inch preformed joint filler for the full depth of the curb.

3.04 FINISHING

A. Adding water to the surface of the concrete to assist in finishing operations is not permitted.

B. A uniform gritty non-slip finish must be provided by brushing the surface with a stiff-bristled broom or by dragging a 'burlap bag' over the surface just before the water sheen disappears.

C. After the final finish has been applied, but before the concrete has become nonplastic, the edges on each side of expansion joints, construction joints, and along any structure extending into the concrete are to be carefully rounded to a 1/4 inch radius. Finish sidewalk and driveway edges with a 1/4 inch radius edging tool. Produce a well-defined and continuous radius and a smooth, dense mortar finish. Remove all concrete from the top of the joint filler.

3.05 CURING

A. After the finishing operations have been completed and as soon as the concrete has hardened sufficiently such that marring of the surface will not occur, the entire surface and the edges of the newly placed concrete are to be cured using a liquid curing compound. Rate of application to be 200 square feet per gallon or as recommended by the manufacturer.

B. Do not leave the concrete exposed for a period in excess of 30 minutes between stages of curing or during the curing period.

3.06 BACKFILLING

A. After the concrete has set sufficiently, but not later than three days after pouring, refill the spaces in front and back of curb/sidewalk to the required elevation with suitable material.

3.07 FIELD OBSERVATIONS

A. The subgrade and formwork prior to placing concrete.

B. Concrete placement activities.

C. Furnish a delivery ticket for each batch of concrete unloaded if so requested by the Engineer.

END OF SECTION

SECTION 02580

PAVEMENT MARKING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Traffic stripes and markings using reflective paint.

B. Traffic stripes and markings using a thermoplastic compound.

C. Reflective pavement markers.

1.02 REFERENCES

A. Florida Department of Transportation – Standard Specifications for Road and Bridge Construction (Latest Edition), herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

B. Palm Beach County Typical Details For Pavement Markings, Signing & Geometrics (No. T-P-24)

PART 2 PRODUCTS

2.01 MATERIALS

A. Reflective Paint Traffic Stripes and Markings: In accordance with Sections 710 of the FDOT Specifications.

B. Thermoplastic Traffic Stripes and Markings: In accordance with Section 711 of the FDOT Specifications.

C. Reflective Pavement Markers: In accordance with Section 706 of the FDOT Specifications, Class B.

2.02 EQUIPMENT

A. In accordance with the following FDOT Specifications: Section 710-3 for reflective paint and Section 711-3 for thermoplastic compounds.

PART 3 EXECUTION

3.01 PREPARATION

A. Establish the necessary tack points and other controls for alignment of the stripes.

B. Tolerances in dimensions and alignment to be in accordance with FDOT Specification 710-5.

3.02 APPLICATION

A. Apply reflective paint in accordance with FDOT Specification 710-4.

B. Apply thermoplastic compounds in accordance with FDOT Specification 711-4. Thermoplastics shall not be installed on roadway until 14 calendar days after final lift of asphalt.

C. Apply reflective pavement markers in accordance with Section 706-4 of the FDOT Specifications. Use bituminous adhesives only when installing. Do not apply markers to new pavement striping or markings.

3.03 FIELD QUALITY CONTROL

A. All Work under this Section which fails to meet the Specifications, including the permissible tolerances and the appearance requirements, or are marred or damaged by traffic or from other cause, must be corrected by the Contractor to the approval of the Engineer.

3.04 PROTECTION

A. Protection of newly painted and applied stripes and markings to be in accordance with Sections 710-7 and 711-6 of the FDOT Specifications.

END OF SECTION

SECTION 02606

MANHOLES AND INLETS

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Concrete manholes and inlets for Drainage Systems.

B. Concrete manholes for Wastewater Systems.

1.02 REFERENCES

A. ASTM A48-94 - Gray Iron Castings.

B. ASTM A185-97 - Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

C. ASTM C32-93 - Sewer and Manhole Brick.

D. ASTM C55-99 - Concrete Brick.

E. ASTM C139-99 - Concrete Masonry Units for Construction of Catch Basins and Manholes.

F. ASTM C150-99 - Portland Cement.

G. ASTM C478-96 - Precast Reinforced Concrete Manhole Sections.

H. Florida Department of Transportation – Standard Specifications for Road and Bridge Construction (Latest Edition), herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

1.03 SUBMITTALS

A. Fabrication drawings for manholes and inlets.

B. Manufacturer's product data for cast iron frames, grates, and covers.

PART 2 PRODUCTS

2.01 MATERIALS

A. Brick: Hardburned clay conforming to ASTM C32, Grade MM or concrete brick conforming to ASTM C55, Grade N.

B. Concrete Masonry Units: ASTM C 139.

C. Mortar: 1 part Portland Cement (ASTM C150, Type II) mixed with 2 parts sand and potable water as required.

D. Stormwater Manholes and Inlets: Materials shall be in accordance with FDOT Specifications Section 425-3. Cast on covers shall include the words ‘Storm’, as applicable, the manufacturer’s name and catalog number.

D. Wastewater Manholes: ASTM C478. Minimum 8 inch wall thickness. Base and first riser section to be a monolithic pour. Use Type II Portland Cement. Openings must be pre-cast.

E. Wastewater Cast Iron Frames, Grates, and Covers: ASTM A48, Class 30 gray iron. Castings to be smooth, true to pattern and free from projections, sand holes, warps and other defects of any kind and well cleaned. Provide concealed type pick holes in all covers. Machine at touching

surfaces so as to seat firmly and not rock. Cast on covers the words ‘Sanitary Sewer’, as applicable, the manufacturer's name and catalog number.

F. Protective Coating: Interior and exterior coatings for wastewater manholes are specified on the Drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Manholes and inlets are to be constructed at the locations and elevations shown on the Drawings.

B. Masonry work to be built true with all courses level. Shove masonry into place (not laid) in full beds of mortar so as to bond masonry thoroughly into the mortar. Strike joints to a smooth finish. Joints should not be less than 1/4 inch nor more than 1/2 inch in thickness.

C. Plaster manholes and inlets as shown on the Drawings to leave a smooth, dense finish, completely watertight.

D. Use Ramneck at all keyed riser joints (1/2 inch thick with width at least 1/2 the wall thickness) with a non-shrink grout on inside and outside.

E. Seal all openings with a water proof, non-shrink grout.

3.02 FIELD OBSERVATIONS

A. All manholes and inlets will be observed at the option of the Engineer prior to backfilling.

B. Engineer to review the invert flow channels in wastewater manholes before field application of the interior protective coating.

END OF SECTION

SECTION 02611

CONCRETE PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Round concrete pipe.

B. Elliptical concrete pipe.

C. Perforated concrete pipe.

1.02 RELATED SECTIONS

A. Section 02220 - Excavating, Backfilling, and Compacting.

B. Section 02271 – Geotextile Fabric.

1.03 REFERENCES

A. Florida Department of Transportation - Standard Specifications for Road and Bridge Construction (Latest Edition) herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

B. ASTM C76-00 - Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe.

C. ASTM C443-98 - Joints for Circular Concrete Sewer and Culvert Pipe, Using Rubber Gaskets.

D. ASTM C444-95 - Perforated Concrete Pipe.

E. ASTM C507-00 - Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe

F. ASTM C969-94 - Infiltration and Exfiltration Acceptance Testing of Installed Precast Concrete Pipe Sewer Lines.

1.04 SUBMITTALS

A. Submit manufacturer's notarized Certification Statement in accordance with Section 430-1 of the FDOT Specifications indicating that all materials comply with this Specification.

PART 2 PRODUCTS

2.01 MATERIALS

A. Round Concrete Pipe: Conforms to the requirements of ASTM C76, with modifications as noted in Section 449-4.2 of the FDOT Specifications. Class III unless noted otherwise on Drawings, with bell and spigot end joints. Pipe gaskets per ASTM C443. Gasket to be of such cross sectional area and perimeter as to properly fit the space provided in the pipe joint in which it is to be used. Prior to use, store gaskets in as cool a place as practicable. Lift holes are not allowed in pipe under 60 inches in diameter.

B. Elliptical Concrete Pipe: Conforms to the requirements of ASTM C507, except that the exceptions and modifications to ASTM C76 and ASTM C507, as specified in Section 449-4.2 of the FDOT Specifications, also apply to elliptical pipe where applicable. Meet the requirements of Table I for Class HE-III, unless noted otherwise on the Drawings.

C. Slotted Round Concrete Pipe: Conforms to the requirements of ASTM C444 and all applicable requirements of ASTM C76, Class III, unless noted otherwise on the Drawings, with bell and spigot end joints. Pipe gaskets per ASTM C361. Gasket to be of such cross sectional area and perimeter as to properly fit the space provided in the pipe joint in which it is to be used. Prior to use, store gaskets in as cool a place as practicable. Provide slots in accordance with Index 443-001 of the Florida Department of Transportation Standard Plans.

D. Slotted Elliptical Concrete Pipe: Conforms to the requirements of paragraph 2.01B. above. Provide slots in accordance with Index 443-01 of the Florida Department of Transportation Standard Plans.

PART 3 EXECUTION

3.01 INSTALLATION

A. All pipe shall be installed in accordance with Section 430 of the FDOT Specifications.

B. Install pipe with spigots pointing in the direction of flow and with bell ends facing in the direction of laying pipe.

C. Thoroughly clean the interior of the pipe of all foreign matter before being lowered into the dry trench and keep clean during laying operations by means of plugs or other approved methods.

D. No trench water is allowed to enter the pipe. During suspension of Work for any reason at any time, a suitable stopper is to be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.

E. Lay pipe lines to grade and alignment as shown on the Drawings.

F. Remove any pipe found defective immediately and replace with sound pipe.

G. Dig bell holes in the subgrade to accommodate the bells and make deep enough to ensure that the bell does not bear on the bottom of the hole. Holes are not to be excessively wide in the longitudinal direction of the pipe line. When the pipes are laid, the barrels must be in contact with the foundation throughout its full length exclusive of the bell.

H. Wrap all concrete pipe joints and all elliptical pipe joints with filter fabric in accordance with FDOT Specifications.

I. The installed condition of all pipe joints shall meet the minimum joint standards specified in Table 430-1 of FDOT Specifications Section 430-4.1. Joints requiring a 'Water-tight' performance specification must not leak up to 5 psi (11.5 feet of water) of hydrostatic water pressure. Joints requiring a 'Soil-tight' performance specification must not leak up to 2 psi (4.6 feet of water) of hydrostatic water pressure.

J. Do not apply mortar, joint compound, or other filler to the joint gaps which would restrict the flexibility of the joint.

K. Lifting holes required for elliptical pipe and round pipe 60 inches and larger in diameter must be sealed in accordance with FDOT Specifications.

L. Bed perforated pipe with the perforations facing down.

3.02 FIELD OBSERVATIONS

A. All pipe will be subject to visual observation by the Engineer at any time. Such sections that do not conform to these Specifications will be rejected when, in the opinion of the Engineer, the methods of manufacture fail to guarantee uniform results, where the materials used are such as to produce inferior pipe, or the pipe otherwise is damaged or defective.

B. All pipe joints may be observed at the option of the Engineer prior to backfilling.

C. Perform and submit to Engineer pipe inspection videos and reports to Engineer per FDOT Specifications section 430-4.8. For pipes larger than 48 inches, submit to Engineer a detailed visual inspection summary report for each pipe run, including photos, locations and details of deficient cracks, joint separations, infiltration, and damage.

END OF SECTION

SECTION 02612

CORRUGATED AND SPIRAL RIB METAL PIPE

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Corrugated steel pipe (CSP).

B. Spiral rib steel pipe (SRSP).

C. Corrugated aluminum pipe (CAP).

D. Spiral rib aluminum pipe (SRAP).

E. Perforated pipe for underdrains.

1.02 RELATED SECTIONS

A. Section 02220 - Excavating, Backfilling and Compacting.

B. Section 02271 – Geotextile Fabric.

1.03 REFERENCES

A. AASHTO M190-80 - Bituminous Coated Corrugated Metal Culvert Pipe and Pipe Arches.

B. AASHTO M218 – Steel Sheet, Zinc-Coated (Galvanized) for Corrugated Steel Drainage Pipe.

C. AASHTO M274 – Steel Sheet, Aluminum-Coated (Type 2) for Corrugated Steel Drainage Pipe.

D. ASTM A153-01 - Zinc Coating (Hot-Dip) on Iron and Steel Hardware.

E. ASTM A307-00 - Carbon Steel Bolts and Studs, 60,000 PSI Tensile Strength.

F. ASTM A563-00 - Carbon and Alloy Steel Nuts.

G. ASTM A760-01 - Corrugated Steel Pipe, Metallic-Coated for Sewers and Drains.

H. ASTM B745-97 - Corrugated Aluminum Pipe for Sewers and Drains.

I. ASTM C33-01 - Concrete Aggregates.

J. ASTM C150-00 - Portland Cement.

K. ASTM F467-01 - Nonferrous Nuts for General Use.

L. ASTM F468-01 - Nonferrous Bolts, Hex Cap Screws, and Studs for General Use.

M. Florida Department of Transportation - Standard Specifications for Road and Bridge Construction (Latest Edition) herein after referred to as the FDOT Specifications. This document must be onsite during the Work.

1.04 SUBMITTALS

A. Manufacturer's certification stating that the materials meet the requirements of this Specification and the specified material standards.

PART 2 PRODUCTS

2.01 PIPE MATERIAL

A. Minimum Thickness of Metal:

Nominal Diameter (Inches)	Corrugated Steel Pipe 2-2/3"x 1/2" (Gauge)	Corrugated Steel Pipe 3"x 1" (Gauge)	Spiral Rib Steel Pipe 3/4"x 3/4" @ 7-1/2" 3/4"x 1" @ 11-1/2" (Gauge)	Corrugated Aluminum Pipe 2-2/3"x 1/2" (Gauge)	Corrugated Aluminum Pipe 3"x 1" (Gauge)	Spiral Rib Aluminum Pipe (Gauge)
12	16	-	-	16	-	--
15	16	-	16	16	-	16
18	16	-	16	16	-	16
21	16	-	16	16	-	16
24	16	-	16	14	-	16
30	14	-	16	14	-	16
36	14	16	16	14	16	16
42	12	16	16	12	16	14
48	12	16	16	12	16	14
54	12	16	14	12	16	12
60	10	14	14	10	14	12
66	10	14	12	10	14	12
72	10	14	12	8	12	10
78	8	14	12	--	12	10
84	8	14	12	--	12	10

B. Corrugated Steel Pipe: Conforms to the requirements of ASTM A760, Type I, with a continuous lock seam. Corrugations to be either 2-2/3" x 1/2" or 3" x 1". Re-corrugate ends for connecting bands. Coat with galvanizing per AASHTO M218 or aluminum per AASHTO M274. See Drawing for specified coating.

C. Spiral Rib Steel Pipe: Conforms to the requirements of ASTM A760, Type IR, with a continuous lock seam. Rib size and spacing to be 3/4" x 3/4" at 7-1/2" on center or 3/4" x 1" at 11-1/2" on center. Re-corrugate ends for connecting bands. Smooth interior wall with a Manning coefficient not greater than 0.012. Coat with galvanizing per AASHTO M218 or aluminum per AASHTO M274. See Drawing for specified coating.

D. Corrugated Aluminum Pipe: Conforms to the requirements of ASTM B745, Type I, with a continuous lock seam. Corrugations to be either 2-2/3" x 1/2" or 3" x 1". Re-corrugate ends for connecting bands. When specified on the Drawings, perforations are to meet the requirements of ASTM B745, Class 2.

E. Spiral Rib Aluminum Pipe: Conforms to the requirements of ASTM B745, Type IR, with a continuous lock seam. Rib size and spacing to be 3/4" x 3/4" at 7-1/2" on center. Re-corrugate ends for connecting bands. Smooth interior wall with a Manning coefficient not greater than 0.012. Where specified on the Drawings, perforations are to meet the requirements of ASTM B745, Class 2.

F. When bituminous coating is specified, the pipe shall be coated in accordance with the requirements of AASHTO M190, Type A.

2.02 BOLTING MATERIAL

A. On corrugated steel pipe, use ASTM A307 bolts and ASTM A563, Grade A nuts that are hot-dipped galvanized per ASTM A153.

B. On aluminum pipe, use alloy 6061-T6 bolts and nuts conforming to ASTM F468 and ASTM F467. Lubricate nuts at the factory with a suitable wax compound.

2.03 GROUT

A. Dry Pack Grout: Grout shall consist of one part Portland Cement Type I conforming to ASTM C150 to two parts well graded sand conforming to ASTM C33. Mixing water shall be potable. The sand and cement shall be mixed thoroughly and then water added slowly and only in sufficient quantity to produce a mixture which has the consistency of damp earth and will hold its shape when formed into a ball in the hand.

PART 3 EXECUTION

3.01 INSTALLATION

A. All pipe shall be installed in accordance with Section 430 of the FDOT Specifications.
B. Handle corrugated steel pipe in such a way that the coatings will not be damaged.
C. Thoroughly clean the interior of the pipe and fittings of all foreign matter before lowering into the dry trench and keep clean during laying operations by means of plugs or other approved methods.
D. During suspension of Work for any reason at any time, place a suitable stopper in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.
E. Lay pipe lines to grade and alignment as shown on the Drawings.
F. Remove immediately any pipe and/or fittings found defective and replace with sound pipe.
G. Field join using locking bands.
H. The installed condition of all pipe joints shall meet the minimum joint standards specified in Table 430-1 of FDOT Specifications Section 430-4.1. Joints requiring a 'Water-tight' performance specification must not leak up to 5 psi (11.5 feet of water) of hydrostatic water pressure. Joints requiring a 'Soil-tight' performance specification must not leak up to 2 psi (4.6 feet of water) of hydrostatic water pressure.
I. When connecting pipe to manholes or inlets, seal openings with dry pack grout.
J. For multiple runs, spacing between pipes must be sufficient to permit proper backfill placement and compaction. Provide a minimum of 12 inches between pipes up to 24 inches in diameter. Provide 1/2 pipe diameter spacing for pipes over 24 inch diameter to 66 inch. Provide 36 inches spacing for pipes 72 inches in diameter and over.
K. Take special care to avoid displacement or damage to the pipe during backfilling operations.
L. Excavate, backfill, and compact in accordance with Section 02220.

M. Coat all ends of pipe in contact with concrete with a coal tar epoxy 3' past outside edge of structure.

3.02 FIELD OBSERVATIONS

A. All pipe will be subject to visual observation by the Engineer at any time. Such sections that do not conform to these Specifications will be rejected when, in the opinion of the Engineer, the methods of manufacture fail to guarantee uniform results, where the materials used are such as to produce inferior pipe, or the pipe otherwise is damaged or defective.
B. All pipe joints may be observed at the option of the Engineer prior to backfilling.
C. Perform and submit to Engineer pipe inspection videos and reports to Engineer per FDOT Specifications section 430-4.8. For pipes larger than 48 inches, submit to Engineer a detailed visual inspection summary report for each pipe run, including photos, locations and details of deficient cracks, joint separations, infiltration, and damage.

END OF SECTION

SECTION 02831

CHAIN LINK FENCES AND GATES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Fence framework, fabric, and accessories.

B. Excavation for post bases.

C. Manual gates and related hardware.

1.02 REFERENCES

A. ASTM A53-01-Pipe, Steel, Black and Hot-Dipped, Zinc-Coated, Welded and Seamless.

B. ASTM A121-99 - Zinc-Coated (Galvanized) Steel Barbed Wire.

C. ASTM A123-01 - Zinc (Hot-Dipped Galvanized) Coatings on Iron and Steel Products.

D. ASTM A307-00 - Carbon Steel Bolts and Studs, 60000 PSI Tensile Strength.

E. ASTM A392-96 - Zinc-Coated Steel Chain-Link Fence Fabric.

F. ASTM A563-00 - Carbon and Alloy Steel Nuts.

G. ASTM B6-00 - Zinc.

H. ASTM C94-00 - Ready-Mixed Concrete.

I. ASTM F552-01 - Terminology Relating to Chain Link Fencing.

J. ASTM F567-00 - Practice for Installation of Chain-Link Fence.

K. ASTM F626-96 - Fence Fittings.

L. ASTM F668-99 - Poly (Vinyl Chloride) (PVC) and other Organic Polymer - Coated Steel Chain-Link Fence Fabric.

M. ASTM F900-94 - Industrial and Commercial Swing Gates.

1.03 SUBMITTALS

A. Manufacturer's catalog cuts with printed specifications.

B. Shop Drawings with complete details of fence and gate construction, fence height, post spacing, dimensions and unit weights of framework, and concrete footing details.

PART 2 PRODUCTS

2.01 MATERIALS

A. Framing (Steel): ASTM A53, Schedule 40 steel pipe.

B. Fabric Wire (Steel): ASTM A392.

C. Barbed Wire: ASTM A121.

D. Bolts: ASTM A307, Grade A.

E. Nuts: ASTM A563, Grade A.

F. Concrete: ASTM C94; Normal Portland Cement, 2000 psi minimum compressive strength at 28 days, 3 inch slump, 1 inch nominal sized coarse aggregate.

2.02 COMPONENTS

A. Line and Corner Posts: See drawing.

B. End Posts: See drawing.

C. Gate Support Post: See drawing. Gate Latch Post: See drawing.

D. Top and Brace Rails: For diameter see drawing, plain end, sleeve coupled.

E. Gate Frame: See drawings.

F. Fabric: 2 inch diamond mesh interwoven wire, 9 gage steel core, top selvage twisted tight, bottom selvage knuckle end closed.

G. Brace and Tension Bands: 1/8 inch thick zinc galvanized steel.

H. Tension Bar: 1/4 inch thick zinc galvanized steel.

I. Tension Wire: 7 gage steel, zinc galvanized at the rate of 1.2 oz/SF.

J. Tie Wire: 9 gage steel, zinc galvanized at the rate of 1.2 oz/SF.

K. Caps: Malleable iron, galvanized; sized to post diameter, stainless steel set screw retainer.

2.03 ACCESSORIES

A. Gate Hardware: Fork latch for single swing gate, center gate stop and drop rod for double swing gates, keeper for double swing gates, hardware for padlock, and two 180 degree hinges per leaf.

2.04 FINISHES

A. Zinc (hot dipped galvanized) Coating

1. Components and Framing: ASTM A123.
2. Fabric: ASTM A392, 1.2 oz./sq. ft.
3. Hardware: ASTM A153.
4. Extension Arms: ASTM A153.
5. Barbed Wire: ASTM A121, 0.80 oz./sq. ft.

B. Vinyl Coating (when specified on the Drawings)

1. General: Factory coated (unless noted otherwise), fusion bonded PVC.
2. Components and Framing: 10-14 mils vinyl coating over galvanizing per ASTM A123.
3. Fabric: 7-12 mils vinyl coating per ASTM F668, Class 2B over 0.3 oz./sq. ft. of galvanizing per ASTM A641.
4. Hardware: Spray paint hardware in the field to match vinyl coating.

PART 3 EXECUTION

3.01 SITE PREPARATION

A. Before installing chain-link fence, all necessary site clearing and grading is to be completed.

B. Where the clearing and grubbing for the Project does not include the area occupied by the fence, clearing is to be done to a width of at least two feet on each side of the fence line, except that the Engineer may direct that valuable trees be left in place. Do not extend clearing beyond the right of way.

3.02 INSTALLATION

A. General

1. Install framework, fabric, accessories, and gates in accordance with ASTM F567.

2. Install all fasteners with the nuts on the inside face of the fence.

B. Posts

1. Space at intervals not exceeding 10 feet on center. Measure the interval parallel to the grade of the fence and in the line of fence from center to center of the post.

2. Set line posts in concrete foundations of not less than 12 inches in diameter and 3.5 feet deep below grade.

3. Set corner and end posts in concrete foundations not less than 18 inches in diameter and 4.5 feet deep below grade.

4. Set gate posts in concrete foundations not less than 18 inches in diameter and 4.5 feet deep below grade.

5. Slope concrete away from the posts to provide for proper water drainage.

6. Install corner posts whenever the fence alignment changes 10 degrees or more.

7. Provide fence height as indicated on the Drawings.

C. Gate and End Post Bracing

1. Brace each gate and end post to adjacent line post with horizontal center rail.

2. Braces required on fences.

D. Top Rail

1. Provide a top rail so that a continuous brace from end to end of each stretch of fence is formed.

2. Support at each line post.

3. Securely fasten to end posts and join with sleeves or coupling to allow for expansion and contraction.

E. Fabric

1. Place chain-link fabric on the outside of the area to be enclosed.

2. Stretch fabric between end posts or at intervals of 100 feet maximum, whichever is less.

3. Position bottom of fabric two inches above finished grade. Over irregular ground, a minimum clearance of one inch and a maximum of six inches will be permitted for a length not to exceed eight feet.

4. Fasten fabric to line posts at intervals not exceeding 15 inches and to top rail at intervals not exceeding 24 inches with wire ties.

5. Provide bands or clips of adequate strength to attach fabric to tension bars at all corner, end, and gate posts at intervals not exceeding 12 inches.

6. Do not place fabric until posts have been permanently positioned and concrete foundations have attained adequate strength.

F. Gates

1. Provide concrete center drop to foundation depth and drop rod retainers at center of double gate openings.

2. Install gates with fabric and barbed wire overhang to match fence. Install three hinges per leaf, latch catches, drop bolt, foot bolts and sockets, torsion spring retainer, retainer and locking clamp.

3. See Drawings for additional requirements.

H. Electrical Grounds

1. Wherever a power line passes over the fence, a ground must be installed directly below the point of crossing. The ground rod is to consist of an aluminum or galvanized rod, with connection of similar metal if required, or of other appropriate material, eight feet in length and at least 5/8 inch in diameter. Drive the rod vertically until the tip of the rod is approximately six inches below the ground surface. Use a No. 6 conductor to connect the rod

and all fence elements. Connect the conductor to each fence element and the ground rod by means of electrical type clamps which will prevent corrosion.

END OF SECTION

SECTION 02938

SODDING

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Preparation of subsoil.

B. Placing topsoil.

C. Fertilizing.

D. Sod installation.

E. Maintenance.

1.02 REGULATORY REQUIREMENTS

A. Comply with regulatory agencies for fertilizer and herbicide composition.

1.03 DELIVERY, STORAGE, AND HANDLING

A. Deliver sod on pallets. Protect exposed roots from dehydration.

B. Do not deliver more sod than can be laid within 24 hours.

1.04 EXISTING CONDITIONS

A. All existing grass areas which are damaged or destroyed during construction are to be replaced with new sod of the same variety, unless otherwise noted, which existed prior to construction.

B. In all cases, Contractor is responsible for the restoration of the grass to the conditions that existed prior to construction.

1.05 FIELD MEASUREMENTS

A. On pipeline projects, sodded areas will be measured based on maximum trench widths shown on the Drawings. Sod placed in excess of the maximum trench widths or limits detailed on the Drawings will be at the full expense of the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

A. Topsoil: Muck; free of plants, weeds, and roots.

B. Sod: In Kind. Live, fresh, and uninjured at time of planting, free of objectionable weeds, and have a soil mat of sufficient thickness adhering firmly to the roots to withstand all necessary handling. Transport within 24 hours after being stripped and plant as soon as possible.

C. Fertilizer: 6 percent nitrogen - 6 percent phosphoric acid - 6 percent potash, 40 percent organics.

D. Water: Free of excess and harmful chemicals, acids, alkalies, or any substance which might be harmful to plant growth. Salt water not allowed.

E. Wood Pegs: Softwood; sufficient size and length to ensure anchorage of sod on a slope.

PART 3 EXECUTION

3.01 PREPARATION OF SUBSOIL

A. Prepare subsoil to eliminate uneven areas and low spots. Maintain lines, levels, profiles and contours. Make changes in grade gradual. Blend slopes into level areas.

B. Remove foreign materials, weeds and undesirable plants and their roots. Remove contaminated soil.

3.02 FERTILIZING

A. Apply fertilizer uniformly at a rate of 16 pounds per 1000 square feet.

B. Apply after smooth raking of topsoil and prior to installation of sod.

C. Apply fertilizer no more than 48 hours before laying sod.

D. Lightly water to aid the dissipation of fertilizer.

3.03 SOD INSTALLATION

A. Moisten prepared surface immediately prior to laying sod.

B. Place sod on the prepared surface with edges in close contact and embed firmly and smoothly by light tamping with appropriate tools.

C. Do not stretch or overlap sod pieces.

D. Where sodding is used in drainage ditches, the setting of the pieces must be staggered to avoid a continuous seam along the line of flow.

E. In order to prevent erosion caused by vertical edges at the outer limits, tamp the outer pieces of sod so as to produce a feather edge effect.

F. On slopes 6 inches per foot and steeper, lay sod perpendicular to slope and secure every row with wooden pegs at maximum 2 feet on center. Drive pegs flush with soil portion of sod.

G. After installation, saturate sod with water to a depth of 4 inches into the soil.

H. After sod and soil have dried, roll sodded areas to ensure good bond between sod and soil and to remove minor depressions and irregularities.

I. After rolling, keep sod moist for the duration of the contract period and in no case less than 2 weeks. The moistened condition should extend at least to the full depth of the rooting zone.

END OF SECTION

SECTION 16000
ELECTRICAL GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. The general provisions of the Contract, including General Conditions, apply to all the work specified in the Electrical 16000 Sections.

1.02 LAWS, PERMITS, FEES AND NOTICES

A. Secure and pay all permits, fees and licenses necessary for the proper execution of the work. Submit all notices and comply with all laws, ordinances, rules and regulations of any public agency bearing on the work. The Contractor shall be a licensed electrical Contractor in the county of construction.

1.03 DEPARTURES

A. If any departures from the Contract Drawings or Specifications are deemed necessary, details of such departures and the reasons therefore shall be submitted as soon as practicable to the CONSULTANT for advance written approval.

1.04 GUARANTEES

A. Final Acceptance

Furnish written guarantee covering all materials, workmanship, labor and equipment for a period of one (1) year from the date of acceptance as described in the Contract General Conditions.

B. The OWNER reserves the right to operate and use all materials and equipment failing to meet the requirements of the Contract Documents until such unacceptable materials and equipment are replaced or repaired to the satisfaction of the CONSULTANT.

1.05 AS-BUILT INFORMATION

A. A set of "red-lined" electrical drawings shall be carefully maintained at the job site. Actual conditions are to be put on the drawings in red on a daily basis so the drawings will continuously show locations and routes of cable trays, conduits, pull-boxes, circuit numbers, and other information required by the CONSULTANT.

1.06 JOB SITE VISIT

A. Visit the project site before submitting a bid. Verify all dimensions shown and determine the characteristics of existing facilities which will affect performance of the work, but

which are not shown on Drawings or described within these Specifications.

1.07 CLEANUP

A. Maintain a continuous cleanup during the progress of the work and use appointed storage areas for supplies. The premises shall be kept free from accumulations of waste materials and rubbish.

1.08 CUTTING AND PATCHING

A. Cut and prepare all openings, chases and trenches required for the installation of equipment and materials. Repair, remodel and finish in strict conformance with the quality of workmanship and materials in the surroundings. Obtain written permission from the CONSULTANT for any alterations to structural members before proceeding.

1.09 MAINTENANCE

A. Render all necessary measures to ensure complete protection and maintenance of all systems, materials, and equipment prior to final acceptance. Any materials or equipment not properly maintained or protected to assure a factory new condition at the time of final acceptance shall be replaced immediately at no additional cost to the OWNER.

1.10 WATERPROOFING

A. Whenever any work penetrates any waterproofing, seal and render the work waterproof. All work shall be accomplished so as not to void or diminish any waterproofing bond or guarantee.

B. The Contractor shall provide and install duct seal putty at all wireway, panels, lighting contactors, panelboards, disconnects, and electrical enclosures where conduits penetrate such enclosures.

1.11 TESTS

A. Conduct an initial operating test of equipment test prior to the CONSULTANT's final approval. The Contractor shall demonstrate the equipment to operate in accordance with the requirements of these Specifications. The final acceptance tests shall be performed in the presence of the CONSULTANT or an authorized representative. The electrical contractor shall furnish all instruments, electrical equipment and personnel as required for the tests.

1.12 SUMMARY OF ELECTRICAL WORK

A. Provide all labor, materials, tools, supplies, equipment, and temporary utilities to complete the work shown on the Drawings and specified herein. All systems are to be completely installed and fully operational. Specifically, the work includes, but is not necessarily limited to:

1. Demolition of the existing electrical equipment, irrigation pump, and existing entrance sign. Provide all coordination with Power Company for demolition of existing single phase electrical service and installation of new 3 phase service.

2. Provide all coordination with FPL for the removal of existing FPL street lights and poles as indicated on the drawings.

3. Provide and install new underground service to FPL service point, new meter, main disconnect, panelboard, lighting contactor, equipment racks, and branch feeders to lighting and irrigation pump/controller.

4. Provide and install Pedestrian Lighting raceways, pull boxes, wiring, and grounding as indicated on drawings.

5. Provide arc flash and coordination study as indicated on specifications and provide custom arc flash labels based on the results of the arc flash study.

6. Provide trenching and cutting/patching as required at all hard surfaces, restore to original condition.

7. Provide spare conduits as indicated on the plans.

8. Provide and install all grounding to equipment, and lighting.

9. Provide startup and testing of all the decorative pole mounted lights and electrical equipment, including the irrigation pump and related timer equipment.

10. Provide as-built drawings.

11. Coordinate with engineer for a night time test of the lighting at the completion of the project, see other specifications.

1.13 CODES AND STANDARDS

A. General Applicable provisions of the following codes and standards and other codes and standards required by the State of Florida and local jurisdictions are hereby imposed on a general basis for electrical work (in addition to specific applications specified by individual work sections of these specifications):

1. U.L.: Electrical materials shall be approved by the Underwriters' Laboratories, Inc. This applies to materials which are covered by U.L. standards. Factory applied labels are required.

2. National Electrical Code

3. Local Electrical Code

4. OSHA: Standards of the Occupational Safety and Health Administration are to be

complied with.

5. NEMA: National Electrical Manufacturers Association Standards are to be met wherever standards have been established by that agency, and proof is specifically required with material submittals for switchboards, motor control centers, panelboards, cable trays, motors, switches, circuit breakers, and fuses.

6. ANSI: American National Standards Institute.

7. NESC: National Electrical Safety Code.

8. FBC: Florida Building Code, latest edition.

1.14 ELECTRICAL TEMPORARY FACILITIES

A. The electrical contractor shall include in his bid the cost of furnishing, installing, maintaining, and removing all materials and equipment required to provide temporary light and power to perform the work of all trades during construction and until work is completed.

B. Safety

1. All reasonable safety requirements shall be observed to protect workers and the public from shock and fire hazards. Ground fault interrupters shall be employed in accordance with codes.

2. Ground wires are required in all circuits. All metallic cases shall be grounded.

3. Rain tight cabinets shall be used for all equipment employed in outdoor or in wet areas.

1.15 EXCAVATING FOR ELECTRICAL WORK

A. General

1. Excavation or drilling, backfill and repair of paving and grassing is to be in the bid of the electrical contractor. The actual work need not be performed by electrical trades. However, the electrical contractor is responsible for all excavation, drilling, dewatering, backfilling, tamping, and repair of pavements and grassing required in support of electrical work. All areas disturbed by electrical work shall be repaired to their original condition, or as indicated on the Drawings.

B. Coordination

1. The electrical contractor must check for existing utilities before commencing any excavation or drilling.

2. Contract Drawings and other trades are to be consulted to avoid interferences with

other utilities on this project.

3. In the event of damage to existing utilities, the CONSULTANT shall be immediately notified, and damage shall be immediately repaired.

4. The OWNER is to be consulted to ascertain locations of existing interferences by referring to "As Built" drawings and OWNER's experience. The excavations are to be scheduled at the OWNER's convenience.

C. Precautions

1. The electrical contractor must take every reasonable precaution to avoid interferences. When working in the vicinity of interference, excavations shall be dug by hand.

1.16 ELECTRICAL SUBMITTAL

A. Submittals for Approval.

1. Refer to Contract General Conditions for additional instructions on the General Conditions and this Section, the more stringent requirements shall apply.

2. Shop drawings and manufacturer's data sheets are required for all electrical materials.

3. Submittals will not be accepted for partial systems. Submit all materials for each specifications section at one time. Submittals must be arranged, correlated, indexed and bound in orderly sets for ease of review.

4. Samples are to be supplied for any approved substitute

5. The following numbers of copies are required:

Shop drawings	8 sets
Samples	2 each
Manufacturer's data	8 sets
Certifications	2 sets
Test reports	8 sets
Warranties/Guarantees	2 sets

6. Submit shop drawings, manufacturer's data, and certifications on all items of electrical work prior to the time such equipment and materials are to be ordered. CONTRACTOR shall not order any equipment or materials without approval from the CONSULTANT. Submittals will not be accepted for partial system submittals;

submit all data at one time. Submittals will be promptly marked "FURNISH AS SUBMITTED, "FURNISH AS CORRECTED," or "REVISE AND RESUBMIT." The distribution and disposition of reviewed shop drawings shall be in accordance with Section 01340 of these Specifications.

7. Time delays caused by rejection of submittals are not cause for extra charges to OWNER or time extensions.

8. Contractor shall be responsible for investigating existing systems or shop drawings in order to fully integrate the new equipment into the system. Adequate shop drawings may or may not exist for all existing systems.

B. Operation and Maintenance Manuals

1. Submit to the CONSULTANT 5 copies of all manufacture's service, installation and operation manuals, instructions and bulletins. These manuals shall be subject to review of the CONSULTANT. If acceptable they shall be forwarded to the OWNER. If not acceptable they shall be returned to the contractor for revision and resubmittal. Manuals shall contain but not be limited to the following:

   a. Brief description of systems and basic features.

   b. Manufacturer's name and model number for all components in the system.

   c. List of local factory authorized service companies.

   d. Operating instructions.

   e. Maintenance instructions.

   f. Trouble shooting instructions.

   g. Manufacturer's literature describing each piece of equipment.

   h. Power and control wiring diagrams.

   i. Parts Lists.

1.17 ELECTRICAL PRODUCTS

A. Standard Products

1. Unless otherwise indicated in writing by the CONSULTANT, the products to be furnished under this specification shall be the manufacturer's latest design. Units of equipment and components of the same purpose and rating shall be interchangeable throughout the project. All products shall be newly manufactured. Defective

equipment or equipment damaged in the course of installation or testing shall be replaced or repaired in a manner meeting with the approval of the CONSULTANT at no additional expense to the OWNER.

B. Delivery, Storage, and Handling

1. Deliver products to project properly identified with names, model numbers, types, grades, compliance labels and similar information needed for distinct identification; adequately packaged or protected to prevent deterioration during shipment, storage and handling. Store in a dry, well ventilated, indoor space, except where prepared and protected by the manufacturer specifically for exterior instructions for storage locations.

C. Substitutions

1. Comply with instructions in the Contract General Conditions and Special Conditions and obtain pre-approval of the CONSULTANT regarding substitutions.

1.18 ELECTRICAL IDENTIFICATION

A. Color Coding Conductor colors shall be in accordance with the N.E.C. and NFPA requirements.

B. Nameplates

1. The following items shall be equipped with nameplates: All motors, motor starters, pushbutton stations, control panels, time switches, disconnect or relays in separate enclosures, receptacles, high voltage boxes and cabinets. All light switches and outlets shall carry a phenolic plate with the supply Special Electrical systems shall be identified at junction and pull boxes, terminal cabinets and equipment racks.

2. Nameplates shall adequately describe the function of the particular equipment involved. Nameplates for panelboards and switchboards shall include the panel designation, voltage and phase of the supply. For example, "Panel A, 277/480V, 3-phase, 4-wire." The name of the machine on the motor nameplates for a particular machine shall be the same as the one used on all motor starters, disconnect and P.B. station nameplates for that machine. Normal power nameplates shall be laminated phenolic plastic, white front and back with black core, with lettering etched through the outer covering; black engraved letters on white background. Lettering shall be 3/16 inch high at pushbutton stations, thermal overload switches, receptacles, wall switches and similar devices, where the nameplate is attached to the device plate. At all other locations, lettering shall 1/4-inch-high, unless otherwise detailed on the Drawings. Nameplates shall be securely fastened to the equipment with No. 4

Phillips, round-head, cadmium plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be non-ferrous metal not less than 0.03 inch thick, die stamped. In lieu of separate plastic nameplates, engraving directly on device plates is acceptable. Engraved lettering shall be filled with contrasting enamel. Equipment nameplate schedule for all equipment shall be submitted with shop drawing submittal for CONSULTANT's approval.

3. All junction and splice boxes shall be labeled using permanent label tags attached to boxes; not covers.

C. Wire and Cable Identification

1. All wire and cable shall be identified at each termination point and at each lighting control panel, pull box, splice box, junction box, terminal box, and manhole. Provide permanent, waterproof, non-metallic (paper unacceptable) tags indicating the circuit number in 3/16 inch letters.

2. Individual wires within equipment enclosures shall be identified using the equipment manufacturer's shop drawing wire numbers. Panel wire numbers and terminal numbers shall agree. Wire markers shall be waterproof and chemical resistant, plastic tags, and marker heat shrink system.

D. Signs

1. Warning signs shall comply with OSHA requirements and reasonable safety precautions.

PART 2 **PRODUCTS** (NOT APPLICABLE)

Refer to drawings and other specifications.

PART 3 **EXECUTION**

3.01 MEASUREMENT AND PAYMENT

A. There shall be no special measurement or payment for the work under this section. Refer to other specification sections for measurement and payment requirements.

The Contractor shall submit for payment a document or form listing all installed equipment and work performed for the dates that each payment covers.

END OF SECTION

SECTION 16050

BASIC MATERIALS AND METHODS

PART 1 GENERAL

1.01 SUBMITTALS

A. Submit data sheets on all items per Section 16000.

1.02 APPROVED MATERIALS

A. All materials shall be U.L. approved.

PART 2 PRODUCTS

2.01 GROUNDING MATERIALS

A. All ground rods shall be 8’ foot 5/8" copperclad, unless otherwise indicated.

B. Ground wires shall be soft drawn copper sized per National Electrical Code, unless otherwise indicated.

2.02 CONDUIT

A. Galvanized Rigid Conduit (ANSI C80.1)

1. Rigid galvanized steel conduit “RGS” shall be U.L. approved, Schedule 40, mild steel pipe, zinc-coated on the inside and outside. Fittings shall be zinc-coated, U.L. approved. Comply with ANSI Spec C80.1 and Federal Spec WW-C-581.

B. PVC Conduit

1. PVC conduit shall be Schedule 80 unless otherwise noted, and shall be U.L. approved. Comply with Federal Spec WC-1094 and NEMA TC-1.

C. Flexible Conduit

1. All flexible conduits shall be liquidtight, made of corrosion resistant plated steel with extruded polyvinyl covering and watertight connectors.

D. Refer to electrical drawings for additional requirements.

2.03 CABLE, WIRE AND CONNECTORS

A. 600 Volt Power Wiring

1. Cable shall be rated for 600 volts and shall meet the requirements below:

   a. Conductors shall be stranded.

   b. All wire shall be brought to the job in unbroken packages and shall bear the date of manufacturing; not older than 12 months.

   c. Type of wire shall be XHHW except where required otherwise by the contract drawings.

   d. No wire smaller than No. 12 gauge shall be used unless specifically indicated.

   e. Conductor metal shall be copper.

   f. All conductors shall be meggered after installation and insulation must be in compliance with the National Electrical Code.

2.04 TERMINATIONS AND SPLICES (600 VOLTS AND LESS)

A. Terminations of power cable shall be by means of U.L. approved connectors. All connectors shall meet U.L. 486B and shall be compatible with the conductor material.

B. Terminate all control and instrumentation cable with fork type compression lugs.

C. Splicing of power, control, or instrumentation wiring will not be allowed except by written approval of the CONSULTANT. Where splicing is allowed, splices shall be made with approved compression connectors, and splices shall be made waterproof regardless of location.

D. Where splicing is allowed inside pull boxes or enclosures; the Contractor shall use a water proof splices; these shall be 3M Scothcast Electrical Insulating Resin 4 with a 2 part epoxy insulating and encapsulating resin; no equal shall be allowed. Use these splice kits per the manufacturer's instructions.

2.05 CONCRETE MANHOLES AND PULL BOXES

A. Where indicated on plans; provide precast traffic rated concrete pull boxes and Quazite traffic rated pull boxes as indicated on the drawings. Pull boxes shall be installed on firmly compacted ground level and plumb at the elevations indicated on the drawings

Pull boxes shall be equipped with pulling-in irons opposite and below each duct way entrance. Pull boxes shall have cable supports so that each cable is supported at a minimum of 3 foot intervals within the pull box. Cable supports shall be fastened with galvanized bolts and shall be fabricated of fiberglass or galvanized steel.

B. Make provision for drainage as indicated on the drawings.

C. All wiring spices inside manholes and pull boxes shall be water proof. Contractor shall provide shop drawings for water proof splices, 3M kit or equal

D. Traffic rated covers shall be provided for pull boxes with identification as follows:

1. "ELECTRIC" where voltages within are 600 volts and less.

2.06 BOXES

A. Boxes for wiring devices (receptacles) installed outdoors shall be weatherproof fiberglass with polycarbonate cover plates. Junction boxes shall be fiberglass with gasketed covers. All boxes shall be securely mounted plumb and level in readily accessible locations. Indoor boxes shall have stainless steel cover plates.

B. All outdoor junction boxes and pull boxes shall be NEMA 4X stainless steel or fiberglass.

C. All fixtures shall be installed with its own dedicated pull box sized per NEC.

2.07 AUXILIARY GUTTERS

A. Gutters shall be provided per NEC article 374.

B. Minimum material for gutters shall be Aluminum

C. Submit shop drawing for all gutters.

D. Refer to details on drawings.

2.08 PANELBOARDS

A. Cabinets shall be of code gauge with ample wiring gutters for all wires and connections, minimum of 4 inches on all sides, minimum of 20 inches wide. Hinged door covering all switching device handles shall be included in all panel trims. Doors shall have semi-flush type cylinder lock and catch. All locks shall be master keyed with all other power and lighting panel boards. Provide a type-written directory on the inside of the door, under clear plastic frame.

B. Branch circuits shall be quick make, quick break, bolt on, thermal magnetic circuits of

the number of poles type, size and interrupting rating indicated. Ground fault interrupting breakers shall be provided where indicated. Panel shall be provided with main circuit breaker where indicated.

C. Panel bus structure shall be for voltage, phase and capacity indicated. Bus bars shall be silver plated and sized in accordance with UL standards. Provide full size neutral and ground busses.

D. Where indicated on drawings, panel shall be provided with electrically operated, mechanically held, magnetic contactor of the size and rating indicated.

E. Manufacturer shall be a UL listed vendor.

F. All panelboard breakers shall be 42kAIC rated (mains and branch devices)

F. Material and NEMA rating of panelboards shall be as indicated on drawings.

G. Provide and install PPE Arc Flash protective labels per NEC 110.16.

2.09 MOUNTING AND SUPPORTING ELECTRICAL EQUIPMENT

A. Furnish and install all supports, hangers, and inserts required to mount fixtures, conduits, cables, pull boxes, and other equipment furnished under this section or furnished for installation under this section.

B. Perforated straps and wire are not permitted for supporting electrical devices. Anchors shall be of approved types.

C. All supports, hangers, hardware, etc. used outdoors, in corrosive atmosphere, or in hazardous areas shall be non-ferrous, corrosion resistant, or 316 stainless steel. Supports shall be selected to avoid galvanic reactions. Support devices shall be submitted for approval.

2.10 SAFETY DISCONNECT SWITCH

A. Provide enclosed breaker disconnect, service entrance rated. Switches shall be heavy-duty, NEMA type H, quick-make, quick-break, visible blades, 600-volt, 3 pole with full cover interlock. Switches shall have copper Lugs.

B. Unless otherwise indicated, disconnects shall be 3-pole, nonfusible switch in a NEMA 3R, 316 stainless steel enclosure.

C. Switches shall be horsepower rated, as manufactured by the s UL listed vendor.

D. Units provided as main service disconnects, shall be service entrance rated, with a 42kIAC minimum rating.

2.11 LIGHTING CONTACTOR

A. Provide a lighting contactor. Contactor ampacity shall be rated for 30 Amps minimum or as called out on drawings. Lighting contactor shall include H-O-A switch. In Hand mode contactor shall activate lighting (bypassing any automatic lighting controls), in Off mode the lighting shall be turned off, and in Auto mode the lighting shall be controlled via photocell to turn on and off the contactor. HOA switch shall be provided on a deadfront behind front cover door of a lighting control panel.

B. Contactors shall be provided in a NEMA 3R enclosure.

2.12 24 HOUR/7 DAY ASTRONOMICAL TIMER

A. Provide a 24 hour, 7 day astronomical electronic timer, Tork EWZ103 or equivalent timer with a 40 Amp rating at 240V, housed in a NEMA 3R enclosure.

2.13 SPARE RACEWAYS

A. Spare raceways shall be tagged, and provided with pull string and capped at each end as indicated on the drawings. Where spares call for conduit stub ups these should not be taller than 6" above finished grade; refer to drawings.

2.14 DUCT SEAL

A. Provide Garvin Industries' duct seal or an approved equal

B. Provide and install duct seal at all conduit ends for all new conduit installations.

C. Duct seal shall be used to seal around junction boxes, control panels and the like. It shall be a permanently soft, non-toxic compound. It shall also not affect other plastic materials or corrode metals.

D. Duct seal shall be applied to the control panels, panelboards, disconnects, timers and controllers and other enclosures, terminal boxes conduit penetrations, MCC conduit penetrations, and disconnects. Apply to each penetration, but not more than 20-2" conduits per panel.

PART 3 EXECUTION

3.01 GROUNDING

A. Provide ground system as indicated on the drawings and as required by the National Electrical Code.

B. All raceways require grounding conductors. Metallic raceways are not adequate

grounding paths. Bonding conductors through the raceway systems shall be continuous from main switch ground buses to panel ground bars of panelboards, and from panel grounding bars of panelboards, and motor control centers to branch circuit outlets, motors, lights, etc. THESE GROUND CONDUCTORS ARE REQUIRED THROUGHOUT THE PROJECT REGARDLESS OF WHETHER CONDUIT RUNS SHOW GROUND CONDUCTORS ON THE DRAWINGS.

C. All connections made below grade shall be of the exothermic type.

3.02 GROUND TESTING

A. The CONTRACTOR shall test ground resistance of each grounding electrode or combination of electrodes. Testing shall not be performed within 48 hours of rainfall. All test equipment shall be provided by the CONTRACTOR and approved by the CONSULTANT. Dry season resistance of each electrode(s) shall not exceed 10 ohms. If such resistance cannot be obtained with the system as installed, the CONTRACTOR shall provide additional grounding rods as required.

B. All grounding system continuity shall be checked with a low range ohmmeter.

C. The CONTRACTOR shall provide a written report for all grounding resistance tests to the CONSULTANT. The report shall be signed by the tester and shall include: test date, time, weather conditions on test date and for three (3) consecutive days prior to the test date location and results.

3.03 CONDUIT

A. Locations: Conduits shall be used as follows:

1. Galvanized rigid conduit shall be used for all power service drop risers.

2. Schedule 80 PVC conduit shall be used underground and embedded in concrete. Where conduit turns up to come out of the ground, Schedule 80 PVC shall be used. All underground conduits shall have a minimum of 24 inches cover, under roadways shall have minimum 36 inches cover.

B. Installation

1. Conduits subjected to rough handling or usage shall be removed from the premises.

2. Conduits must be kept dry and free of water or debris with approved pipe plugs or caps. Care shall be given that plugs or caps be installed before pouring of concrete.

3. Where conduits pass through exterior concrete walls or fittings below grade, the entrances shall be made watertight. This shall be done by providing pipe sleeves in the concrete with one half inch minimum clearance around the conduits and caulking with askum and sealant, or by means of conduit entrance seals.

4. In furred ceilings, conduit runs shall be supported from structure, not furring.

5. Conduits entering panelboards, pull boxes, or outlet boxes shall be secured in place by galvanized locknuts and bushings, one (1) locknut outside and one (1) locknut inside of box with bushing on conduit end. The locknuts shall be tightened against the box without deforming the box. Bushings shall be of the insulating type.

6. Field conduit bends shall be made with standard tools and equipment manufactured especially for conduit bending.

7. Where embedded conduits cross expansion joints, furnish and install offset expansion joints or sliding expansion joints. Sliding expansion joints shall be made with straps and clamps.

8. Exposed runs of conduits shall be installed with runs parallel or perpendicular to walls, structural members or intersections of vertical planes and ceilings, with right angle turns consisting of symmetrical bends or pull boxes as indicated on the drawings. Bends and offsets shall be avoided where possible.

9. Conduits in structural slabs shall be placed between the upper and the lower layers of reinforcing steel, requiring careful bending of conduits. Conduits embedded in concrete slabs shall be spaced not less than eight (8) inches on centers or as widely spaced as possible where they converge at panels or junction boxes. Conduits running parallel to slab supports, such as beams, columns and structural walls, shall be installed not less than 12 inches from such supporting elements. To prevent displacement during concrete pour, saddle supports for conduit, outlet boxes, junction boxes, inserts, etc., shall be secured.

10. Conduit runs shall always be concealed except where indicated on plans.

11. Pull wires shall be installed in all empty conduits. Pull wires shall be No. 12 gauge copper. All pull wires shall be identified with conduit number at each end.

12. The use of running threads is prohibited, and where some such device is necessary, split couplings, Erickson couplings, or equal shall be used. Where watertight conduit installations are required, watertight conduit unions shall b used.

13. Where conduits are run individually, they shall be supported by approved pipe straps, secured by means of toggle bolts on hollow masonry; expansion shields and machine screws or standard preset inserts on concrete or solid masonry; machine screws or bolts on metal surfaces, and wood screws on wood construction. The use of perforated straps or wires will not be permitted.

14. Concrete inserts and pipe straps shall be galvanized. Steel bolts, galvanized or cadmium-plated. Individual hangers, trapeze hangers and rods shall be prime-coated and painted.

15. Wire shall not be installed until all work of any nature that may cause damage is completed, including pouring of concrete. Mechanical means shall not be used in pulling in wires No. 8 or smaller.

16. Underground conduits not under concrete slabs, are to be buried at least two (2) feet below finished grade for circuits rated 600 volts or less, except under traffic areas where motor vehicles may cross. Under traffic areas, conduits are to be buried at least three (3) feet below finished grade.

17. All conduits shall be cleaned by pulling a brush swab through before installing cables.

18. All conduits shall be sealed at each end with electrical putty. Special care shall be taken at all equipment where entrance of moisture could be detrimental to equipment.

19. Where steel conduit penetrates ground or concrete, the conduit shall be painted with two (2) coats of asphaltic base paint one (1) foot on each side of penetration.

20. No more than two (2) feet of flexible conduit shall be used at connections of motors, transformers, irrigation pumps or valves, field instruments, and other items of equipment where vibration is present.

3.04 WIRES, CABLES AND CONNECTIONS

A. Cables pulled into conduits shall be pulled using pulling eyes attached to conductors.

B. Where exposed in manholes and pull boxes, cables shall be wrapped using 3M 77 Scotch electrical fireproofing tape or approved equal. Wrapping shall be made using 50 percent lap.

C. Shields shall be grounded at all splice and termination points.

D. A loop of each conductor shall be provided in each manhole to facilitate the addition of future tee splices.

3.05 BOXES

A. Installation of boxes shall be in accordance with the National Electrical Code requirements.

B. Boxes shall be mounted plumb and level in accessible locations and mounting shall be secure, vibration resistant, and galvanically compatible. Hardware shall be used that is specifically intended for the purpose. When mounted in corrosive, dam or wet locations, stainless steel hardware shall be utilized.

C. Enclosure sizes called out in the drawings are minimum; the Contractor shall increase the enclosure or box size as required by the NEC.

3.06 WIRING DEVICES

A. Wiring devices shall be installed in devices boxes approved for the application. All connections shall be made with screw terminals.

3.07 SUPPORTING DEVICES

A. All surface or slab mounted devices (control panels, transformers, etc.) shall be securely anchored to the slabs, concrete pads, or floors. Refer to details on the drawings, and where installation instructions or recommendations are made by manufacturer, these recommendations shall be adhered to; provide all 316 SS fasteners and additional material as required.

END OF SECTION

SECTION 16345

SHORT-CIRCUIT, COORDINATION STUDY AND ARC FLASH HAZARD STUDY

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish short-circuit and protective device coordination studies as prepared by the electrical equipment manufacturer or an approved Engineering firm.

B. The Contractor shall furnish an Arc Flash Hazard Analysis Study per the requirements set forth in the NFPA 70E – Standard for Electrical Safety in the Workplace. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA70E-2204, Annex D.

C. The scope of the studies shall include all new equipment and existing equipment listed at this control structure, the new power company service, refer to this specification and the drawings for additional information.

D. Provide Arch Flash Protection labels with arc flash levels based on the arc flash study; obtain the power company fault current for the utility service, and the following equipment: the Meter, Main Breaker, Panelboard, Pump Disconnect, Lighting Contactor.

E. Arch flash labels shall be provided and installed on applicable equipment listed herein.

1.02 REFERENCES

A. Institute of Electrical and Electronics Engineers, Inc. (IEEE):

1. IEEE 141 – Recommended Practice for Electric Power Distribution and Coordination of Industrial and Commercial Power Systems

2. IEEE 242 – Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems

3. IEEE 399 – Recommended Practice for Industrial and Commercial Power System Analysis

4. IEEE 241 – Recommended Practice for Electric Power Systems in Commercial Buildings

5. IEEE 1015 – Recommended Practice for Applying Low-Voltage Circuit Breakers Used in Industrial and Commercial Power Systems

6. IEEE 1584 – Guide for Performing Arc-Flash Hazard Conditions

B. American National Standards Institute (ANSI):

1. ANSI C57.1200 – Standard General Requirements for Liquid-Immersed Distribution, Power and Regulating Transformers

2. ANSI C37.13 – Standard for Low Voltage AC Power Circuit Breakers Used in Enclosures

3. ANSI C37.010 – Standard Application Guide for AC High Voltage Circuit Breakers Rated on a Symmetrical Current Basis

4. ANSI C 37.41 – Standard Design Tests for High Voltage Fuses, Distribution Enclosed Single-Pole Air Switches, Fuse Disconnecting Switches and Accessories.

C. The National Fire Protection Association (NFPA)

1. NFPA 70 – National Electrical Code, latest edition

2. NFPA 70E – Standard for Electrical Safety in the Workplace

1.03 SUBMITTALS FOR REVIEW/APPROVAL

A. The short-circuit and protective device coordination studies shall be submitted to the Design Engineer prior to receiving final approval of the distribution equipment shop drawings and prior to release of equipment drawings for manufacturing.

1.04 SUBMITTALS FOR CONSTRUCTION

A. The results of the short-circuit, protective device coordination and arc flash hazard analysis studies shall be summarized in a final report. Quantities of copies shall be per shop drawing quantities. Copies of the short-circuit input and output data shall be provided on CD in PDF format.

B. The report shall include the following sections:

1. Executive Summary

2. Descriptions, purpose, basis and scope of the study

3. Tabulations of circuit breaker, fuse and other protective device ratings versus calculated short circuit duties.

4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip unit settings, fuse selection.

5. Fault current calculations including a definition of terms and guide for interpretation of the computer printout.

6. Details of the incident energy and flash protection boundary calculations.

7. Recommendations for system improvements, where needed.

8. One-line diagram in AutoCAD format.

C. Detailed non-generic arc flash labels shall be provided fro all new equipment.

1.05 QUALIFICATIONS

A. The short-circuit, protective device coordination and arc flash hazard analysis studies shall be conducted under the supervision and approval of a Registered Professional Electrical Engineer skilled in performing and interpreting the power system studies.

B. The Registered Professional Electrical Engineer shall be a full-time employee of the equipment manufacturer or an approved Engineering firm.

C. The equipment manufacturer or approved engineering firm shall demonstrate experience with Arc Flash Hazard Analysis by submitting names of at least ten actual arc flash hazard analysis it has performed.

D. Paul Lawrence, 321-452-4019, pblpe452@cfl.rr.com, is an approved study planner.

1.06 COMPUTER ANALYSIS SOFTWARE

A. The studies shall be performed using the latest revision of the SKM Systems Analysis Power*Tools for Windows (PTW) software program.

1.07 SYSTEM STUDY PROVIDER

A. The system study provider shall be provided by Square D, Eaton, General Electric or Paul Lawrence or other approved equal.

PART 2 PRODUCT

2.01 STUDIES

A. Contractor to furnish short-circuit and protective device coordination studies as prepared by equipment manufacturer or an approved Engineering firm.

B. The Contractor shall furnish an Arc Flash Hazard Analysis Study per NFPA 70E – Standard for Electrical Safety in the Workplace, reference Article 130.3 and Annex D.

2.02 DATA COLLECTION

A. Contractor shall furnish all data as required by the power system studies. The system study Engineer performing the short-circuit performing the short-circuit protective device coordination and arc flash hazard analysis studies shall furnish the Contractor with a listing of required data immediately after award of the contract. The Contractor shall expedite collection of the data to assure completion of the studies as required for final approval of the equipment shop drawings and/or prior to the release of the equipment for manufacturing.

B. Source contributions shall include present and known future motors and generators.

C. Load data utilized shall include existing and proposed loads. Field investigation shall be required by the Contractor to obtain existing loads.

D. If applicable, include fault contribution of existing motors in the study. The Contractor shall obtain required existing equipment data to satisfy the study requirements.

E. Contractor shall coordinate with the power company to obtain the utility fault current. Contractor shall verify the fault current data on the drawings.

2.03 SHORT-CIRCUIT AND PROTECTIVE DEVICE EVALUATION STUDY

A. Use actual conductor impedances.

B. Transformer design impedances shall be used when test impedances are not available.

C. Provide the following:

1. Calculation methods and assumptions

2. Selected base per unit quantities

3. One-line diagram of the system being evaluated

4. Source impedance data, including electric utility system and motor fault contribution characteristics.

5. Tabulations of calculated quantities.

6. Results, conclusions and recommendations.

D. Calculate short-circuit momentary and interrupting duties for a three-phase bolted fault at each applicable location. Locations shall include the following unless otherwise noted in the specifications or indicated in the drawings.

1. Electric utility's supply termination point

2. Incoming switchgear

3. Unit substation primary and secondary terminals.

4. Low voltage switchgear or distribution panels.

5. Motor control centers

6. Standby generators and automatic transfer switches

7. Branch circuit panelboards

8. Other significant locations throughout the system

E. For grounded systems, provide a bolted line-to-ground fault current study for areas as defined for the three-phase bolted fault short-circuit study.

F. Protective Device Evaluation:

1. Evaluate all applicable equipment and protective devices and compare to short circuit ratings.

2. Address adequacy of switchgear, motor control centers and panelboard bus bars to withstand short-circuit stresses.

3. Notify Owner in writing of existing circuit protective devices improperly rated for the calculated available fault current.

2.04 PROTECTIVE DEVICE COORDINATION STUDY

A. Proposed protective device coordination time-current curves (TCC) shall be displayed on log-log scale graphs.

B. Include on each TCC graph, a complete title and one-line diagram with legend identifying the specific portion of the system covered.

C. Terminate device characteristic curves at a point reflecting maximum symmetrical or asymmetrical fault current to which the device is exposed.

D. Identify the device associated with each curve by manufacturer type, function, and if applicable, tap, time delay and instantaneous settings recommended.

E. Plot the following characteristics on the TCC graphs, where applicable:

1. Electric utility's overcurrent protective device.

2. Medium voltage equipment overcurrent relays.

3. Medium and low voltage fuses including manufacturer's minimum melt, total clearing, tolerance and damage bands..

4. Low voltage equipment circuit breaker trip devices, including manufacturer's tolerance bands.

5. Transformer full-load current, magnetizing inrush current and ANSI through-fault protection curves.

6. Conductor damage curves.

7. Ground fault protective devices, as applicable.

8. Pertinent motor starting characteristics and motor damage points, where applicable.

9. Pertinent generator short-circuit decrement curve and generator damage point.

10. The largest feeder circuit breaker in each motor control center and applicable panelboard.

F. Provide adequate time margins between device characteristics such that selective operation is provided, while providing proper protection.

2.05 ARC FLASH HAZARD ANALYSIS

A. The arc flash hazard analysis shall be performed according to the IEEE 1584 equations that are presented in NFPA 70E-2004, Annex D.

B. The flash protection boundary and the incident energy shall be calculated at all significant locations in the electrical distribution system (switchboards, switchgear, motor-control centers, panelboards, busway and the like) where work could be performed on energized parts.

C. The Arc Flash Hazard Analysis shall include all significant locations on 480 volt, 240 volt and 208 volt systems.

D. Safe working distances shall be based upon the calculated arc flash boundary considering incident energy of 1.2 cal/cm^2.

E. When appropriate, the short circuit calculations and the clearing of the phase overcurrent devices will be retrieved from the short-circuit and coordination study model. Ground overcurrent relays should not be taken into consideration when determining the clearing time when performing incident energy calculations.

F. The short-circuit calculations and the corresponding incident energy calculations for multiple system scenarios must be compared and the greatest incident energy must be uniquely reported for each equipment location. Calculations must be performed to represent the maximum and minimum contributions of fault current magnitude for all normal and emergency operating conditions. The minimum calculation will assume that the utility contribution is at a minimum and will assume a minimum motor contribution (all motors off). Conversely, the maximum calculation will assume a maximum contribution from the utility and will assume the maximum amount of motors to be operating. Calculations shall take into consideration the parallel operation of synchronous generators with the electric utility, where applicable.

G. The incident energy calculations must consider the accumulation of energy over time when performing arc flash calculations on buses with multiple sources. Iterative calculations must take into account the changing current contributions, as the sources are interrupted or decremented with time. Fault contribution from motors and generators should be decremented as follows:

1. Fault contribution form induction motors should not be considered beyond 3-5 cycles.

2. Fault contribution from synchronous motors and generators should be decayed to match the actual decrement of each as closely as possible (e.g. contributions from permanent magnet generators will typically decay from

10 per unit to 3 per unit after 10 cycles).

H. For each equipment location with a separately enclosed main device (where there is adequate separation between the line side terminals of the main protective device and the work location), calculations for incident energy and flash protection boundary shall include both the line and load side of the main breaker.

I. When performing incident energy calculations on the line side of a main breaker as required per above, the line side and load side contributions must be included in the fault calculation.

J. Miscoordination shall be checked among all devices within the branch containing the immediate protective device upstream of the calculation location and the calculation should utilize the fastest device to compute the incident energy for the corresponding location.

K. Arc Flash calculations shall be based on actual overcurrent protective device clearing time. Maximum clearing time will be capped at 2 seconds based on IEEE 1584-2002 Section B.1.2. Where it is not physically possible to move outside of the flash protection boundary in less than 2 seconds during an arc flash event, a maximum clearing time based on the specific location shall be utilized.

L. Detailed Personnel Protective Equipment Warning Label

Example:

! WARNING

Arc Flash and Shock Hazard Required

43 inch *	Flash Hazard Boundary
3.16 *	cal/cm^2 Flash Hazard at 24 inches
Class 1*	FR Shirt and Pants
480 VAC *	Shock Hazard when cover is removed
42 inch *	Limited Approach
12 inch *	Restricted Approach
1 inch *	Prohibited Approach

Bus Name: MCC Bus, Prot Device: 1600 T/M LVB

2.06 REPORT SECTIONS

A. Input data shall include, but not be limited to the following:

1. Feeder input data including feeder type (cable or bus), size, length, number per phase, conduit type (magnetic or non-magnetic) and conductor material (copper or aluminum).

2. Transformer input data, including winding connections, secondary neutral-ground connection, primary and secondary voltage ratings, kVA rating, impedance, % taps and phase shift.

3. Reactor data, including voltage rating and impedance.

4. Generation contribution data, (synchronous generators and Utility), including short-circuit reactance (X"d), rated MVA rated voltage, three-phase and single line-ground contribution (for Utility sources) and X/R ratio.

5. Motor contribution data (induction motors and synchronous motors), including short-circuit reactance, rated horsepower or kVA, rated voltage and XR ratio.

B. Short-Circuit Output Data shall include, but not be limited to the following reports:

1. Low Voltage Fault Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

a. Voltage

b. Calculated fault current magnitude and angle

c. Fault point X/R ratio

d. Equivalent impedance

2. Momentary Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

a. Voltage

b. Calculated symmetrical fault current magnitude and angle

c. Fault point X/R ratio

d. Calculated asymmetrical fault currents

e. Equivalent impedance

3. Interrupting Duty Report shall include a section for three-phase and unbalanced fault calculations and shall show the following information for each applicable location:

a. Voltage

b. Calculated symmetrical fault current magnitude and angle.

c. Fault point X/R ratio

d. No AC Decrement (NACD) Ratio

e. Equivalent impedance

f. Recommended Protective Device Settings:

4. Phase and Ground Relays:

a. Current transformer ratio

b. Current setting

c. Time setting

d. Instantaneous setting

e. Recommendations on improved relaying systems, if applicable.

5. Circuit Breakers:

a. Adjustable pickups and time delays (long time, short time, ground)

b. Adjustable time-current characteristic

c. Adjustable instantaneous pickup

d. Recommendations on improved trip systems, if applicable.

G. Incident energy and flash protection boundary calculations

1. Arcing fault magnitude

2. Protective device clearing time

3. Duration of arc

4. Arch flash boundary

5. Working distance

6. Incident energy

7. Hazard Risk Category

8. Recommendations for arc flash energy reduction

PART 3 EXECUTION

3.01 FIELD ADJUSTMENT

A. Adjust relay and protective device settings according to the recommended settings table provided by the coordination study.

B. Make minor modifications to equipment as required to accomplish conformance with short circuit and protective device coordination studies.

C. Notify Owner in writing of any required equipment modifications.

3.02 ARC FLASH WARNING LABELS

A. The study provider of the Arc Flash Hazard Analysis shall provide a 3.5 in. x 5 in. thermal transfer type label of high adhesion polyester for each work location analyzed. Labels shall be installed by the Contractor.

B. The label shall be based on recommended overcurrent device settings and will be provided after the results of the analysis have been presented to the Owner and after any system changes, upgrades or modifications have been incorporated in the system.

C. The label shall include the following information, at a minimum:

1. Location designation

2. Nominal voltage

3. Flash protection boundary

4. Hazard risk category

5. Incident energy

6. Working distance

7. Engineering report number, revision number and issue date.

D. Labels shall be machine printed, with no field markings.

E. Unless otherwise indicated on the drawings or noted in the specifications, existing equipment shall not be provided with arch flash labels.

F. Arc flash labels shall be provided in the following manner and all labels shall be provided as applicable.

1. For each 480, 240 and applicable 208-volt panelboards, one arc flash label shall be provided per panel.

2. For each motor control center, one arc flash label shall be provided.

3. For each low voltage switchboard, one arc flash label shall be provided.

4. For each switchgear, one flash label shall be provided.

5. For medium voltage switches, one arc flash label shall be provided.

E. Labels shall be field installed by the Contractor.

3.03 ARC FLASH TRAINING

A. The Contractor of the Arc Flash Hazard Analysis shall train the Owner's qualified electrical personnel of the potential arc flash hazards associated with working on energized equipment (minimum of 4 hours).

END OF SECTION

SECTION 16527
OUTDOOR LIGHTING SYSTEMS

PART 1 GENERAL

1.01 SCOPE

A. The Contractor shall furnish all materials, parts, equipment and labor necessary for the replacement and installation of new lighting, poles, fixtures, hand holes, and electrical system as specified and/or implied by these plans, drawings and specifications. All materials for a complete and functional system shall be provided.

1. Major components include:

a. Poles, Pole lights and fixtures, lighting hand hole/pull box, and accessories, refer to drawings

b. Mounting hardware, as required per drawings

c. One spare lighting fixture.

d. One spare Lighting pole.

e. Decorative Luminaires with mounting equipment

f. Six (6) spare fuses of each type used.

g. UL listed Electrical equipment as called out on drawings and other specification sections.

h. Fuses, surge arrestors, panelboards, service rack, and pull boxes shall be provided and installed as indicated on drawings.

1.02 COORDINATION

A. Contractor shall coordinate with pole vendor and luminaire vendor to be sure all pole mounted equipment is included.

B. Contractor shall coordinate mounting location with other trades, utilities and the like and avoid conflicts.

C. Contractor shall coordinate new service points with Power Company.

1.03 CONTRACTOR'S DUTIES

A. All work performed under this contract shall be performed in accordance with all provisions of these specifications or drawings and must be approved in writing by the Owner or his representative. The Contractor shall be presumed to have made a reasonable inspection of the premises prior to the time of bidding and shall be held responsible for all information available through such inspections. The Contractor shall immediately upon discovery, bring to the attention of the Owner and Engineer any conflicts which may occur among the various provisions of the specifications and plans.

1.04 MATERIAL QUALITY

A. All materials supplied by the Contractor under the provisions of these specifications and drawings shall be new materials of the kind and character called for by the specifications. Defective equipment or material damaged in the course of installation or tests shall be replaced or repaired in a manner satisfactory to the Owner. All materials and equipment to be furnished under these specifications shall be the standard product of a manufacturer regularly engaged in the production of such material and shall be the manufacturer's current standard design.

1.05 ALTERNATE MATERIALS

A. No substitution of materials shall be permitted.

1.06 SUBMITTALS OF PLANS AND SPECIFICATIONS

A. Provide submittals per the general conditions.

B. Minimum submittal data

1. Lighting pole and fixture assembly design showing pole, pole base and foundation, include dimensions and assembly details, refer to the drawing details also.

2. Drawings of the decorative lighting poles meeting or exceeding specified criteria as indicated on the drawings. No substitutes.

3. Fuses, fuse holders, and water proof splice kits, including UL listed wire gauge reducers.

4. Lighting/surge arrestor and grounding rod as indicated on details.

5. Pull Boxes, hand holes, including manufacturer's traffic loading data per details.

6. Written statements of model number and manufacturer for all equipment bid.

7. Written warranty from the manufacturer covering entire structure as outlined in specifications.

8. Certified Engineer, independent of manufacturer, shall verify and sealed wind load test of luminaire assembly to meet or exceed structural strength per Florida Building Code wind loading requirements, latest edition.

9. Lighting Contactor shall be controlled by 24 hour 7 day astronomical electronic timer. Contractor shall provide and install timer onto equipment rack as indicated on the drawings.

1.07 CODES, PERMITS AND LICENSES

A. All work shall comply with the applicable rules of the National Electrical Code, the National Electrical Safety Code, the National Fire Codes, (published by the National Fire Protection Association), state and local codes and ordinances and the terms and conditions of the services of the electrical utility, as well as any other authorities that may have lawful jurisdiction pertaining to the work specified. None of the terms or provisions of this specification shall be construed as waiving any other rules, regulations or requirements of these authorities. The Contractor shall procure all necessary permits or licenses to carry out his work, and shall pay the lawful fee therefore, as well as for any inspection fee or the cost of any certificate of approval.

B. All electrical materials used shall be Underwriter Laboratory listed, including but not limited to the luminaire assembly unit.

C. In any instance where these specifications call for materials for construction of a better quality or larger size than required by the codes, the provisions of these specifications shall take precedence. Conversely, should the codes call for better quality or larger size, the codes will govern.

1.08 FINAL APPROVAL

A. The entire electrical system shall be tested by the Contractor in the presence of the Owner/Engineer.

B. All major electrical equipment, including the main disconnect switch, lighting contactor, panel board breaker and safety switch shall be operated under load conditions. Every fixture shall be lighted and any special equipment shall be tested and operated. Any defects in workmanship, material or equipment, or any ground or short circuits shall be corrected by the Contractor before final acceptance.

PART 2 PRODUCTS

2.01 LIGHT STRUCTURE SYSTEM

A. Decorative poles, coordinate mounting requirements with base, per manufacturer recommendations, see detail indicated on drawings.

B. Fixture consisting of lamp, lamp socket, LED driver, Decorative fixture lens

C. U.L. listed fusing for the lamp circuits.

D. Provide hand hole per the drawings in poles.

2.02 LAMPS

A. Lamps shall be LED type, Acorn decorative fixtures dark sky compliant, and as indicated per drawings, including spares.

2.03 GROUND FAULT CIRCUIT INTERRUPTOR (GFCI) RECEPTACLE

A. None provided.

2.04 WATER PROOF SPLICE KITS

A. Provide water proof splice kits at all splice locations. These kits shall use UL approved Resin 4 with a 2 part insulating and encapsulating epoxy resin, as manufactured by an approved vendor for products under categorized as water proof wiring harness as may be required.

2.06 SURGE PROTECTION

A. All light fixtures shall be provided at each structure at least one surge arrestor.

2.07 LIGHTING MATERIALS

A. Lighting fixtures assemblies shall be provided as indicated and tagged on the drawings.

PART 3 EXECUTION

3.01 INSTALLATION

A. Backfill – The pole base shall be installed in an excavation as prescribed by the Broms or UBC standards for foundation design.

B. Electrical Wiring – The pole and the luminaries shall be designed such that all wiring remains underground before entering the base of the pole and that no wiring shall be exposed to sun or weather as it transitions through the pole and to the ballast and on to each lamp.

C. Lighting Electrical Wiring – The Contractor shall provide traffic rated pull boxes, see details on drawings, with water proof splices per the Contract Documents. Due to voltage drop and long wire runs, the Contractor shall provide pull boxes with water proof fuse holders, and distribution power blocks and Polaris taps for each wire, hot neutral and ground.

D. Provide wireway below lighting panel and install insulated Polaris taps and reduce street lighting circuits from wire gauge size, refer to electrical oneline and details on drawings.

3.02 TESTING

A. The Electrical Engineer will perform a night time test at the completion of the installation; the Engineer will be measuring lighting levels at different locations of the project areas; the Contractor shall make available personnel to assist the Engineer and have lighting on during the testing. This shall be scheduled at a time convenient to the Engineer.

END OF SECTION

WIRX ENGINEERING

Geotechnical Engineering Report

Lake Worth Road / 120th Avenue Intersection Improvements Project

Village of Wellington, Florida

WIRX Project No. 2504001
Submission Date: May 14, 2025

Prepared for:

MOCK • ROOS
CONSULTING ENGINEERS

Mock, Roos & Associates, Inc.
5720 Corporate Way
West Palm Beach, Florida 33407

May 14, 2025

Mock, Roos & Associates, Inc.
5720 Corporate Way
West Palm Beach, Florida 33407

Attn: Mr. Garry G. Gruber, P.E.
Direct: (561) 472-6293
Email: garry.gruber@mockroos.com

Subject: **Geotechnical Engineering Report**
Lake Worth Road / 120th Avenue Intersection Improvements Project
Village of Wellington, Palm Beach County, Florida
WIRX Project No. 2504001

WIRX Engineering, LLC (WIRX) is pleased to submit this Geotechnical Engineering Report for the above-referenced project. Our services were performed in general accordance with our proposal dated August 22, 2024, and the Professional Services Agreement dated March 20, 2025.

This report presents the results of our field exploration and laboratory testing programs, and provides our geotechnical recommendations for the Lake Worth Road / 120th Avenue Intersection Improvements Project located in the Village of Wellington, Palm Beach County, Florida.

We appreciate the opportunity to be of service to Mock, Roos & Associates, Inc. (Mock-Roos) on this project. Should you have any questions regarding the report, or if we can be of further assistance as this project develops, please contact us at (954) 451-0354.

Sincerely,

WIRX Engineering, LLC

This document has been digitally signed and sealed by Andrew Nixon, P.E. on the date indicated here.

Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Andrew Nixon, P.E.
Senior Engineer
Florida Registration No. 71458

TABLE OF CONTENTS

1.0 INTRODUCTION 1

2.0 PROJECT DESCRIPTION 1

3.0 SCOPE OF WORK 2

4.0 USDA SOIL SURVEY REVIEW 3

5.0 FIELD EXPLORATION 3

5.1 PAVEMENT CORES 4
5.2 STANDARD PENETRATION TEST BORINGS 5
5.3 AUGER BORINGS 6
5.4 VIBRACORE BORINGS 6
5.5 EXFILTRATION TESTS 6

6.0 LABORATORY TESTING 7

7.0 SUMMARY OF SUBSURFACE CONDITIONS 7

7.1 SOIL STRATIGRAPHY 7
7.2 CANAL SEDIMENTS 8
7.3 GROUNDWATER 8

8.0 RECOMMENDATIONS 8

8.1 GENERAL 8
8.2 GENERAL SITE PREPARATION RECOMMENDATIONS 8
8.2.1 Clearing and Grubbing 8
8.2.2 Select Fill, Placement & Compaction 9
8.2.3 Excavations 9
8.2.4 Dewatering 10
8.2.5 Pipe Bedding 10
8.2.6 Trench Backfill and Compaction 10
8.2.7 Canal Backfill 11
8.3 FOUNDATION RECOMMENDATIONS 11
8.4 SOIL PARAMETERS FOR UNDERGROUND STRUCTURES 11
8.5 PAVEMENT DESIGN CONSIDERATIONS 12

9.0 MONITORING OF EXISTING STRUCTURES 13

10.0 LIMITATIONS 13

ATTACHMENTS

Sheet 1 – Site Vicinity Map
Sheet 2 – USDA Soil Survey Map
Sheet 3 – Test Location Plan
Sheets 4A to 4B – Subsurface Profiles
Table A-1: Summary of Field Permeability Test Results
Table A-2: Summary of Laboratory Test Results

Appendix A

Asphalt Core Log
Vibracore Sample Log

1.0 INTRODUCTION

This Geotechnical Engineering Report was prepared for the Lake Worth Road / 120th Avenue Improvements Project (Project) located in the Village of Wellington, Palm Beach County, Florida. The primary purpose of the subsurface geotechnical exploration was to obtain information regarding the subsurface materials at the proposed Project site to assist the design team with the design of the project. This report includes geotechnical exploration data, groundwater information, laboratory and engineering analysis, recommendations for design, and other site-specific information that may affect construction and earthwork operations for the proposed Project.

The information presented in this report is based upon our interpretation of the subsurface information revealed by the performance of pavement corings and soil borings. The report does not reflect variations in subsurface conditions that may exist between or beyond these borings. Variations in soil and groundwater conditions should be expected, the nature and extent of which might not become evident until construction is undertaken. If variations are encountered, and/or the scope of the Project altered, we should be consulted for additional recommendations.

2.0 PROJECT DESCRIPTION

We understand that the proposed Project consists of roadway and drainage improvements at the intersection of Lake Worth Road and 120th Avenue in the Village of Wellington, Florida. The location of the project is shown on the attached **Site Vicinity Map, Sheet 1**. A Conceptual Plan, dated December 27, 2022, was provided by Mock-Roos and is shown in Figure 1 below. The project will include the construction of a roundabout at the intersection for safety and operational benefits. The widened footprint of the intersection will result in the adjacent C-24 Canal and C-7 Canal being partially filled in to support the new roadway embankments.

Figure 1 – Conceptual Project Layout

3.0 SCOPE OF WORK

WIRX Engineering, LLC (WIRX) performed the following services in accordance with the proposed scope of work:

1. Completed a site visit to field stake/mark the planned boring locations and observe the existing site conditions.

2. Contacted Sunshine 811 to request field location and clearance of underground utilities in the areas of the borings as per Florida Statutes.

3. Prepared a Temporary Traffic Control (TTC) Plan and implemented it during our field exploration for traffic control and safety purposes in accordance with the Florida Department of Transportation's (FDOT's) *"Standard Plans for Road Construction"*.

4. Mobilized a truck-mounted drill rig and personnel.

5. Obtained three (3) pavement cores to determine pavement thickness and the nature and thickness of the base material.

6. Performed five (5) Standard Penetration Test (SPT) borings to a depth of 10 feet and one (1) SPT boring to a depth of 20 feet in accordance with ASTM D-1586.

7. Performed two (2) South Florida Water Management District (SFWMD) exfiltration tests within 10 feet deep boreholes to obtain soil hydraulic conductivity values for others to use in the design of drainage facilities. The tests were performed in accordance with the methods described in the SFWMD "*Permit Information Manual, Volume IV*".

8. Following completion of the drilling operations, the boreholes were backfilled with grout and the asphalt surface patched, where appropriate.

9. Performed four (4) Vibracore borings within the adjacent canals to evaluate the thickness of the surficial sediment deposits within the canals.

10. An Engineer visually classified the collected soil samples in the field using the American Association of State Highway and Transportation Officials (AASHTO) Soil Classification System in accordance with ASTM D 3282. Representative samples were sealed in standard glass sample jars with air-tight rubber rings and labeled with the project name, boring number, sample number, sample depth, and date of sampling. A limited laboratory testing program was assigned and performed to identify soil index properties and assist in the final classification of the soils for highway construction.

11. Performed a geotechnical analysis and prepared this geotechnical engineering report which includes the results of the borings and field testing, the pavement cores, the exfiltration tests, the soil laboratory testing, recommendations regarding proposed backfilling and compaction, pipeline bedding, and other considerations for site construction including utility excavations and pavement design.

4.0 USDA SOIL SURVEY REVIEW

The U. S. Department of Agriculture, Natural Resources Conservation Service (USDA, NRCS) Web Soil Survey of Palm Beach County shows the project area to be underlain by two (2) main soil units. The USDA soil unit descriptions are presented in the following Table 1:

Table 1: USDA Soil Units

Palm Beach County Soil Units & Description	Permeability	USDA Environmental Classification*
Pineda Fine Sand (29): The Pineda series consists of nearly level, poorly drained, sandy soils over loamy material. These soils are on broad, low flatwoods and in grassy sloughs. They formed in sandy and loamy marine sediments. Under natural conditions, the water table is within 10 inches of the surface for 1 to 6 months in most years and within 10 to 30 inches most of the remainder of each year, except during extended dry periods. Water covers depressions for 1 to 3 months. In a representative pedon the surface layer is dark grayish brown sand about 3 inches thick. Below this is about 16 inches of yellowish brown and brownish yellow sand. The next layer is light gray sand about 15 inches thick. A grayish brown sandy loam that has vertical sandy tongues that extend from the layer above is at a depth of 34 inches. The underlying material is a mixture of light gray sand and shell fragments below a depth of 44 inches.	0 to 34”: 6-20 in/hr 34 to 44”: 2-6 in/hr 44 to 62”: 6-20 in/hr	Risk of Corrosion Uncoated Steel: High Concrete: Low
Riviera Fine Sand (36): The Riviera series consists of nearly level, poorly drained soils that have a loamy subsoil. These soils are on broad, low areas and in depressions. They formed in beds of sandy and loamy marine sediment. Under natural conditions, the water table is within 10 inches of the surface for 2 to 4 months in most years and within 10 to 30 inches for most of the remaining year, except during extreme dry periods. Water covers depressions for more than 6 months each year. In a representative pedon the surface layer is dark grayish brown sand about 6 inches thick. Below this is a subsurface layer of white sand about 22 inches thick that tongues into a grayish brown sandy loam subsoil to a depth of about 36 inches. Gray sand and shell fragments are below a depth of about 42 inches.	0 to 28”: 6-20 in/hr 28 to 36”: 6-20 in/hr 36 to 42”: 2-6 in/hr 42 to 62”: 6-20 in/hr	Risk of Corrosion Uncoated Steel: High Concrete: Low to High

*Independent of FDOT Structures Design Guidelines

The soil and groundwater conditions reported by the USDA/SCS in the Palm Beach County Soil Survey have likely been modified by the manmade placement of fill materials and construction of near surface drainage improvements associated with the construction of the existing roadways and adjacent developed lands. A soil survey map for the project is presented on the attached **USDA Soil Survey Map, Sheet 2**.

5.0 FIELD EXPLORATION

WIRX personnel visited the project site prior to drilling to observe the locations of the planned boring and test locations. Sunshine 811 was then contacted to clear the field locations of underground utilities around the planned boring and test locations, as per Florida Statutes. Once the underground utilities were cleared, our field exploration commenced.

A TTC Plan was prepared and TTC equipment was used in the vicinity of our fieldwork efforts to protect our field crew and the general public from damage or injury. The TTC system and components were designed and set up in accordance with the FDOT *"Standard Plans for Road Construction"*.

5.1 Pavement Cores

Three (3) pavement cores (PC-1 to PC-3) were performed at the three (3) boring locations (B-1 to B-3), respectively. The approximate locations of the pavement cores are depicted on the attached **Test Location Plan, Sheet 3**, which was reproduced from the Conceptual Plan, dated December 27, 2022. The pavement cores were cut using a 4-inch diameter diamond tipped core drill bit. The measured pavement section thicknesses and base thicknesses are presented in the following Pavement Coring Data, Table 2. Photographs of the pavement cores are provided in the **Asphalt Core Log** provided in **Appendix A**.

The following Table 2 presents a summary of the measured pavement section thickness, the base thickness and composition, and estimated existing structural numbers (SN_E) for the asphalt and base. The structural numbers were estimated in accordance with FDOT's *"Flexible Pavement Design Manual"* using a reduced layer coefficient of 0.34 per inch ("Good Condition") for the asphalt and a layer coefficient of 0.18 per inch for the base material.

Table 2 – Pavement Coring Data

Core No.	Asphalt/Concrete		Base Course		Base Course Composition
	Thickness (in)	SN_E	Thickness (in.)	SN_E	
PC-1	2.7	0.9	8.0	1.4	Sandy shell rock
PC-2	2.4	0.8	12.0	2.2	Sandy shell rock
PC-3	2.2	0.8	8.0	1.4	Sandy shell rock

During our site inspection on April 18, 2025, the pavement was observed to be in good condition with only minor cracking. The asphalt pavement cores physically measured between 2.2 and 2.7 inches thick. The encountered base coarse material typically consisted of approximately 8 to 12 inches of gray sandy shell rock.

The estimated total Equivalent Structural Number (SN_E) for the existing pavement section ranges from approximately 2.2 to 3.0 with an average of 2.5. The estimated asphalt pavement SN_E is approximately 0.8 to 0.9 with an average of 0.8. The estimated base course material SN_E is approximately 1.4 to 2.2 with an average of 1.7. Please note that Limerock Bearing Ratio (LBR) field sampling and laboratory testing of the base material was not conducted. If it proposed to re-use the existing base material, then the material should be tested to determine if it meets the requirements presented in "*Section 911, Base and Stabilized Base Materials*" of FDOT's *"Specifications for Road and Bridge Construction"*.

The subgrade material was determined to be comprised of fine sand, non-stabilized. Limerock Bearing Ratio (LBR) field sampling and laboratory testing was not included in the scope of work for this project. Therefore, LBR values of the subgrade material were not determined and the non-stabilized subgrade was not assigned a SN_E.

5.2 Standard Penetration Test Borings

The field exploration program to evaluate the subsurface conditions at the Project site consisted of five (5) Standard Penetration Test (SPT) borings drilled to depths of approximately 10 feet bgs, and one (1) SPT boring drilled to a depth of 20 feet bgs. SPT borings B-1 to B-3 were advanced through the cored holes (PC-1 to PC-3), respectively. The approximate boring locations were provided by the Client. The approximate locations of the soil borings are depicted on the attached **Sheet 3**. The latitude and longitude boring location information was obtained using a handheld GPS unit. We estimate that the actual boring locations are within 20 feet of locations shown on **Sheet 2**. The latitude and longitude coordinates are presented in the following Table 3.

Table 3 – Soil Boring Coordinates

Boring Number	GPS Coordinates		Depth (ft bgs)
	Longitude (deg.)	Latitude (deg.)	
B-1	-80.236012	26.622204	10
B-2	-80.236642	26.621830	10
B-3	-80.237044	26.622204	10
B-4	-80.236182	26.621999	20
B-5	-80.236630	26.622396	10
B-6	-80.237827	26.622149	10

Field work was conducted on April 18, 2025. The SPT sampling was performed continuously in 2-feet intervals to a depth of 10 feet bgs and then in 5 feet intervals thereafter until the boring termination depth. The SPT sampling was conducted in general accordance with ASTM D 1586, "*Standard Method for Penetration Test and Split-Barrel Sampling of Soils*" using 1-3/8-inch diameter split-spoon sampler along with an automatic hammer. SPT blow counts and resulting N-Values were recorded by the Field Engineer as well as a field visual classification of the recovered materials.

Representative samples were collected from the sampler and sealed immediately in standard glass sample jars with air-tight rubber rings and labeled with the project name, boring number, sample number, sample depth, and date of sampling.

Subsurface strata descriptions were logged in the field by a Field Engineer in accordance with using the AASHTO Soil Classification System in accordance with ASTM D 3282, *"Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes"*. Final soil profiles were prepared based on a Senior Engineer's review of the field boring logs, split spoon samples, and laboratory testing for soil index properties. Subsurface profiles were prepared in ACAD and are presented on the **Subsurface Profiles, Sheets 4A to 4B**.

The groundwater depth at each boring location was measured and recorded. At the completion of each boring, the boreholes were decommissioned by grouting the borehole. Following grouting, the pavement was patched with cold asphalt patch, where appropriate. The top of the asphalt patches were leveled flush with the pavement surface upon completion.

5.3 Auger Borings

One (1) auger boring (HA-1) was performed under powerlines on the west shoulder of 120th Avenue South and therefore was not accessible to a drill rig due to safety guidelines. The auger boring was advanced using a stainless-steel hand auger to a depth of 10 feet in accordance with ASTM D 1452, "*Standard Practice for Soil Exploration and Sampling by Auger Borings*". The approximate location of the auger boring is depicted on the attached **Sheet 3** and the encountered subsurface conditions are depicted on **Sheet 4B**.

5.4 Vibracore Borings

Sediment samples (i.e., Vibracore Borings; VB-1 to VB-4) were collected from the adjacent canals using Vibracoring technology (Model: SDI VibeCore Mini). The Vibracoring drive head was equipped with 6-foot long, 3-inch diameter acrylic sampling tubes. Vibracoring is a sediment sampling technology to obtain undisturbed cores of unconsolidated, sediment in saturated conditions by driving sampling tubes with a high-frequency-low-amplitude vibrating device. During sediment coring, the high-frequency vibration transfers the energy to the sediment and aids in the liquefaction of the surrounding sediment. It greatly reduces the friction between the core tube and sediment and eases the core tube to penetrate into the sediment layer. The sampling device is equipped with a check valve that opens as the core tube is advanced allowing water within the tube to be displaced by the sample. Upon reaching refusal to penetration, the vibration is terminated, and the device is retrieved, which closes the check valve to secure the sample within the tube. Upon retrieval of the samples, the core tube were capped and sealed on both ends and returned to the laboratory for visual classification. The sample locations are depicted on **Sheet 3**. Photographs of the recovered samples are provided in the Vibracore Sample Log provided in **Appendix A**.

5.5 Exfiltration Tests

Two (2) exfiltration permeability tests (EX-1 to EX-2) were performed at borings B-4 and B-5, respectively, to evaluate the hydraulic conductivity of the subsurface soils within the project limits. The field permeability test was performed in general accordance with the usual open-hole exfiltration test method described in the SFWMD "*Permit Information Manual, Volume IV*" procedures in a 10 feet deep borehole, which was augered using a 6-inch diameter continuous flight auger in accordance with ASTM D 1452. The approximate test location is depicted on **Sheet 3** and the encountered subsurface profiles are depicted on **Sheets 4A to 4B**. The results of the exfiltration tests are presented in the following Table 4 and on the attached **Table A-1: Summary of Field Permeability Test Results**.

Table 4 – Exfiltration Test Results

Test ID	General Soil Profile	Hydraulic Conductivity, K (cfs/ft2 - ft. head)*
EX-1/B-4	0 to 0.33': Topsoil 0.33 to 2.0': Brown fine sand 2.0 to 6.0': Light brown fine sand 6.0 to 10.0': Brown clayey fine sand	2.84×10^{-5}

Test ID	General Soil Profile	Hydraulic Conductivity, K (cfs/ft2 - ft. head)*
EX-2/B-5	0 to 0.33': Topsoil 0.33 to 1.0': Brown fine sand with limerock 1.0 to 2.0': Brown fine sand 2.0 to 4.0': Light yellowish brown fine sand 4.0 to 8.0': Brown clayey fine sand 8.0 to 10.0': Gray fine sand with silt and shells	6.98×10^{-5}

* The hydraulic conductivity values represent an ultimate value, and the designer should decide on the required factor of safety in accordance SFWMD Permit Information Manual, Volume IV.

The groundwater depth at each test location was measured and recorded. At the completion of the tests, the boreholes were decommissioned by grouting the borehole.

6.0 LABORATORY TESTING

Soil samples obtained from the borings were reviewed and field classifications confirmed in the laboratory by a WIRX Geotechnical Engineer using visual examination and the field boring logs. Selected soil samples were tested for index properties to aid in the classification for highway construction purposes in accordance with ASTM D 3282 "*Standard Practice for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes*". The following laboratory tests were performed in accordance with the applicable ASTM procedures:

- Six (6) moisture content (ASTM D 2216)
- Six (6) fines content (ASTM D 1140)

A summary of laboratory test results is provided on the attached **Table A-2: Summary of Laboratory Test Results** and on the attached **Sheets 4A to 4B**.

7.0 SUMMARY OF SUBSURFACE CONDITIONS

7.1 Soil Stratigraphy

The findings of the field exploration program are presented graphically in the subsurface profiles (**Sheets 4A to 4B**). The soil stratification shown in the subsurface profiles represent our interpretation of the field and laboratory test data, and our material characterizations based on visual inspection of recovered soil/rock samples. Stratification lines represent approximate boundaries between soil types, but the actual transition between layers may be gradual or abrupt. Additionally, soil and groundwater conditions will vary between boring locations.

The soil borings performed in the roadway generally encountered approximately 2.2 to 2.7 inches of asphalt pavement underlain by a sandy shell rock base material that was approximately 8 to 12 inches in thickness. The soil borings performed in the grass generally encountered 4.0 inches of topsoil (AASHTO Classification: A-8). In general terms, the shallow subsurface conditions at the Project site consisted of brown to gray fine sand (A-3), occasionally with shells, silt and clay to the termination depth of the borings except for a relatively thin layer of clayey fine sand (A-2-6) that was encountered in a majority of the borings. Review of the SPT-N values shown on the boring logs indicates that the sandy soils are generally in a medium dense to dense condition.

7.2 Canal Sediments

The Vibracore borings were advanced to collect sediment samples within the adjacent canals. The sampling tubes were advanced until reaching refusal to penetration in dense material. The depth of refusal is provided in Table 5 below. The sampling tubes were then retrieved and recovered samples classified in accordance with using the AASHTO Soil Classification System. The sediment in the canals mostly consisted of gray and brown fine sand (A-3) with some organic deposits (A-8) in the upper few inches. The results of the sediment sampling is presented in the following Table 5.

Table 5 – Sediment Sampling Results

Sample Number	GPS Coordinates		Depth of Refusal (ft bgs)	Thickness of Surficial Organics (inches)
	Longitude (deg.)	Latitude (deg.)		
VB-1	-80.236220	26.621905	0.5	2.0
VB-2	-80.236467	26.621351	2.4	3.0
VB-3	-80.236813	26.621920	2.9	0.0
VB-4	-80.236430	26.622507	0.7	1.0

7.3 Groundwater

The depth to the groundwater was measured from the existing ground surface in each boring and is plotted adjacent to the soil profiles on the attached **Sheets 4A to 4B**. The depth of the groundwater table ranged between approximately 5.8 and 6.9 feet below the prevailing ground surface at the time of our drilling. Groundwater levels will fluctuate with the seasonal variations of precipitation. Groundwater levels are also expected to be influenced by nearby canals and the stormwater management systems for the adjacent developed land and properties in the area.

8.0 RECOMMENDATIONS

8.1 General

The following sections present our conclusions and recommendations for the proposed construction. The recommendations discussed herein are based on our interpretation and understanding of the project's needs and site conditions. If subsurface conditions encountered during the construction differ from those disclosed by the borings, we should be notified immediately, so that we can review and modify as necessary, our recommendations included herein.

8.2 General Site Preparation Recommendations

8.2.1 Clearing and Grubbing

Clearing and grubbing may be required in the proposed construction areas. Clearing and grubbing, where required, should include the complete removal and disposal of surficial grasses, associated root systems, topsoil, organic and silt soil, rubbish, debris, any demolition material/pavement and all other obstructions resting on or protruding through the surface of the existing ground and the surface of excavated areas. Clearing and grubbing should be performed

in accordance with "*Section 110, Clearing and Grubbing*" of FDOT's *"Standard Specifications for Road and Bridge Construction*".

If buried organic soils, debris or other unsuitable materials as defined in "*Index 120-002, Subsoil Excavation*" of FDOT "*Standard Plans for Road Construction*" are encountered during the construction, they should be removed and replaced with a backfill material as described in Section 8.2.2.

8.2.2 Select Fill, Placement & Compaction

Backfill required for construction should consist of Select Fill, which consists of sands or sand and gravel, with an AASHTO classification of A-3, A-2-4 or A-1 as per "*Index 120-001, Embankment Utilization*" of FDOT's "*Standard Plans for Road Construction"*. Such fill shall not contain more than five (5) percent organics or other deleterious materials by weight. With the exception of the clayey fine sand (A-2-6), the materials encountered at the site appear to be satisfactory for use in embankment construction. The encountered clayey fine sand (A-2-6) may be placed above the existing water level to within 4 feet of the proposed base material as per "Index 120-001, Embankment Utilization" of FDOT's "*Standard Plans for Road Construction"*. However, please not that the certain types of A-2-6 material may retain excess moisture and may be difficult to dry and compact.

The embankment materials should be placed and compacted in accordance with "*Index 120-001, Embankment Utilization*" of FDOT's "*Standard Plans for Road Construction"* and "*Section 120, Excavation and Embankment*" of FDOT's "*Standard Specifications for Road and Bridge Construction*".

The granular fill should be placed at a moisture content within three (3) percent of its Standard Proctor (ASTM D 698) determined optimum in level lifts whose loose thickness does not exceed twelve (12) inches. In areas where heavy equipment cannot be operated for compaction, the fill should be placed in six (6) inch thick level lifts. Each fill lift should be stable, unyielding and uniformly compacted to one hundred (100) percent of the maximum dry density value determined in accordance with ASTM D 698, "*Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort*".

Fill soils will require moisture conditioning to near the optimum moisture content prior to initiating the densification operations. The fill densification should normally be accomplished using a self-propelled vibratory compactor; however, in residential areas, the use of such heavy vibratory compaction equipment may prove problematic and disruptive or even damaging to existing/adjacent structures. In such cases, the compaction will need to be performed and achieved with lighter weight, less vibration generation capable equipment such as walk behind (e.g., Whacker) ground pounder or small vibratory rolling equipment. See Section 9.0 for further discussion on ground vibrations produced by construction equipment.

8.2.3 Excavations

The Contractor should be solely responsible for making temporary excavations in a safe manner and provide appropriate measures to retain side slopes to ensure that persons working in or near the excavation are protected. All excavations shall comply with Occupational Health and Safety Administration (OHSA) stipulations for Trench Excavation Safety, including all temporary design and safety requirements. Temporary and/or permanent structural retaining walls shall be

designed and sealed by a structural engineer registered in the State of Florida. Excavations should be performed in accordance with "*Section 120, Excavation and Embankment*" and "*Section 125, Excavation and Embankment for Structures and Pipe*" of FDOT's "*Standard Specifications for Road and Bridge Construction*".

8.2.4 Dewatering

At the time of drilling of the borings (April 2025), groundwater was encountered at depths ranging between approximately 3.5 and 6.5 feet below the existing ground surface. In-the-dry construction of deeper underground utilities and foundations will require groundwater lowering via dewatering and control of groundwater seepage. Dewatering of the excavations may necessitate the use of sumps, wells, well-points or combinations thereof to be operated on a 24/7 basis until underground features are constructed and properly backfilled. Control of groundwater should be accomplished in a manner that preserves the integrity of the foundation bearing materials and does not cause instability of the excavation sidewalls. The dewatering system employed should be capable of maintaining a pre-drained surface a minimum of 24 inches below the excavation bottoms.

8.2.5 Pipe Bedding

The sands encountered in the borings are expected to provide good support for utility pipelines without the need for bedding when the invert elevations are at least 24 inches above the groundwater level (natural or pre-drained by dewatering).

Should unsuitable soils be present at or below pipes, such soils shall be considered compressible and unsuitable for pipe support. These soils should be over-excavated and replaced in accordance with the "*Index 120-002, Subsoil Excavation*" of FDOT "*Standard Plans for Road Construction*" and "*Section 125, Excavation and Embankment for Structures and Pipe*" of FDOT's "*Standard Specifications for Road and Bridge Construction*".

The bedding surface should be uniformly compacted to a density of not less than one hundred (100) percent of the maximum dry density in accordance with ASTM D 698, the Standard Proctor Method.

8.2.6 Trench Backfill and Compaction

Backfilling and compaction should be performed in accordance with "*Section 125, Excavation and Embankment for Structures and Pipe*" of FDOT's "*Standard Specifications for Road and Bridge Construction*".

Backfill required for construction should consist of Select Fill, which consists of sands or sand and gravel, with an AASHTO classification of A-3, A-2-4 or A-1 as per "*Index 120-001, Embankment Utilization*" of FDOT's "*Standard Plans for Road Construction"*. Such fill shall not contain more than five (5) percent organics or other deleterious materials by weight.

Granular backfill should be placed at a moisture content within three (3) percent of its ASTM D 698 determined optimum moisture and in level lifts whose thickness does not exceed eight (8) inches. Each fill lift should be stable, unyielding and uniformly compacted to at least one hundred (100) percent of the maximum dry density in accordance with ASTM D 698, the Standard Proctor Method. We recommend the use of only relatively light, hand-held compaction equipment in the

densification operations around utilities to limit the potential damage to the pipelines and buried structures.

8.2.7 Canal Backfill

We recommend that an earthen plug/berm be constructed across each canal to form a cofferdam which will allow the canals to be dewatered and the removal of any unsuitable materials as defined in "*Index 120-002, Subsoil Excavation*" of FDOT "*Standard Plans for Road Construction*" at the bottom of the canal. A trackhoe may be used along the sides of the dewatered area to remove any unsuitable soils. After the trackhoe work, the canal may then be backfilled in accordance with Section 8.2.2. The dewatering method should be maintained until backfilling has reached a height of two (2) feet above the groundwater level at the time of construction.

The above recommendations are provided for informational purposes only and is not intended to dictate the means of methods of the contractor.

8.3 Foundation Recommendations

Following in-situ subgrade preparation described herein, it is our opinion that any proposed underground drainage structures, manholes or other miscellaneous lightly loaded structures may be designed using an allowable soil bearing pressure of up to 1,500 pounds per square foot (psf). For design purposes, we recommend using a subgrade reaction modulus of 125 pounds per cubic inch (pci) for the well compacted shallow sands. Foundation subgrade soils should be compacted to not less than ninety-five (95) percent of the maximum dry density in accordance with ASTM D 1557, "*Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort*".

Settlements of the underground drainage structures are anticipated to be negligible due to the effective net reduction in load when the existing soils are replaced with the structures. Please note that the miscellaneous structures should be designed to resist hydrostatic buoyancy forces (flotation) that would be present when the groundwater is at the estimated seasonal high levels and the structure is completely empty. An appropriate safety factor should also be included in the design of the structure.

Our recommendations for design and construction are based on our understanding of the project as described in Section 2.0, Project Description. If this information is incorrect or changes, we should be notified so we can review our recommendations and revise them if necessary. WIRX should be contacted to review the foundation design when structure loads and foundation designs become available.

8.4 Soil Parameters for Underground Structures

Geotechnical soil design parameters for underground structures were derived based on field data, laboratory test data, established empirical correlations based on SPT N-values, and our experience. The recommended soil parameters are presented in the following Table 6.

Table 6 – Soil Design Parameters

Depth (ft – ft bgs)	Average N_{AUTO}	Average N_{ES}	Recommended Values			Earth Pressure Coefficients		
			Friction Angle (Degree)	Total Unit Weight (pcf)	Submerged Unit Weight (pcf)	Active K_a	Passive K_p	At rest K_o
0 – 20	17	21	33	115	52	0.292	3.431	0.451

The SPT borings were performed with a CME-55 drill rig utilizing an automatic hammer. For design recommendations and soil parameter correlations, the automatic hammer SPT N-Values (N_{AUTO}) were converted to safety hammer SPT N-Values (N_{ES}) using the conversion equation obtained from FDOT's "*Soils and Foundation Handbook*", $N_{ES} = 1.24 \times N_{AUTO}$.

8.5 Pavement Design Considerations

The following information is provided and intended as a guideline only, as the roadway or any replacements/repairs thereof, should be designed by the Civil Design Engineer specifically for the vehicle load intensities and frequencies anticipated during the life of the project. Flexible pavement systems in the South Florida area, typically consist of an asphaltic concrete wearing course and friction course, a base course and a stabilized pavement subgrade. Typical roadway pavement standards for residential access and local streets include the following:

- 12 inches of Type B stabilized subgrade (LBR 40)
- 8 to 10 inches of compacted limerock (LBR 100)
- 1.5 inches of Type SP-9.5 asphalt structural course
- 1.0 inch of Type FC-9.5 asphalt friction course

Any new or re-constituted base course material should consist of crushed limestone having a minimum Limerock Bearing Ratio [LBR] (FDOT FM 5-515) of 100. Base materials should meet the requirements presented in "Section 911, Base and Stabilized Base Materials" of FDOT"s "*Specifications for Road and Bridge Construction*". The base course should be placed and compacted in two 4-inch lifts to at least ninety-eight (98) percent of its maximum dry density as per ASTM D 1557, the Modified Proctor Method.

We recommend that any new pavement subgrade be stabilized to a depth of twelve (12) inches to achieve a minimum LBR of 40. If necessary, this LBR value can be achieved by blending the existing base material (shell rock) or imported base material with the existing sandy subgrade soils. The required mixing ratio should be determined by laboratory testing. The stabilized subgrade should be compacted to at least ninety-eight (98) percent of its maximum dry density as per ASTM D 1557, the Modified Proctor Method.

Actual pavement section thickness should be determined by the Civil Engineer based on traffic loads, volume, and the Owner's design life requirements in accordance FDOT's *"Flexible Pavement Design Manual"*. The above sections represent minimum thickness representative of typical local construction practices and, as such, periodic maintenance should be anticipated. All pavement materials and construction procedures should conform to FDOT and/or appropriate City or County requirements for roadway pavement construction.

9.0 MONITORING OF EXISTING STRUCTURES

Ground vibrations induced upon adjacent structures should be monitored to assure that they do not reach levels which prove damaging to any adjacent/nearby structures. Vibration Monitoring should be performed in general accordance with "Section 108, Monitor Existing Structures" of FDOT's "*Standard Specifications for Road and Bridge Construction*" or other similar County regulations or ordinances.

Vibration levels on adjacent industrial facilities should generally be maintained below 0.50 inches per second (ips) peak particle velocity vibration level. However, more restrictive/lessor levels may be specified for highly sensitive residential or commercial areas at the discretion of the Designer or County. The Contractor should be required to inventory and provide a pre-construction inspection of adjacent structures and to monitor the adherence to suitable vibration monitoring impact limits for their construction activities.

10.0 LIMITATIONS

WIRX warrants that the professional services performed and presented in this report are prepared for Mock Roos and are based upon recognized typical standard of care principles and practices in the discipline of geotechnical engineering and hydrogeology at this place and point in time, for this project site. No other warranties are expressed or implied.

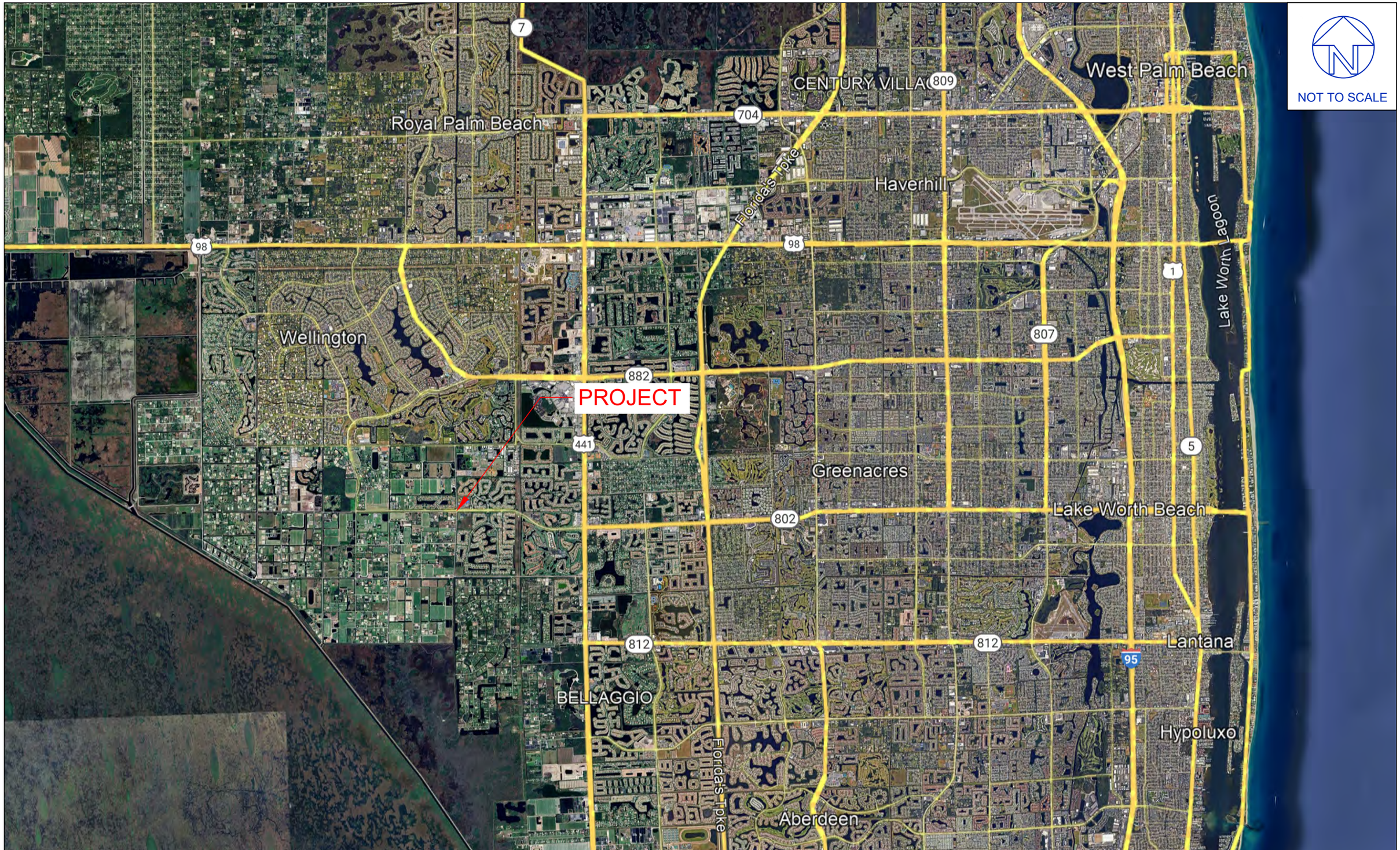
This report is intended for geotechnical purposes only, and does not document or detect the presence, or absence, of any environmental conditions at the site, nor is it intended to perform an environmental assessment of the site.

The recommendations presented in this report are based upon our interpretation of the subsurface information revealed by the test boring. The report does not reflect variations in subsurface conditions that may exist beyond the boring. Variations in soil and groundwater conditions should be expected, the nature and extent of which might not become evident until construction is undertaken. If variations are encountered, and/or the scope of the project altered, we should be consulted for additional recommendations.

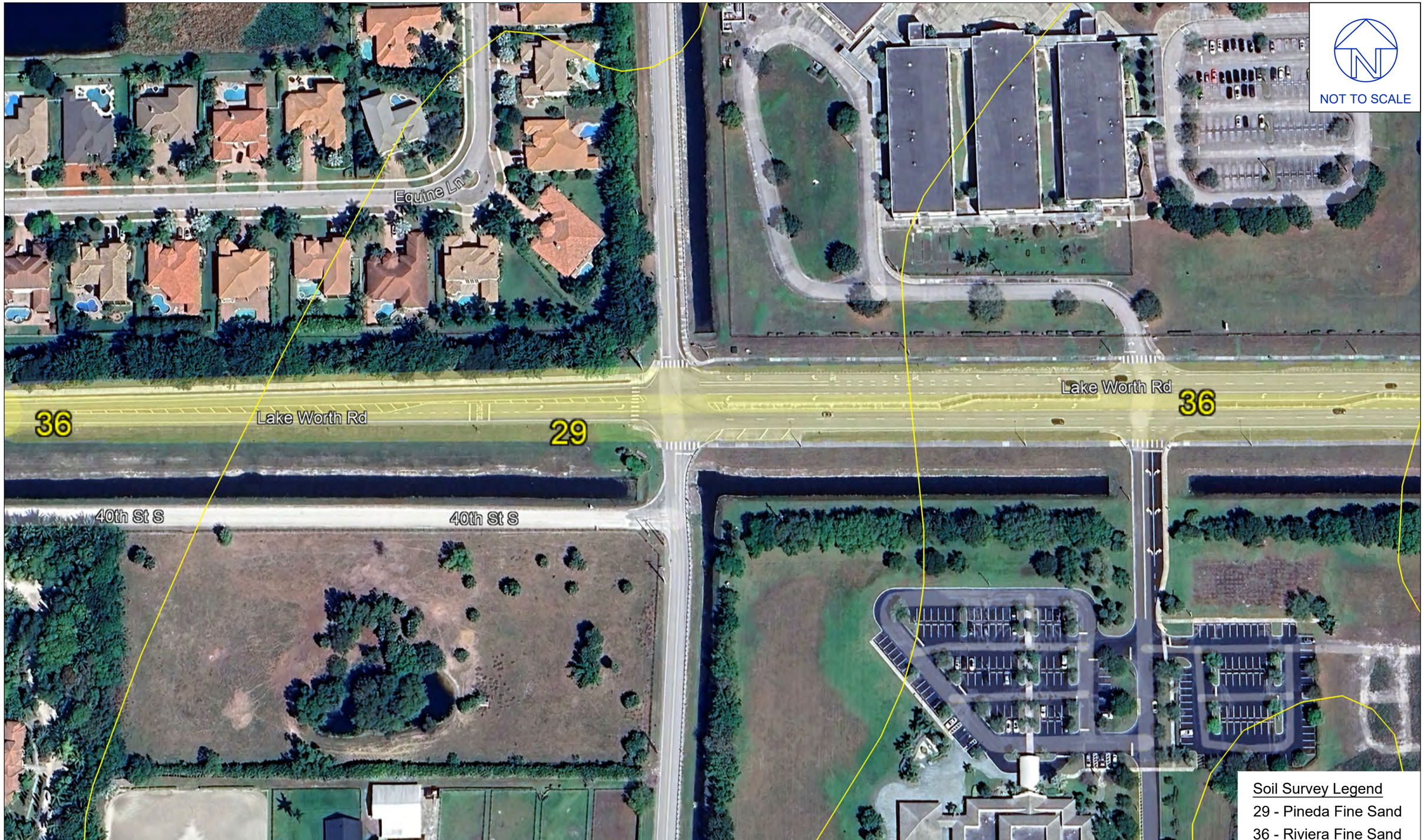
We appreciate the opportunity to continue to provide our services as part of this contract and welcome any questions or comments you may have.

ATTACHMENTS

Sheet 1 – Site Vicinity Map
Sheet 2 – USDA Soil Survey Map
Sheet 3 – Test Location Plan
Sheets 4A to 4B – Subsurface Profiles
Table A-1: Summary of Field Permeability Test Results
Table A-2: Summary of Laboratory Test Results



REVISIONS		DRAWN BY:	ANDREW NIXON, P.E. P.E. LICENSE NUMBER 71458 WIRX ENGINEERING, LLC 515 E. LAS OLAS BOULEVARD, SUITE 120 FORT LAUDERDALE, FLORIDA 33301 WWW.WIRXENG.COM	WIRX ENGINEERING	CLIENT	SHEET TITLE:	SHEET NO.
DATE	DECRIPTIONS	AN			MOCK, ROOS & ASSOCIATES, INC. 5720 CORPORATE WAY WEST PALM BEACH, FLORIDA 33407	SITE VICINITY MAP	1
		DATE: 05/06/2025				PROJECT NAME: LAKE WORTH ROAD / 120TH AVENUE INTERSECTION VILLAGE OF WELLINGTON, FLORIDA	WIRX PROJECT NO: 2504001



Data Source: U.S. Department of Agriculture- National Resources Conservation Service (USDA-NRCS). Web Soil Survey- Online Soil Information, http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx

REVISIONS		DRAWN BY:	ANDREW NIXON, P.E. P.E. LICENSE NUMBER 71458 WIRX ENGINEERING, LLC 515 E. LAS OLAS BOULEVARD, SUITE 120 FORT LAUDERDALE, FLORIDA 33301 WWW.WIRXENG.COM	WIRX ENGINEERING	CLIENT	SHEET TITLE:	SHEET NO.
DATE	DECRIPTIONS	AN			MOCK, ROOS & ASSOCIATES, INC. 5720 CORPORATE WAY WEST PALM BEACH, FLORIDA 33407	USDA SOIL SURVEY MAP	2
		DATE: 05/06/2025				PROJECT NAME: LAKE WORTH ROAD / 120TH AVENUE INTERSECTION VILLAGE OF WELLINGTON, FLORIDA	WIRX PROJECT NO: 2504001

Legend

- Standard Penetration Test Boring (B-#)
- Hand Auger Boring (HA-#)
- Exfiltration Test (EX-#)
- Vibracore Boring (VB-#)

REVISIONS	
DATE	DECRIPTIONS

DRAWN BY: AN

DATE: 05/06/2025

ANDREW NIXON, P.E.
P.E. LICENSE NUMBER 71458
WIRX ENGINEERING, LLC
515 E. LAS OLAS BOULEVARD, SUITE 120
FORT LAUDERDALE, FLORIDA 33301
WWW.WIRXENG.COM

WIRX ENGINEERING

CLIENT
MOCK, ROOS & ASSOCIATES, INC.
5720 CORPORATE WAY
WEST PALM BEACH, FLORIDA 33407

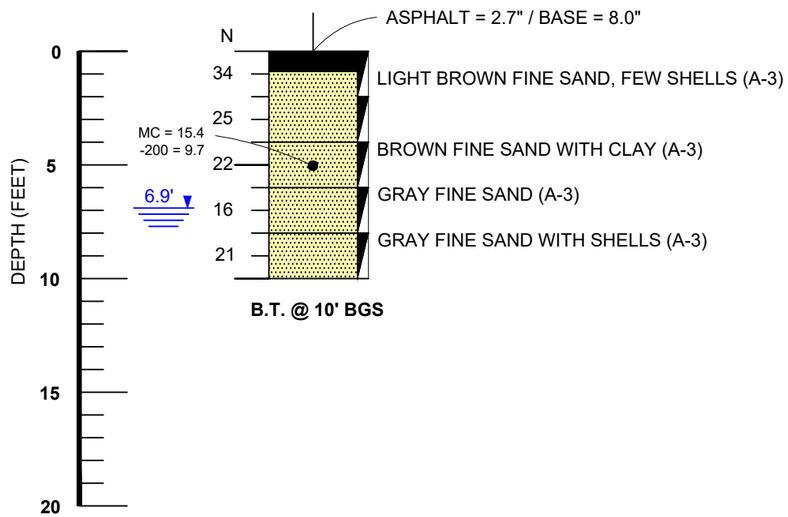
SHEET TITLE: TEST LOCATION PLAN

SHEET NO. 3

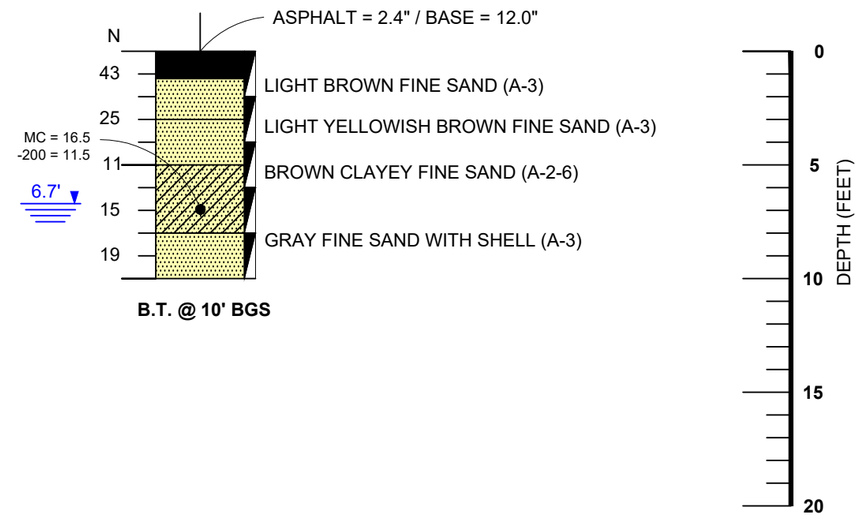
PROJECT NAME: LAKE WORTH ROAD / 120TH AVENUE INTERSECTION
VILLAGE OF WELLINGTON, FLORIDA

WIRX PROJECT NO: 2504001

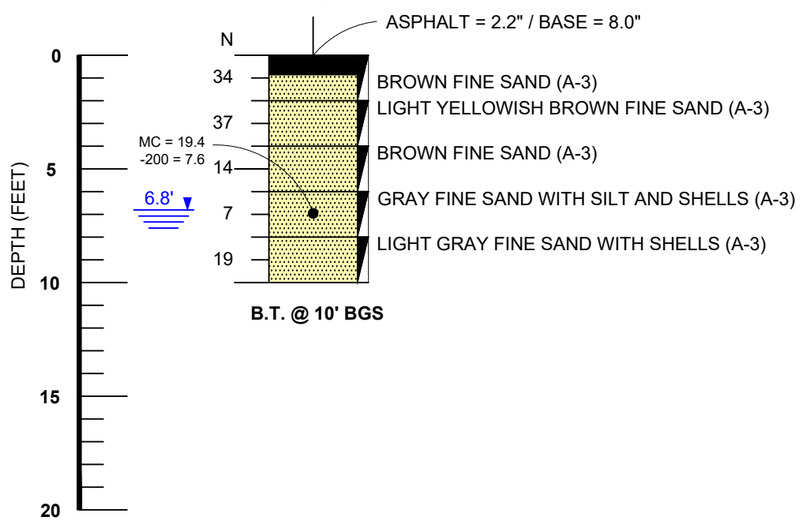
	B-1
BORING NO.	B-1
LONGITUDE:	W -80.236012°
LATITUDE:	N 26.622204°
RIG/SAMPLER:	CME-55/AUTO
DRILLER:	C. CHARRIS
LOGGER:	Y. PEREZ
DATE:	04/18/2025



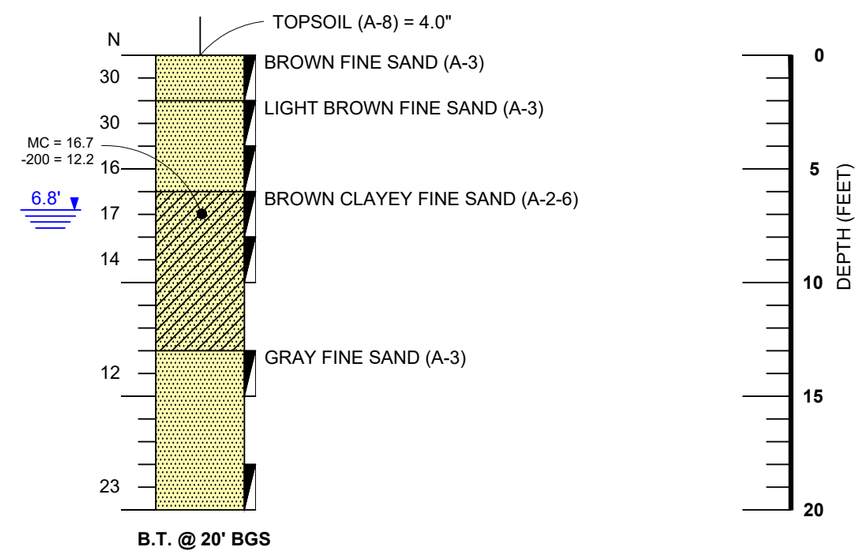
	B-2
BORING NO.	B-2
LONGITUDE:	W -80.236642°
LATITUDE:	N 26.621830°
RIG/SAMPLER:	CME-55/AUTO
DRILLER:	C. CHARRIS
LOGGER:	Y. PEREZ
DATE:	04/18/2025



	B-3
BORING NO.	B-3
LONGITUDE:	W -80.237044°
LATITUDE:	N 26.622204°
RIG/SAMPLER:	CME-55/AUTO
DRILLER:	C. CHARRIS
LOGGER:	Y. PEREZ
DATE:	04/18/2025



	B-4
BORING NO.	B-4
LONGITUDE:	W -80.236182°
LATITUDE:	N 26.621999°
RIG/SAMPLER:	CME-55/AUTO
DRILLER:	C. CHARRIS
LOGGER:	Y. PEREZ
DATE:	04/18/2025



LEGEND

- SAND (A-3)
- CLAYEY SAND (A-2-6)
- PAVEMENT SECTION (ASPHALT & BASE)

AASHTO SOIL CLASSIFICATION SYSTEM (ASTM D 3282)

B.T @ ##'	BORING TERMINATED AT ## FEET BELOW GROUND SURFACE
B-1	STANDARD PENETRATION TEST (SPT) BORING ID
HA-1	AUGERING BORING ID
N	STANDARD PENETRATION RESISTANCE-BLOWS PER FOOT USING AUTOMATIC HAMMER
	SPT SAMPLING INTERVAL
	AUGER SAMPLING INTERVAL
5.0'	GROUNDWATER DEPTH IN FEET ON DRILLING DATE
BGS	BELOW GROUND SURFACE
MC	NATURAL MOISTURE CONTENT (%)
-200	AMOUNT PASSING US STANDARD 200 SIEVE (%)

NOTES:

1. SPT BORING WAS PERFORMED USING A CME-55 TRUCK MOUNTED DRILL RIG WITH AUTOMATIC HAMMER (ASTM D1586)
2. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY.
3. GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER LEVEL ON THE DRILLING DATE. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
4. AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT AND THE ASPHALT SURFACE PATCHED, WHERE APPROPRIATE.

STANDARD PENETRATION TEST DATA *

SPOON INSIDE DIA.	1.375 INCH
SPOON OUTSIDE DIA.	2 INCHES
AVG. HAMMER DROP	30 INCHES
HAMMER WEIGHT	140 POUNDS

GRANULAR MATERIALS RELATIVE DENSITY	AUTOMATIC HAMMER SPT N - VALUE BLOWS/FOOT
VERY LOOSE	LESS THAN 3
LOOSE	3 - 8
MEDIUM	8 - 24
DENSE	24 - 40
VERY DENSE	GREATER THAN 40

SILTS AND CLAYS CONSISTENCY	AUTOMATIC HAMMER SPT N - VALUE BLOWS/FOOT
VERY SOFT	LESS THAN 1
SOFT	1 - 3
FIRM	3 - 6
STIFF	6 - 12
VERY STIFF	12 - 24
HARD	GREATER THAN 24

*FDOT SOILS AND FOUNDATIONS HANDBOOK

REVISIONS	
DATE	DECRIPTIONS

DRAWN BY: AN
DATE: 05/06/2025

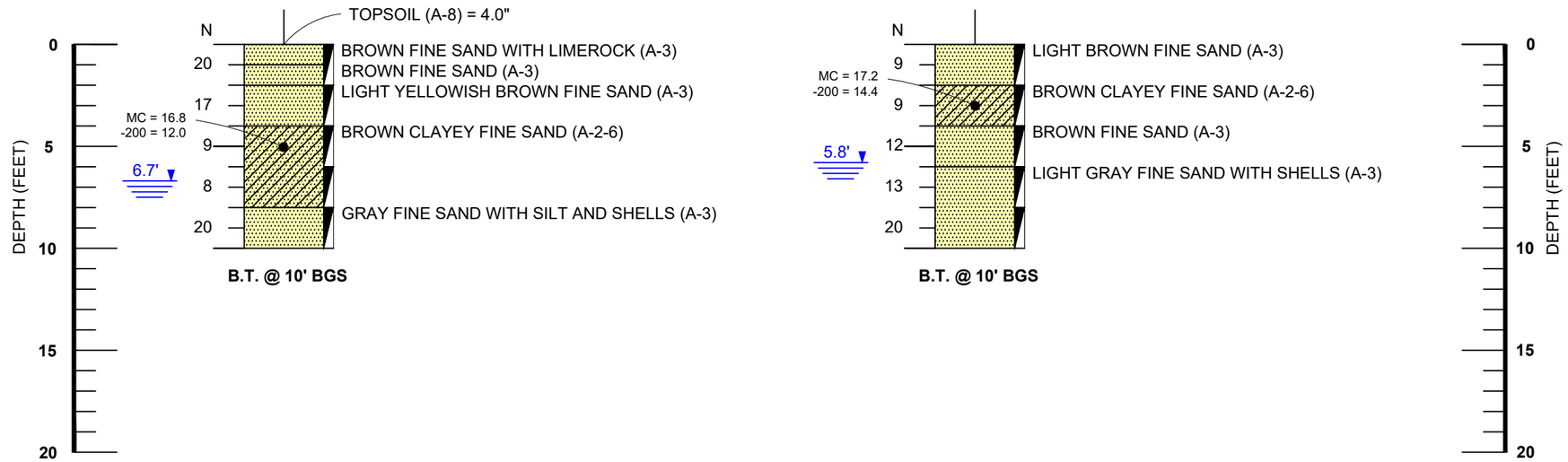
ANDREW NIXON, P.E.
P.E. LICENSE NUMBER 71458
WIRX ENGINEERING, LLC
515 E. LAS OLAS BOULEVARD, SUITE 120
FORT LAUDERDALE, FLORIDA 33301
WWW.WIRXENG.COM

WIRX ENGINEERING

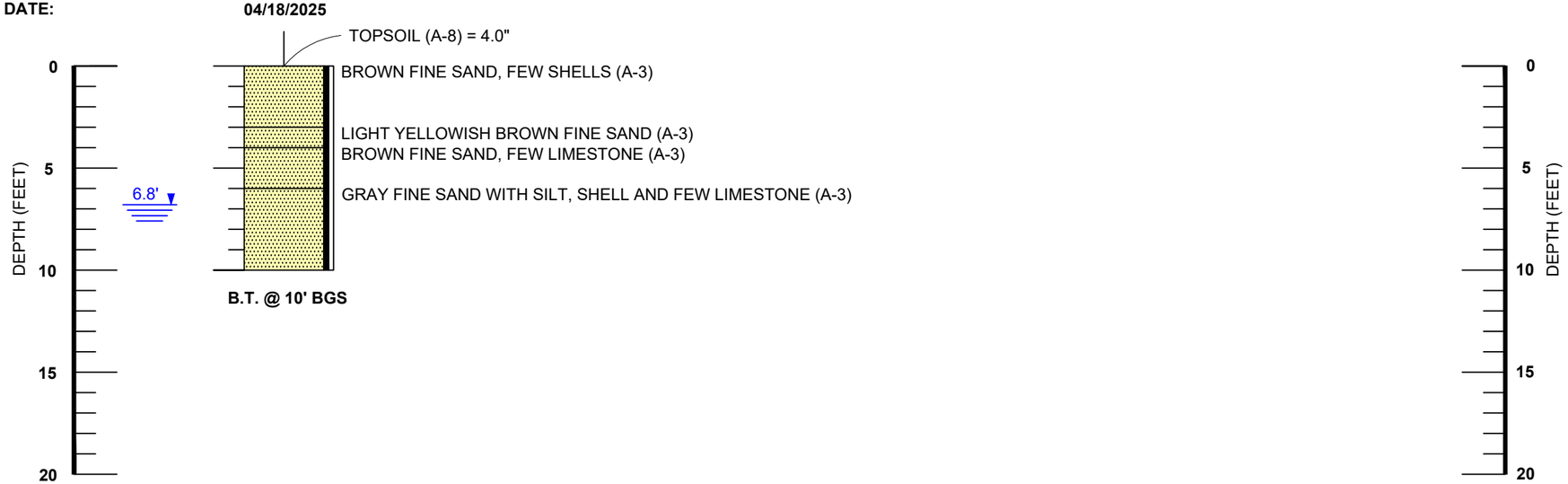
CLIENT
MOCK, ROOS & ASSOCIATES, INC.
5720 CORPORATE WAY
WEST PALM BEACH, FLORIDA 33407

SHEET TITLE: SUBSURFACE PROFILES
SHEET NO. 4A
PROJECT NAME: LAKE WORTH ROAD / 120TH AVENUE INTERSECTION
VILLAGE OF WELLINGTON, FLORIDA
WIRX PROJECT NO: 2504001

	B-5	B-6
BORING NO.	B-5	B-6
LONGITUDE:	W -80.236630°	W -80.237827°
LATITUDE:	N 26.622396°	N 26.622149°
RIG/SAMPLER:	CME-55/AUTO	CME-55/AUTO
DRILLER:	C. CHARRIS	C. CHARRIS
LOGGER:	Y. PEREZ	Y. PEREZ
DATE:	04/18/2025	04/18/2025



	HA-1
BORING NO.	HA-1
LONGITUDE:	W -80.236649°
LATITUDE:	N 26.621342°
RIG/SAMPLER:	CME-55/AUTO
DRILLER:	C. CHARRIS
LOGGER:	Y. PEREZ
DATE:	04/18/2025



LEGEND

- SAND (A-3)
- CLAYEY SAND (A-2-6)
- PAVEMENT SECTION (ASPHALT & BASE)

AASHTO SOIL CLASSIFICATION SYSTEM (ASTM D 3282)

B.T @ ##'	BORING TERMINATED AT ## FEET BELOW GROUND SURFACE
B-1	STANDARD PENETRATION TEST (SPT) BORING ID
HA-1	AUGERING BORING ID
N	STANDARD PENETRATION RESISTANCE-BLOWS PER FOOT USING AUTOMATIC HAMMER
	SPT SAMPLING INTERVAL
	AUGER SAMPLING INTERVAL
5.0'	GROUNDWATER DEPTH IN FEET ON DRILLING DATE
BGS	BELOW GROUND SURFACE
MC	NATURAL MOISTURE CONTENT (%)
-200	AMOUNT PASSING US STANDARD 200 SIEVE (%)

NOTES:

1. SPT BORING WAS PERFORMED USING A CME-55 TRUCK MOUNTED DRILL RIG WITH AUTOMATIC HAMMER (ASTM D1586)
2. STRATA BOUNDARIES ARE APPROXIMATE AND REPRESENT SOIL STRATA AT EACH TEST HOLE LOCATION ONLY.
3. GROUNDWATER LEVELS SHOWN ON THE SUBSURFACE PROFILES REPRESENT GROUNDWATER LEVEL ON THE DRILLING DATE. GROUNDWATER LEVEL FLUCTUATIONS SHOULD BE ANTICIPATED THROUGHOUT THE YEAR.
4. AFTER COMPLETION OF DRILLING, BOREHOLES WERE BACKFILLED WITH GROUT AND THE ASPHALT SURFACE PATCHED, WHERE APPROPRIATE.

STANDARD PENETRATION TEST DATA *

SPOON INSIDE DIA.	1.375 INCH
SPOON OUTSIDE DIA.	2 INCHES
AVG. HAMMER DROP	30 INCHES
HAMMER WEIGHT	140 POUNDS

GRANULAR MATERIALS RELATIVE DENSITY	AUTOMATIC HAMMER SPT N - VALUE BLOWS/FOOT
VERY LOOSE	LESS THAN 3
LOOSE	3 - 8
MEDIUM	8 - 24
DENSE	24 - 40
VERY DENSE	GREATER THAN 40

SILTS AND CLAYS CONSISTENCY	AUTOMATIC HAMMER SPT N - VALUE BLOWS/FOOT
VERY SOFT	LESS THAN 1
SOFT	1 - 3
FIRM	3 - 6
STIFF	6 - 12
VERY STIFF	12 - 24
HARD	GREATER THAN 24

*FDOT SOILS AND FOUNDATIONS HANDBOOK

REVISIONS	
DATE	DECRIPTIONS

DRAWN BY: AN
DATE: 05/06/2025

ANDREW NIXON, P.E.
P.E. LICENSE NUMBER 71458
WIRX ENGINEERING, LLC
515 E. LAS OLAS BOULEVARD, SUITE 120
FORT LAUDERDALE, FLORIDA 33301
WWW.WIRXENG.COM

WIRX ENGINEERING

CLIENT
MOCK, ROOS & ASSOCIATES, INC.
5720 CORPORATE WAY
WEST PALM BEACH, FLORIDA 33407

SHEET TITLE: SUBSURFACE PROFILES
SHEET NO. 4B
PROJECT NAME: LAKE WORTH ROAD / 120TH AVENUE INTERSECTION
VILLAGE OF WELLINGTON, FLORIDA
WIRX PROJECT NO: 2504001

Table A-1: Summary of Field Permeability Test Results

Lake Worth Road / 120th Avenue Intersection Improvement Project
Village of Wellington, Florida
WIRX Project No. 2504001

Test ID.	Test Depth (ft)	Test Hole Diameter, d		Test Length (ft.)	Water Table Depth, H_2 (ft.)	Volume of Water (gal.)	Time (sec)	Stabilized Flow Rate, Q (cfs)	Saturated Hole Depth, D_S (ft)	Hydraulic Conductivity, K (cfs/sqf - ft head)
		(in)	(ft)							
EX-1	0 - 10	6	0.50	10	6.7	9.1	600	0.0020	3.3	2.84E-05
EX-2	0 - 10	6	0.50	10	6.8	22.5	600	0.0050	3.2	6.98E-05

Note:
Methodology and equation from the SFWMD Environmental Resource Permit Information Manual Volume IV

$$K = \frac{4Q}{\pi d(2H_2^2 + 4H_2D_S + H_2d)}$$

K Hydraulic Conductivity (cfs/sqf - ft head)
Q Stabilized Flow Rate (cfs)
d Diameter of Test Hole (ft)
H_2 Depth to Water Table (ft)
D_S Saturated Hole Depth (ft)

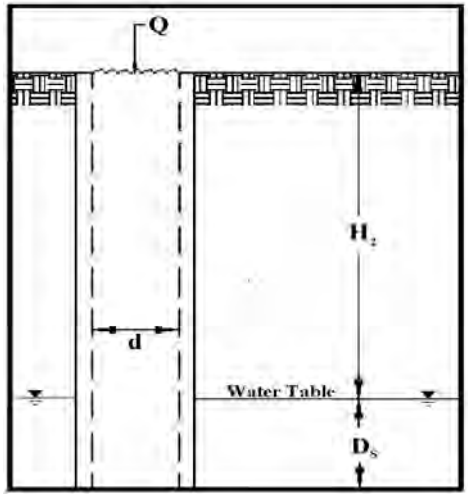


Table A-2: Summary of Laboratory Test Results

Lake Worth Road / 120th Avenue Intersection Improvement Project
Village of Wellington, Florida
WIRX Project No. 2504001

Boring Number	Sample Depth (ft)	AASHTO Classification	Moisture Content (%)	Fines Content (%)
B-1	4-6	A-3	15.4	9.7
B-2	6-8	A-2-6	16.5	11.5
B-3	6-8	A-3	19.4	7.6
B-4	6-8	A-2-6	16.7	12.2
B-5	4-6	A-2-6	16.8	12.0
B-6	2-4	A-2-6	17.2	14.4

Notes: Soil Classification in accordance to ASTM-D3282
Moisture Content tested in accordance ASTM-D2216
Fines Content (Passing No. 200 Sieve) tested in general accordance with ASTM-D1140

APPENDIX A

Asphalt Core Log
Vibracore Sample Log

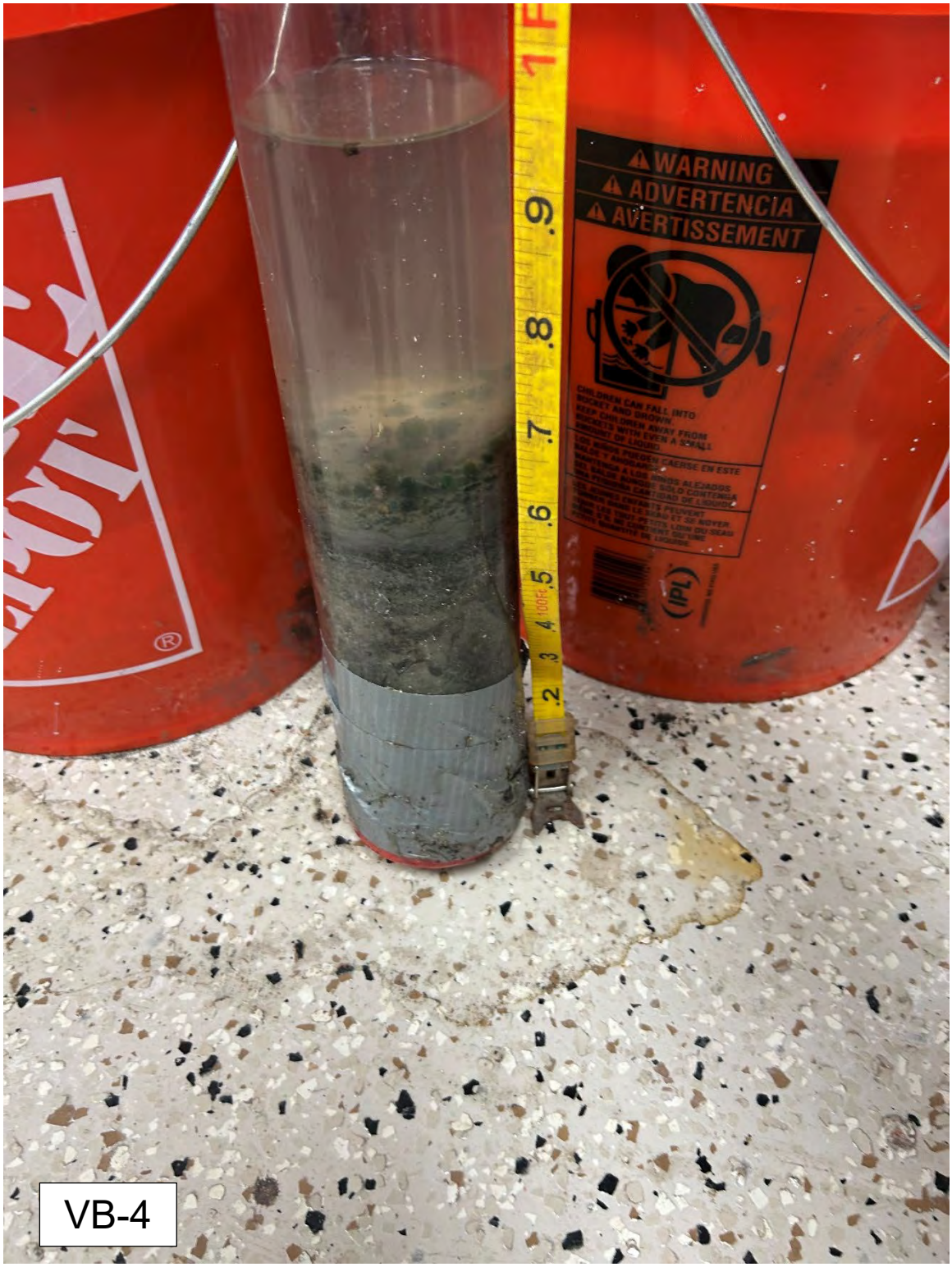
CHECKED BY:	AN	WIRX ENGINEERING	**ASPHALT CORE LOG** Lake Worth Road / 120th Avenue Intersection Improvements Project Village of Wellington Palm Beach County, Florida	APPENDIX **A**
PLOTTED BY:	JR			
DATE:	5/7/2025	**PROJECT NUMBER:** 2504001		

CHECKED BY:	AN	WIRX ENGINEERING	**ASPHALT CORE LOG** Lake Worth Road / 120th Avenue Intersection Improvements Project Village of Wellington Palm Beach County, Florida	APPENDIX **A**
PLOTTED BY:	JR			
DATE:	5/7/2025	**PROJECT NUMBER:** 2504001		

CHECKED BY:	AN	WIRX ENGINEERING	**VIBRACORE SAMPLE LOG** Lake Worth Road / 120th Avenue Intersection Improvements Project Village of Wellington Palm Beach County, Florida	APPENDIX **A**
PLOTTED BY:	JR			
DATE:	5/7/2025	**PROJECT NUMBER:** 2504001		

CHECKED BY:	AN	WIRX ENGINEERING	**VIBRACORE SAMPLE LOG** Lake Worth Road / 120th Avenue Intersection Improvements Project Village of Wellington Palm Beach County, Florida	APPENDIX **A**
PLOTTED BY:	JR			
DATE:	5/7/2025	**PROJECT NUMBER:** 2504001		

CHECKED BY:	AN	WIRX ENGINEERING	**VIBRACORE SAMPLE LOG** Lake Worth Road / 120th Avenue Intersection Improvements Project Village of Wellington Palm Beach County, Florida	APPENDIX **A**
PLOTTED BY:	JR			
DATE:	5/7/2025	**PROJECT NUMBER:** 2504001		



CHECKED BY:	AN	WIRX ENGINEERING	**VIBRACORE SAMPLE LOG** Lake Worth Road / 120th Avenue Intersection Improvements Project Village of Wellington Palm Beach County, Florida	APPENDIX **A**
PLOTTED BY:	JR			
DATE:	5/7/2025	**PROJECT NUMBER:** 2504001		

APPENDIX A

GEOTECHNICAL REPORT