CITY OF WESTON

GATOR RUN PARK IMPROVEMENTS

VOLUME II

City Bid No. 2024-07
June 2024

Calvin, Giordano & Associates, Inc.
EXCEPTIONAL SOLUTIONS™
1800 Eller Drive, Suite 600 · Fort Lauderdale, FL 33316
(phone) 954.921.7781 · (fax) 954.266.6487
Certificate of Authorization #514

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CITY OF WESTON

Gator Run Park Improvements

CGA Project No. 23-7936

TECHNICAL SPECIFICATIONS

DIVISION 1 - GENERAL REQUIREMENTS

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SECTION 01010

SUMMARY OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. This section includes general descriptions of the Contractor use of site, location of work, description of work, work sequence, owner occupancy and work by others.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Section 01025 – Measurement and Payment

C. Section 01030 – Special Project Procedures

D. Section 01505 – Control of Work

E. Other Sections as applicable.

1.03 REFERENCES (NOT USED)

1.04 CONTRACTOR USE OF SITE

A. The Contractor shall limit his area of work to remain within those properties and easements as depicted in the Drawings or as approved in writing by the Owner.

B. Contractor's use of lands other than those depicted in the Drawings shall require written approval from the landowner and be at the Contractors risk and cost.

1.05 LOCATION OF WORK

A. The work is generally located within Gator Run Park, 1101 Park Road, Weston, Florida.

1.06 DESCRIPTION OF WORK

The following is a general list of the work included. It is not intended to be complete. Consult the contract drawings and specifications for all contract requirements.

1. Mobilization
2. Maintenance of Traffic
3. Landscape and Irrigation
4. Clearing/Grubbing, Demolition
5. Erosion and Sediment Control

6. Excavation/Embankment/Grading
7. Paver Parking lot, multi-purpose play courts, basketball goals, seating areas, shade structures, monument columns and metal gates
8. Storm Drainage Systems
9. Chain-link Fencing & Gates
10. Concrete Curb, Sidewalk Path, Pavers Parking/driveways
11. Wastewater infrastructure
12. Site Lighting and Electrical Infrastructure
13. Pavement Restoration
14. Tree Relocations, Landscape, and Irrigation
15. Site Restoration

1.07 WORK SEQUENCE (NOT USED)

1.08 OWNER OCCUPANCY

A. Cooperate with Owner to minimize conflict, and to facilitate Residences and Owner's operations.

B. Schedule the Work to accommodate this requirement.

1.09 WORK BY OTHERS

A. The Contractor is advised that work by others may take place during the duration of the contract time. It shall be the Contractor's responsibility to coordinate and schedule all Work as not to delay or hinder his work or the work by others.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01015

GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for miscellaneous provisions applicable to the Work.

1.02 RELATED SECTIONS

A. Section 01030 – Special Project Procedures

B. Section 01310 – Construction Schedules

C. Section 01340 – Shop Drawings, Working Drawings and Samples

D. Section 01720 – Project Record Documents

E. Other Sections as applicable.

1.03 REFERENCES

A. Reference to standards, specifications, manuals, or codes of any technical society, organization, or association, or to Laws or Regulations, whether such reference be specific or by implication, shall mean the standard, specification, manual, code, or Laws or Regulations in effect at the time of opening of Bids (or on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

1.04 SAFETY

A. All work shall be done in a safe manner and in strict compliance with all requirements of the Federal Occupational Safety and Health Act (OSHA), The Florida Trench Safety Act and all other State and local safety and health regulations.

1.05 APPLICABLE CODES

A. The Contractor shall comply with the applicable standards codes and specifications governing the Contract Documents whether City, County, State or Federal. The Contractor is obligated to notify the Owner and Engineer of any deficiency contained in the Contract Documents immediately upon discovery. Where conflicts exist in such, the more stringent shall govern.

1.06 APPLICABLE PERMITS AND LICENSES

A. The Contractor shall abide by all permit conditions, whether, general, specific, limited or otherwise. A copy of all applicable permits and licenses, with the exception of City permits obtained by the Contractor, are attached hereto and made

a part of the Contract Documents.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 PRE-CONSTRUCTION RESPONSIBILITIES

A. Upon receipt of the Notice To Proceed, the Contractor shall arrange for a Pre-Construction meeting. The meeting shall be held with a minimum of one weeks' notice and shall include the Engineer, the Owner and Representatives for all affected utility companies.

3.02 TEMPORARY UTILITIES

A. The Contractor shall be responsible to arrange for and supply all temporary utilities including, but not limited to, water, sewer and electricity.

B. The cost of temporary utilities shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.03 UNDERGROUND LOCATING SERVICE

A. Prior to underground construction, the Contractor is required by the Underground Facility Damage Prevention and Safety Act, Chapter 556 FS to contact Sunshine 811, for the location of underground utilities.

3.04 ADVANCE INVESTIGATIONS

A. The Contractor shall be responsible for uncovering and exposing existing utilities sufficiently in advance of pipe laying operations to confirm elevation, size, material and clearance separation(s). If, upon excavation, an existing utility is found to be in conflict with the proposed construction or be of a size or material different from what is shown on the plans, the Contractor shall immediately notify the Engineer, who will in turn prepare a recommendation. Failure of the Contractor to perform advance investigations shall not relieve it of any claims for delay or damages.

3.05 PRESERVATION AND RESTORATION

A. Contractor shall be responsible for the preservation and protection of property adjacent to the work site against damage or injury as a result of his operations under this project. Any damage or injury occurring on account of any act, omission or neglect on the part of the Contractor shall be restored in a proper and satisfactory manner or replaced by and at the expense of the Contractor to an equal or superior condition than previously existed.

3.06 CONTRACTOR USE OF PREMISES

A. Contractor shall have limited use of the premises for construction operations,

including limited use of the site. The Contractor's use of the premises is further limited to the Owner's right to perform construction operations with its own forces or to employ separate contractors on portions of the project.

B. The Contractor shall be responsible for coordinating his daily activities in conjunction with any Contractors presently working within the vicinity of this project.

C. Confine operations to areas within project areas shown on plans and easements.

D. Keep existing driveways and entrances serving the premises clear and available to the Owner, residents and the Owner's employees at all times.

1. Do not use these areas for parking or storage of materials.

2. Schedule deliveries to minimize space and time requirements for storage of materials and equipment on site.

3.07 DISPOSAL

A. Do not dispose of any unsuitable fill, hazardous or organic material onsite. All such material shall be disposed of in a legal manner by the Contractor, the cost of which shall be included in the Bid.

3.08 ENVIRONMENTAL PROTECTION

A. Provide protection, operate temporary facilities, and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possibility that air, waterways and subsoil might be contaminated or polluted, or that other undesirable effects might result.

3.09 MATERIAL AND EQUIPMENT

A. Substitutions: After Bidding period, up to 30 days after date of Notice to Proceed, the Engineer will consider written requests from Contractor for proposed substitutions of products. Subsequent requests will be considered only in case of product unavailability or other condition beyond control of the Contractor. Submit a separate request for each proposed substitution in accordance with applicable Sections;

1. Do not order or install substitute products without written acceptance from the Engineer of Record.

2. Do not imply or indicate substitutions on shop drawings or product data submittals without a separate formal request.

3. Engineer will determine acceptability of substitution.

4. Only one request for substitution for each product will be considered. If not accepted, Contractor shall provide specified product.

B. Product selection is governed by the Contract Documents and governing regulations, not by previous project experience.

1. Where a single or multiple products or manufacturers are named, provide one of the products indicated or submit a request for substitution for any product or manufacturer not named unless no substitution is permitted.

2. Where the Specifications only require compliance with performance requirements, an imposed code, standard or regulation, select a product that complies with the requirements, standards, codes or regulations specified.

3. Manufacturers named in a Specification section are those manufacturers considered capable of manufacturing products conforming to the specified requirements. The naming of a particular manufacturer does not imply acceptance or approval of just any standard product of that manufacturer.

3.10 ADJUSTMENT OF EXISTING UTILITIES

A. The Contractor shall raise or lower all manholes, valve boxes, etc. to finished grade. The cost of these adjustments shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.11 TREES AND LANDSCAPING WITHIN PROJECT LIMITS

A. General: The CONTRACTOR shall exercise all necessary precautions so as not to damage or destroy any trees or landscaping on the project site, and shall not trim or remove any trees or landscaping unless such trees or landscaping have been approved for trimming or removal by the jurisdictional agency or owner. All existing trees or landscaping which are damaged during construction shall be replaced by the CONTRACTOR or a certified tree/landscaping company to the satisfaction of the owner.

B. Replacement: The CONTRACTOR shall immediately notify the jurisdictional agency or owner if any tree or landscaping is damaged by the CONTRACTOR's operations. If, in the opinion of the jurisdictional agency or owner, the damage is such that replacement is necessary, the CONTRACTOR shall replace the tree or landscaping at its own expense. The tree or landscaping shall be of a like size and variety as the tree or landscaping damaged, or, if of a smaller size, the CONTRACTOR shall pay any compensatory payment.

3.12 EXISTING IRRIGATION

A. All existing irrigation systems (if not shown on irrigation plans) within the area of the Work shall be restored to original condition or better and adjusted to finished grade. The cost of repairs and/or adjustment to existing irrigation shall be considered incidental to the cost of the Work and is therefore included in the Bid.

3.13 DEWATERING

A. In accordance with SFWMD criteria contained in 40E-2.061 F.A.C., a dewatering

permit is not required provided the following provisions are met:

1. Maximum daily pumpage is less than 5 million gallons (MG) and a maximum total project pumpage of less than 100 MG over a one year period;

2. All discharge shall remain on the project site;

3. No dewatering shall occur to a depth below elevation 0.0 feet NGVD within 1,000 feet of saline water, except when dewatering water with a chloride concentration of greater than 1,000 milligrams per liter;

4. No dewatering shall occur within 100 feet of a wastewater treatment plant rapid-rate land application system permitted under Part IV of Chapter 62-610, F.A.C.;

5. No dewatering shall occur within 1,000 feet of a known landfill or contamination; and,

6. No dewatering shall occur within 1,000 feet of a freshwater wetland unless dewatering activities are completed within 60 days.

7. All dewatering operations are subject to the Permit Conditions in Section 5.0 of the SFWMD APPLICANT'S HANDBOOK FOR WATER USE PERMIT APPLICATIONS (07-16-2014), including responsibility for mitigating any harm that may occur as a result of the dewatering to existing legal uses, off-site land uses, or natural resources.

B. The Contractor shall apply for a dewatering permit through the SFWMD if any of the above conditions cannot be met.

3.14 DEMOLITION

A. Limits of demolition which may be shown in the Contract Documents are general in nature. Actual limits of demolition shall be as determined by the field conditions in conformance with the requirements of the Work.

B. All sidewalks within the limits of construction which are not ADA compliant (cross-slopes which exceed 2% and/or running slopes which exceed 5% and/or changes in level of ¼" or greater) shall be demolished and reconstructed to meet these requirements.

C. When sidewalk tie-ins exist outside the limits of construction which are not ADA compliant, the contractor shall replace those sections as directed by the Owner.

END OF SECTION

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SECTION 01025

MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes administrative and procedural requirements for determining Work completed under the unit price contract.

1.02 RELATED SECTIONS

A. Section 01030 – Special Project Procedures

B. Section 01152 – Applications for Payment

C. Section 01370 – Schedule of Values

D. Other Sections as applicable.

1.03 REFERENCE STANDARDS

A. Manual of Uniform Traffic Control Devices (MUTCD)

B. FDOT Standard Specification for Road and Bridge Construction (Standard Specifications)

C. FDOT Design Standards for Design, Construction, Maintenance and Utility Operations in the State Highway System (Standard Indexes)

D. City of Weston Engineering Design Standards, City of Sunrise Design Standards as applicable

1.04 GENERAL REQUIREMENTS

A. Prices shall include all costs required for the completed, in-place construction of the specified unit of work. This may include but not be limited to, materials and delivery; cost of installation; incidentals; labor including social security, insurance, and other required fringe benefits; workman's compensation insurance; bond premiums; rental of equipment and machinery; taxes; testing; surveys; incidental expenses; and supervision.

B. Installation, acceptance, and payment shall be in accordance with the REFERENCE STANDARDS.

C. The Owner reserves the right to reject the Contractor's measurement of completed work that involves use of established unit prices, and to have this Work measured by an independent surveyor acceptable to the Contractor at the Owner's expense.

D. Contract Sum adjustments will be by Change Order on basis of net accumulative change for each unit price category.

1. Except as otherwise specified, unit prices shall apply to both deductive and additive variations of quantities.

2. Lump sum and unit prices in the Agreement shall remain in effect until date of final completion of the entire Work.

E. Partial payment for material and equipment properly stored and protected will be made in accordance with requirements of the General Conditions.

F. No separate payment will be made for Record Drawings.

G. Abbreviations:

1. Acre - AC
2. Allowance - AL
3. Cubic Yard - CY
4. Each - EA
5. Furnish and Install - F & I
6. Gallons - GA
7. Gross Mile - GM
8. Linear Feet – LF
9. Lump Sum - LS
10. Million Gallons – MG
11. Net Mile - NM
12. Square Foot – SF
13. Square Yard – SY
14. Ton - TN

PART 2 - PRODUCTS (NOT APPLICABLE)

PART 3 - EXECUTION

3.01 MEASUREMENT AND PAYMENT

A. Payment shall constitute full compensation and will be made as indicated in the RELATED SECTIONS.

B. The Contractor shall submit a Schedule of Values for Engineer approval in accordance with Section 01370 prior to the first Application for Payment.

C. The quantity approved for payment shall be either:

1. Percentage of the Lump Sum price - A percentage of the lump sum price equivalent to the percentage of the project completion as determined by the Engineer as of the date of the pay request submitted. The percent completion of the project shall be based on the percent of the total project actually constructed and not on the percent of the Contract price completed.

2. Measured Quantities - The actual quantities in-place and accepted as measured by the Engineer on the date of the pay request submitted in the units specified in the bid form or schedule of values.

3.02 PROTECTION

A. Where pavement, pipes, valves, appurtenances, trees, shrubbery, fences, other property or structures are in proximity to the WORK, adequate protection shall be provided. Such protection is considered incidental to construction and shall not be assigned to any pay item.

3.03 RESTORATION

A. Where pavement, pipes, valves, structures, appurtenances, trees, shrubbery, fences, other property or structures not designated as pay items, have been damaged, removed or disturbed by the Contractor, whether deliberately or through failure to carry out the requirements of the Contract Documents, state laws, municipal ordinances or the specific direction of the Engineer, or through failure to employ usual and reasonable safeguards, such property and surface structures shall be replaced or repaired at the expense of the Contractor to a condition equal to that before work began within a time frame approved by the Engineer. Such restoration is considered incidental to construction and shall not be assigned to any pay item.

END OF SECTION

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SECTION 01030

SPECIAL PROJECT PROCEDURES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for provisions which are specific to the Work.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Other Sections as applicable.

1.03 OBSTRUCTIONS

A. The attention of the Contractor is drawn to the fact that during digging at the Project site, the possibility exists of the Contractor encountering water, sewer, petroleum, gas, telephone, electrical, or other utility lines not shown on the Drawings. The Contractor is responsible for obtaining utility locations from the utility owners or utility locate company. The Contractor shall exercise extreme care before and during digging to locate and flag these lines so as to avoid damage to the existing lines. Should damage occur to an existing line, The Contractor shall repair the line at the no cost to the Owner.

B. The Contractor shall be responsible for uncovering and exposing existing utilities sufficiently in advance of pipe laying operations to confirm elevation, size, material and clearance separation(s). If, upon excavation, an existing utility is found to be in conflict with the proposed construction or be of a size or material different from what is shown on the plans, the Contractor shall immediately notify the Engineer, who will in turn prepare a recommendation. Failure of the Contractor to perform the advance investigation shall not relieve it of any claims for delay or damages.

1.04 PROVISIONS FOR THE CONTROL OF DUST

A. Sufficient precautions shall be taken during construction to minimize the amount of dust created. Appropriate precaution may include wetting down the site or other action as directed by the Engineer to prevent dust as a result of vehicular traffic.

1.05 SALVAGE

A. Any existing equipment or material, including but not limited to, motors, electrical components or controls, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the Engineer or Owner, and. if so, shall be removed or excavated, if necessary, and delivered to the Owner at a location directed by the Owner. Any equipment or material not worthy of salvaging, as directed by the Owner, shall be disposed of by the Contractor at a suitable location.

1.06 MAINTENANCE OF EXISTING WATER, WASTEWATER, DRAINAGE FACILITIES OPERATION

A. The Contractor shall take notice that the existing sanitary sewer line to the existing restroom building runs through the construction area and new multi-purpose courts. It is the responsibility of the Contractor relocate this line and to contact the Owner's utility operator to coordinate this work.

B. The Contractor shall fully cooperate at all times with the Owner in order to maintain the operation of the existing facilities with the least amount of interference and interruption possible. Continuous service, public health, and safety considerations shall exceed all others and the Contractor's schedule, plans, and work shall at all times be subject to alteration and revision, if necessary, for the above considerations.

C. The Engineer and Owner reserve the right to require the Contractor to work 24 hours per day in all cases where, in their opinion, interference with operation of the system may result.

D. In no case will the Contractor be permitted to interfere with the existing system until all materials, supplies, equipment, tools, and incidentals necessary to complete the interfering portion of the work are on the site, or a temporary bypass system is effectively in place. All existing utilities shall be pothole located prior to construction of conflicting piping.

E. The Contractor shall provide emergency sanitary sewer pumping if required.

1.07 UTILITY CROSSINGS

A. It is intended that wherever existing utilities such as water, chemical, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when, in the opinion of the Owner or Engineer, this procedure is not feasible the Engineer may direct the use of fittings for a utility crossing as detailed on the Drawings. All existing utilities shall be pothole located prior to construction of conflicting piping.

1.08 CONNECTIONS TO EXISTING SYSTEMS

A. The Contractor shall perform all work necessary to locate, excavate, and prepare for connections to the terminus of the existing mains all as shown on the Drawings or where directed by the Owner. The cost of this work and the cost for the actual connection to the existing mains shall be included in the bid price and shall not result in any additional cost to the Owner.

1.09 RELOCATIONS

A. The Contractor shall be responsible for the relocation of structures, including but not limited to, light poles, signs, sign poles, fences, piping, irrigation conduits, and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations shall be included in the bid for the project and shall not result in any additional cost to the Owner.

1.10 WARRANTIES

A. All warrantees shall be in accordance with Section 01740.

B. All warranties and bonds shall be submitted prior to the issuance of final payment.

1.11 HURRICANE PREPAREDNESS PLAN

A. Within thirty days of the date of Notice to Proceed, the Contractor shall submit to the Engineer and Owner a Hurricane Preparedness Plan. The plan should outline the necessary measures that the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning. The plan shall detail these measures with specific action items defining responsible personnel.

B. In the event of inclement weather, or whenever Engineer shall direct; Contractor will cause Subcontractors to protect carefully the Work and materials against damage or injury from the weather. If, in the opinion of the Engineer, any portion of Work or materials shall have been damaged or injured by reason of failure on the part of Contractor or any Subcontractor to so protect the Work, such Work and materials shall be removed and replaced at the expense of the Contractor.

1.12 EQUIPMENT, TESTING & INSPECTION

A. Regardless of the number of days specified in the individual sections for the manufacturer's representative to be present on the site for inspection and testing, if the equipment fails to perform as specified, then the representative shall remain on site until the malfunction is corrected.

B. The cost for the additional days shall not be added to the cost for the Owner, but shall be to the account of the Contractor.

1.13 ADJACENT PROPERTY OWNER NOTIFICATION

A. The Contractor shall prepare a written notice to property owners adjacent to the project work site notifying them of the schedule of work affecting them and anticipated inconveniences they may expect. The notice shall meet the approval of the Engineer and be delivered to property owners at least 72 hours prior to construction adjacent to their property. This notice shall indicate the work to be performed, the time it will take to perform the work, and the time when the water service to the property owner will be disrupted.

1.14 RIGHT-OF-WAY'S

A. The Contractor shall not do any work that would affect any oil, gas, sewer, or water pipeline; any telephone, telegraph, or electric transmission line; any fence; or any other structure, nor shall the Contractor enter upon the rights-of-way involved until notified by the Engineer that the Owner has secured authority therefore from the proper party. After authority has been obtained, the Contractor shall give said party due notice of its intention to begin work, if required by said party, and shall remove, shore, support, or otherwise protect such pipeline, transmission line, ditch, fence, or structure or replace the same. When two or more contracts are being executed at one time on the same or adjacent land in such manner that work on one contract

may interfere with that on another, the Owner shall determine the sequence and order of the work. When the territory of one contract is the necessary or convenient means of access for the execution of another contract, such privilege of access or any other reasonable privilege may be granted by the Owner to the Contractor so desiring, to the extent and amount, and in the manner and at the times permitted. No such decision as to the method or time of conducting the work or the use of territory shall be made the basis of any claim for delay or damage.

1.15 PROTECTION OF STREET OR ROADWAY MARKERS

A. The Contractor shall not destroy, remove, or otherwise disturb any existing survey markers or other existing street or roadway markers without proper authorization. No pavement breaking or excavation shall be started until all survey or other permanent marker points that will be disturbed by the construction operations have been properly referenced for easy and accurate restoration. It shall be the Contractor's responsibility to notify the proper representatives of the Owner of the time and location that work will be done. Such notification shall be sufficiently in advance of construction so that there will be no delay due to waiting for survey points to be satisfactorily referenced for restoration. All survey markers or points disturbed by the Contractor without proper authorization by the Engineer will be accurately restored by the Owner at the Contractor's expense after all street or roadway resurfacing has been completed.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01041

PROJECT COORDINATION

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. ENGINEER will coordinate the work between CONTRACTOR and the OWNER.

B. The CONTRACTOR shall:

1. Coordinate work of his employees and subcontractors.

2. Expedite his work to assure compliance with schedules.

3. Comply with orders and instructions of ENGINEER.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01200 – Project Meetings

C. Section 01310 – Construction Schedules

D. Section 01340 – Shop Drawings, Working Drawings, and Samples

1.03 CONSTRUCTION ORGANIZATION AND START-UP

ENGINEER shall establish on-site lines of authority and communications.

A. Schedule and conduct preconstruction meetings and progress meeting as specified in section 01200.

B. Establish intra-project communications procedures for

1. Submittals

2. Reports and records

3. Recommendations

4. Coordination of drawings

5. Schedules

6. Resolution of conflicts

C. Interpret Contract Documents: Transmit written interpretations of CONTRACTOR and to other concerned parties.

D. Assist in obtaining permits and approvals: verify that CONTRACTOR and Contractors have obtained inspections for work and for temporary facilities.

E. Control the use of Site: Through coordination with the OWNER, allocate space for CONTRACTOR's use for field offices, sheds, and work and storage areas.

F. Inspection and Testing:

1. Inspect work to assure performance in accordance with requirements of Contract Documents.

2. Administer special testing and inspections of suspect work.

3. Reject work which does not comply with requirements of Contract Documents.

4. Coordinate Testing Laboratory Services:

   a. Verify that required laboratory personnel are present.

   b. Verify that tests are made in accordance with specified standards.

   c. Review test reports for compliance with specified criteria.

   d. Recommend and administer any required re-testing.

1.04 CONTRACTOR'S DUTIES

A. Construction Schedules:

1. Prepare a detailed schedule of basic operations.

2. Monitor schedules as work progresses:

   a. Identify potential variances between scheduled and probable completion dates for each phase.

   b. Recommend to OWNER adjustments in schedule to meet required completion dates.

   c. Document changes in schedule, submit to OWNER, ENGINEER and to involved subcontractors.

3. Observe work of each subcontractor to monitor compliance with schedule.

   a. Verify that labor and equipment are adequate for the work and the schedule.

   b. Verify that product procurement schedules are adequate.

   c. Verify that product deliveries are adequate to maintain schedule.

   d. Report noncompliance to ENGINEER, with recommendation for changes.

B. Process Shop Drawings, Product Data and Samples: Prior to submittal to ENGINEER, review for compliance with Contract Documents:

1. Field dimensions and clearance dimensions.

2. Relation to available space

3. Effect of any changes on the work of any subcontractor.

C. Review Drawings prepared by subcontractors: Prior to submittal to ENGINEER, review for compliance with Contract Documents.

D. Prepare Coordination Drawings as required to resolve conflicts and to assure coordination of the work of, or affected by, mechanical, electrical, etc., trades, or by special equipment requirements.

1. Submit to ENGINEER.

2. Reproduce and distribute copies to concerned parties after ENGINEER review.

E. Maintain Report and Records at Job Site, available to ENGINEER and OWNER.

1. Daily log of progress of work.
2. Records
    a. Contracts
    b. Purchase orders
    c. Materials and equipment records
    d. Applicable handbooks, codes, and standards
3. Maintain file of record documents

1.05 CONTRACTOR'S CLOSE-OUT DUTIES

A. Mechanical and Electrical equipment start up:
1. Coordinate check-out of utilities, operational systems, and equipment.
2. Organize initial start-up and testing.
3. Record dates of start of operation of systems and equipment.
4. Submit to OWNER written notice of beginning of warranty period for equipment put into service.

B. At completion of work, conduct an inspection to assure that:
1. Specified cleaning has been accomplished.
2. Temporary facilities have been removed from site.

C. Substantial Completion:
1. Conduct an inspection to develop a list of work to be completed or corrected.
2. Assist ENGINEER in inspection.
3. Supervise correction and completion of work of Subcontractors.
4. CONTRACTOR to provide the OWNER a letter stating that all shop drawings, Requests for Information and Change Orders submitted have been responded and closed out.
5. CONTRACTOR is required to finalize all outstanding Tax Saver Credit prior to receiving his final payment.
6. CONTRACTOR must submit prior to Substantial Completion of final Tax Saver executed vendor list.
7. After substantial completion walk-through has been completed, OWNER will coordinate a meeting between the Public Work Department of the Owner and the CONTRACTOR for on-site training dealing with the building and its equipment including mechanical and electrical systems. Contractor is to submit three copies to the Public Works Department of any/all manuals and warranties three weeks prior to the training.
8. As-builts, specification corrections, other manuals not dealing with training, and any/all testing work will be sent to Calvin, Giordano & Associates, Inc. no later than thirty days after substantial completion walk-through but prior to the final payment. Final payment will not be received until all submittals have been received.

9. CONTRACTOR will provide copies of all approved inspections as part of the walk-through.

1.06 ENGINEER'S CLOSE-OUT DUTIES

A. Final Completion: When CONTRACTOR determines that work is finally complete, conduct an inspection to verify completion of work.

B. Administration of Contract closeout:

1. Receive and review CONTRACTOR's final submittals.

2. Transmit to OWNER with recommendations for action.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01045

CUTTING AND PATCHING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Contractor shall be responsible for all cutting, fitting and patching required to complete the work or to:

1. Make its several parts fit together properly.

2. Uncover portions of the Work to provide for installation of ill-timed work.

3. Remove and replace defective work.

4. Remove and replace work not conforming to requirements of Contract Documents.

5. Remove samples of installed work as specified for testing.

6. Investigate subsurface conditions or utilities.

1.02 RELATED SECTIONS

A. Section 01010 - Summary of Work

B. Other Sections as applicable.

1.03 SUBMITTALS

A. Submit a written request to the Engineer in advance of executing any cutting or alteration which affects:

1. Work of the Owner or any separate contractor.

2. Structural value or integrity of any element of the Project.

3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.

4. Efficiency, operational life, maintenance, or safety of operational elements.

5. Visual qualities of sight-exposed elements.

B. Request shall include:

1. Identification of the Project.

2. Description of affected work.

3. The necessity for cutting, alteration, or excavation.

4. Effect on work of Owner or any separate contractor, or on structural or weatherproof integrity of Project.

5. Description of proposed work:

   a. Scope of cutting, patching, alteration, or excavation.

   b. Trades who will execute the work.

   c. Products proposed to be used.

   d. Extent of refinishing to be redone.

6. Alternatives to cutting and patching.

7. Cost proposal, when applicable.

8. Written permission of any separate contractor whose work will be affected.

C. Submit written notice to the Engineer designating the date and the time work will be uncovered.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Comply with specifications and standards for each specific project involved.

PART 3 - EXECUTION

3.01 INSPECTION

A. Inspect existing conditions of Project, including elements subject to damage or to movement during cutting or patching.

B. After uncovering work, inspect conditions affecting installation of Products, or performance of work.

C. Report unsatisfactory or questionable conditions to the Engineer in writing; do not proceed with work until the Engineer has provided further instructions.

3.02 PREPARATION

A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of Work.

B. Provide devices and methods to protect other portions of Project from damage.

C. Provide protection from elements for that portion of the Project which may be exposed by cutting and patching work and maintain excavations free from water.

3.03 PERFORMANCE

A. Execute cutting and demolition by methods which will prevent damage to other work and will provide proper surfaces to receive installation of repairs.

B. Execute cutting methods which will prevent settlement or damage to other work.

C. Employ original Installer or Fabricator to perform cutting and patching for:

1. Weather-exposed or moisture-resistant surfaces.

2. Sight-exposed finished surfaces.

D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.

E. Restore work which has been cut or removed; install new products to provide completed Work in accord with requirements of Contract Documents.

F. Fit work airtight to pipes, sleeves, ducts, conduit, and other penetrations through surfaces.

G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:

1. For continuous surfaces, refinish to nearest intersection.

2. For an assembly, refinish entire unit.

END OF SECTION

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SECTION 01050

FIELD ENGINEERING AND SURVEYING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide and pay for field engineering and surveying services required for Project as follows:

1. Surveying work required for the lay-out and execution of Work.

2. Surveying work required to identify and maintain existing control points, bench marks and property line corners.

3. Surveying work required to verify existing utility locations.

4. Surveying work as required to create Project Record Documents and As-builts.

5. Civil, structural, or other professional engineering services specified, or required to execute the Contractor's construction methods.

6. Testing, sampling, calibrating and training services specified, or required to execute the Contractor’s construction methods including soils, concrete, material, etc.

1.02 RELATED SECTIONS

A. Section 01410 – Materials and Installation Testing

B. Section 01720 – Project Record Documents

C. Other Sections as applicable.

1.03 QUALIFICATIONS OF PROFESSIONAL

A. Florida Registered Professional Surveyor and Mapper, acceptable to the Owner and the Engineer.

B. Florida Registered Professional Engineer(s) of the specialty required for on the Project, acceptable to the Owner and the Engineer.

1.04 SURVEY REFERENCE POINTS

A. Horizontal and vertical control points for the Project are to be established by the Engineer and provided to the Contractor.

B. Locate and protect control points prior to starting work and preserve all permanent reference points during construction.

1. Make no changes or relocations without prior written notice to the Engineer.

2. Report to the Engineer when any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations.

3. Require surveyor to replace project control points which may be lost or destroyed.

a. Establish replacements based on original survey control.

1.05 PROJECT SURVEY REQUIREMENTS

A. Establish a minimum of two temporary benchmarks on site, referenced to data by survey control points.

1. Record locations, with horizontal and vertical data, on Project Record Documents.

B. Establish lines and levels, locate, and lay out, by instrumentation and similar appropriate means:

1. Site Improvements

a. Line and grade of pipe and structure installation; top of pipe, invert, slope, etc.

b. Grading for fill and topsoil placement, roadway sub-base and base installation.

2. Controlling lines and levels required for all trades.

C. From time to time, verify layouts by same methods.

1.06 RECORDS

A. Maintain a complete, accurate log of all control and survey work as it progresses in accordance with Section 01720.

1.07 SUBMITTALS

A. Submit name and address of Professional Surveyor and Mapper or Professional Engineer to the Engineer.

B. On request of the Engineer, submit documentation to verify accuracy of field engineering work.

C. Submit certificate signed by registered surveyor certifying that elevations and locations of improvements are in conformance, or non-conformance, with Contract Documents.

D. Submit Project Record Documents in accordance with Section 01720.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 ADVANCE INVESTIGATIONS

A. The Contractor shall be responsible for uncovering and exposing existing utilities sufficiently in advance of pipe laying operations to confirm elevation, size, material, and clearance separation(s). If, upon excavation, an existing utility is found to be in conflict with the proposed construction or be of a size or material different from what is shown on the plans, the Contractor shall immediately notify the Engineer, who will in turn prepare a recommendation. Failure of the Contractor to perform the advance investigation shall not relieve it of any claims for delay or damages.

END OF SECTION

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SECTION 01090

REFERENCES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Applicable Publications: Whenever in these specifications references are made to published specifications, codes, standards, or other requirements, it shall be understood that wherever no date is specified, only the latest specifications, standards, or requirements of the respective issuing agencies which have been published as of the date that the WORK is advertised for bids, shall apply; except to the extent that said standards or requirements may be in conflict with applicable laws, ordinances, or governing codes. No requirements set forth herein or shown on the drawings shall be waived because of any provision of, or omission from, said standards or requirements.

B. Specialists, Assignments: In certain instances, specification text requires (or implies) that specific work is to be assigned to specialists or expert entities, who must be engaged for the performance of that work. Such assignments shall be recognized as special requirements over which the CONTRACTOR has no choice or option. These assignments shall not be interpreted so as to conflict with the enforcement of building codes and similar regulations governing the WORK; also they are not intended to interfere with local union jurisdiction settlements and similar conventions. Such assignments are intended to establish which party or entity involved in a specific unit of work is recognized as "expert" for the indicated construction processes or operations. The final responsibility for fulfillment of the entire set of contract requirements remains with the CONTRACTOR.

1.02 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

A. Without limiting the generality of other requirements of the specifications, all work specified herein shall conform to or exceed the requirements of the following documents to the extent that the provisions of such documents are not in conflict with the requirements of these Specifications nor the applicable codes.

B. References herein to "Building Code" or “Code” shall mean the Florida Building Code. The latest edition of the code as approved and used at the local agency having jurisdiction, shall apply to the WORK herein, including, all addenda, modifications, amendments, or other lawful changes thereto.

C. In case of conflicts between codes, reference standards, drawings and other Contract Documents, the most stringent requirements shall govern. All conflicts shall be brought to the attention of the ENGINEER for clarifications and directions prior to ordering or providing any materials or labor. The CONTRACTOR shall bid the most stringent requirements.

D. Applicable Standard Specifications: The CONTRACTOR shall construct the WORK specified herein in accordance with the requirements of the Contract Documents and the referenced portion of those referenced codes, standards, and specifications listed herein; except, that wherever references to "Standard Specifications" are made, the provisions therein for measurement and payment shall not apply.

E. References herein to "OSHA Regulations for Construction" shall mean Title 29, Part 1926, Construction Safety and Health Regulations, Code of Federal Regulations, including all changes and amendments thereto.

F. References herein to "OSHA Standards" shall mean Title 29, Part 1910, Occupational Safety and Health Standards, Code of Federal Regulations (OSHA), including all changes and amendments thereto.

1.03 TRADE NAMES AND ALTERNATIVES

A. For convenience in designation in the Contract Documents, materials to be incorporated in the WORK may be designated under a trade name or the name of a manufacturer and its catalog information. The use of alternative material which is equal in quality and of the required characteristics for the purpose intended will be permitted, subject to the following requirements:

1. The burden of proof as to the quality and suitability of such alternative equipment, products, or other materials shall be upon the CONTRACTOR.

2. The ENGINEER will be the sole judge as to the comparative quality and suitability of such alternative equipment, products, or other materials and its decisions shall be final.

3. Base Bid requirements outlined in the Supplement to Bid Form, shall supersede any language contained hereinafter.

B. Whenever in the Contract Documents the name or the name and address of the manufacturer or distributor is given for a product or other material, or if any other source of a product or material is indicated therefore, such information is given for the convenience of the CONTRACTOR only, and no limit, restriction, or direction is indicated or intended thereby, nor is the accuracy or reliability of such information guaranteed. It shall be the responsibility of the CONTRACTOR to determine the accurate identity and location of any such manufacturer, distributor, or other source of any product or material called for in the Contract Documents.

C. The CONTRACTOR may offer any material, process, or equipment which it considers equivalent to that indicated. Unless otherwise authorized in writing by the ENGINEER, the substantiation of offers of equivalency must be submitted within 30 days after execution of the Agreement. The CONTRACTOR, at its sole expense, shall furnish data concerning items it has offered as equivalent to those specified. The CONTRACTOR shall have the material as required by the ENGINEER to determine that the quality, strength, physical, chemical, or other characteristics, including durability, finish, efficiency, dimensions, service, and suitability are such that the items will fulfill its intended function. Installation and use of a substitute item shall not be made until accepted by the ENGINEER. If a substitute offered by the CONTRACTOR is found to be not equal to the specified material, the CONTRACTOR shall furnish and install the specified material.

D. The CONTRACTOR'S attention is further directed to the requirement that failure to submit data substantiating a request for the substitution of an "or equal" item within said 30-day period after the execution of the Agreement, shall be deemed to mean that the CONTRACTOR intends to furnish one of the specific brand-named products named in the specification, and the CONTRACTOR does hereby waive all rights to offer or use substitute products in each such case. Wherever a proposed substitute product has not been submitted within said 30-day period, or wherever the submission of a proposed substitute product fails to meet the requirements of the specifications and an acceptable resubmittal is not received by the ENGINEER within said 30-day period, the CONTRACTOR shall furnish only one of the products originally-named in the Contract Documents.

1.04 ABBREVIATION

A. Wherever in these specifications references are made to the standards, specifications, or other published data of the various national, regional, or local organizations, such organizations may be referred to by their acronyms or abbreviation only. As a guide to the user of these specifications, the following acronyms and abbreviations which may appear in these specifications shall have the meanings indicated herein.

1.05 ABBREVIATIONS AND ACRONYMS

A. Abbreviations and acronyms contained in the Contract Documents may include, but not be limited to, the following:

AAMA	Architectural Aluminum Manufacturer's Association
AAR	Association of American Railroads
AASHTO	American Association of the State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ACPA	American Concrete Pipe Association
ACPPA	American Concrete Pressure Pipe Association
AFBMA	Anti-Friction Bearing Manufacturer's Association, Inc.
AGA	American Gas Association
AGC	Associated General Contractors
AGMA	American Gear Manufacturer's Association
AHAM	Association of Home Appliance Manufacturers
AI	The Asphalt Institute
AIA	American Institute of Architects
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AITC	American Institute of Timber Construction
AMCA	Air Movement and Control Association
ANS	American Nuclear Society
ANSI	American National Standards Institute, Inc.
APA	American Plywood Association
API	American Petroleum Institute
APWA	American Public Works Association
AREA	American Railway Engineering Association
ASA	Acoustical Society of America

ASAE	American Society of Agricultural Engineers
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
ASLE	American Society of Lubricating Engineers
ASME	American Society of Mechanical Engineers
ASPE	American Society of Plumbing Engineers
ASQC	American Society for Quality Control
ASSE	American Society of Sanitary Engineers
ASTM	American Society for Testing and Materials
AWPA	American Wood Preservers Association
AWPI	American Wood Preservers Institute
AWS	American Welding Society
AWWA	American Water Works Association
BBC	Basic Building Code, Building Officials and Code Administrators International
BHMA	Builders Hardware Manufacturers Association
CBM	Certified Ballast Manufacturers
CEMA	Conveyors Equipment Manufacturers Association
CGA	Compressed Gas Association
CLPCA	California Lathing and Plastering Contractors Association
CLFMI	Chain Link Fence Manufacturers Institute
CMA	Concrete Masonry Association
CRSI	Concrete Reinforcing Steel Institute
CSI	Construction Specifications Institute
DCDMA	Diamond Core Drill Manufacturers Association
DIPRA	Ductile Iron Pipe Research Association
EIA	Electronic Industries Association
ETL	Electrical Test Laboratories
HI	Hydraulic Institute
ICBO	International Conference of Building Officials
IEEE	Institute of Electrical and Electronic Engineers
IES	Illuminating Engineering Society
IME	Institute of Makers of Explosives
IP	Institute of Petroleum (London)
IPC	Institute of Printed Circuits
IPCEA	Insulated Power Cable Engineers Association
ISA	Instrument Society of America
ISO	International Organization for Standardization
ITE	Institute of Traffic Engineers
MBMA	Metal Building Manufacturers Association
MPTA	Mechanical Power Transmission Association
MTI	Marine Testing Institute
NAAM	National Association of Architectural Metal Manufacturers
NACE	National Association of Corrosion Engineers
NBS	National Bureau of Standards
NCCLS	National Committee for Clinical Laboratory Standards
NEC	National Electric Code
NEMA	National Electrical Manufacturers Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association

NGLI	National Grease Lubricating Institute
NMA	National Microfilm Association
NRCA	National Roofing Contractors Association
NWMA	National Woodwork Manufacturers Association
NWWA	National Water Well Association
OSHA	Occupational Safety and Health Administration
PCA	Portland Cement Association
PCI	Precast Concrete Institute
PDI	Plumbing and Drainage Institute
RIS	Redwood Inspection Service
RVIA	Recreational Vehicle Industry Association
RWMA	Resistance Welder Manufacturers Association
SAE	Society of Automotive Engineers
SAMA	Scientific Apparatus Makers Association
SBC	Southern Building Code Congress International, Inc. (SBCCI)
SIS	Swedish Standards Association
SJI	Steel Joist Institute
SMA	Screen Manufacturers Association
SMACCNA	Sheet Metal and Air Conditioning Contractors National Association
SPR	Simplified Practice Recommendation
SSBC	Southern Standard Building Code, Southern Building Code Congress
SSPC	Steel Structures Painting Council
SSPWC	Standard Specifications for Public Works Construction
TAPPI	Technical Association of the Pulp and Paper Industry
TFI	The Fertilizer Institute
UBC	Uniform Building Code
UL	Underwriters Laboratories, Inc.
USGS	United States Geological Survey
WCLIB	West Coast Lumber Inspection Bureau
WCRSI	Western Concrete Reinforcing Steel Institute
WIC	Woodwork Institute of California
WPCF	Water Pollution Control Federation
WRI	Wire Reinforcement Institute, Inc.
WWPA	Western Wood Products Association

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

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SECTION 01152

APPLICATIONS FOR PAYMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Submit Applications for Payment to the Engineer in accordance with the schedule established by Conditions of the Agreement between Owner and Contractor and the Contract Documents.

PART 2 - RELATED SECTIONS

A. Section 01050 - Field Engineering and Surveying

B. Section 01310 - Construction Schedules

C. Section 01370 - Schedule of Values

D. Section 01380 - Construction Photographs

E. Section 01700 - Contract Close Out

F. Section 01720 - Project Record Documents

2.02 FORMAT AND DATA REQUIRED

A. Submit applications typed on forms provided by the Owner (or forms provided by Contractor and agreed to by Owner), Application for Payment, with itemized data typed on 8 - 1/2-inch x 14 inch white paper and continuation sheets.

B. Payment forms shall show significant detail to substantiate request. Additional detail may be required by the Engineer.

2.03 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

A. Application Form:

1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.

2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.

3. Execute certification with signature of a responsible officer of Contract firm.

B. Continuation Sheets:

1. Fill in total list of scheduled component items of work, with item number and scheduled dollar value for each item.

2. Fill in dollar value in each column for each scheduled line item when work has been performed or products stored.

   a. Round off values to nearest dollar, or as specified.

3. List each Change Order Number, and description, as for an original component item or work.

2.04 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information, with a cover letter identifying:

1. Project

2. Application number and date

3. Detailed list of enclosures

4. For stored products:

   a. Item number and identification as shown on application.

   b. Description of specific material.

   c. Copy of material invoice.

   d. Address of location where item is stored.

   e. Photographs of item (if requested)

B. Submit one copy of data cover letter for each copy of application.

C. As a prerequisite for payment, Contractor is to submit the following:

1. A "Surety Acknowledgment of Payment Request" letter showing amount of progress payment which the Contractor is requesting,

2. Updated record drawings for review by the Engineer,

3. Updated construction schedule for review by the Engineer,

4. Construction photographs.

2.05 PREPARATION OF APPLICATION FOR FINAL PAYMENT

A. Fill in Application form as specified for progress payments.

B. Provide FINAL COMPLETION documentation for the final statement of accounting as specified in Section 01700 - Contract Closeout.

C. Submit final record drawings.

2.06 SUBMITTAL PROCEDURE

A. Submit Applications for Payment to the Engineer at the times stipulated in the Agreement.

B. Number: Five copies of each Application.

C. When the Engineer finds Application properly completed and correct, he will transmit certificate of payment to Owner, with copy to Contractor.

PART 3 - PRODUCTS (NOT USED)

PART 4 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01200

PROJECT MEETINGS

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Engineer shall schedule and administer preconstruction meetings, periodic progress meetings, and specially called meetings throughout the progress of work. The Engineer shall:

1. Prepare agenda for meetings.
2. Make physical arrangements for meetings.
3. Preside at meetings.
4. Record in writing the minutes; include significant proceedings and decisions.
5. Record the meeting with an audio recording device.
6. Reproduce and distribute copies of minutes within five working days after each meeting:
    a. To participants in the meeting.
    b. To parties affected by decisions made at the meeting.

B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

C. The Contractor shall attend meetings to ascertain that work is executed consistent with Contract Documents and construction schedules.

1.02 RELATED SECTIONS

A. Section 01310 - Construction Schedules.

B. Section 01340 - Shop Drawings, Working Drawings, and Samples.

C. Section 01720 - Project Record Documents.

D. Other Sections as applicable.

1.03 PRECONSTRUCTION MEETING

A. Schedule a preconstruction meeting no later than 15 days after date of Notice to Proceed.

B. Location: A central site, convenient for all parties designated by the Owner.

C. Attendance:

1. Owner's Representative.
2. Engineer and his Professional Consultants.
3. Resident Project Representative.
4. Contractor's Superintendent.
5. Major Subcontractors.
6. Major Suppliers.
7. Utilities.
8. Others as appropriate.

D. Suggested Agenda:

1. Distribution and discussion of:
    a. List of major subcontractors and suppliers.
    b. Projected Construction Schedule.
2. Critical work sequencing/critical path scheduling.
3. Major equipment deliveries and priorities.
4. Project Coordination.
    a. Designation of responsible personnel.
5. Procedures and processing of:
    a. Field decisions.
    b. Proposal requests.
    c. Submittals.
    d. Change Orders.
    e. Applications for Payments.
6. Adequacy of Distribution of Contract Documents.
7. Procedures for maintaining Record Documents.
8. Use of Premises:
    a. Office, Work and Storage Areas.
    b. Owner's Requirements.
9. Construction facilities, controls, and construction aids.
10. Temporary Utilities.

1.04 PROGRESS MEETINGS

A. Schedule regular periodic meetings. The progress meetings will be held as required by progress of the work.

B. Hold called meetings as required by progress of the work.

C. Location of the meetings: Project field office of the Contractor or Engineer.

D. Attendance:

1. Engineer, and his professional consultants as needed.
2. Subcontractors as appropriate to the agenda.
3. Suppliers as appropriate to the agenda.
4. Others as appropriate.

E. Suggested Agenda:

1. Review, approval of minutes of previous meeting.
2. Review of work progress since previous meeting.
3. Field observations, problems, and conflicts.
4. Problems which impede Construction Schedule.
5. Review of off-site fabrication, delivery schedule.
6. Corrective measures and procedures to regain projected schedule.
7. Revisions to Construction Schedule.
8. Progress, schedule, during succeeding work period.
9. Coordination of schedules.
10. Review submittal schedules; expedite as required.
11. Maintenance of quality standards.
12. Pending changes and substitutions.
13. Review proposed changes for:
    a. Effect on Construction Schedule and on a completion date.
    b. Effect on other contracts of the Project.
14. Other business.
15. Construction schedule.
16. Critical/long lead items.

F. The Contractor is to attend progress meetings and is to study previous meeting minutes and current agenda items, in order to be prepared to discuss pertinent topics such as deliveries of materials and equipment, progress of work, etc.

G. The Contractor is to provide a current submittal log at each progress meeting in accordance with Section 01340.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01310

CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Promptly after Award of the Contract and within ten days after the effective date of the Agreement, prepare and submit to the Engineer an estimated construction progress schedules for the work, with sub-schedules of related activities which are essential to its progress.

B. Submit revised progress schedules on a monthly basis.

C. No partial payments shall be approved by the Engineer until there is an approved up to date construction progress schedule on hand.

D. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor's schedule.

1.02 RELATED SECTIONS

A. Section 01010 - Summary of Work

B. Section 01152 - Applications for Payment

C. Section 01200 - Project Meetings

D. Section 01340 - Shop Drawings, Working Drawings and Samples

E. Other Sections as applicable.

1.03 FORM OF SCHEDULES

A. Prepare schedules for submittal each month with pay request. The form of the schedule is to be Microsoft Project or approved equal. The Schedule is to indicate work completed to date and additions to or deletions from the schedule.

1. Provide separate horizontal bar for each trade or operation within each structure or item.

2. Horizontal time scale: In weeks from start of construction and identify the first work day of each month.

3. Scale and spacing: To allow space for notations and future revisions.

B. Format of listings: The chronological order of the start of each item of work for each structure.

C. Identification of listings: By major specification section numbers as applicable and structure.

1.04 CONTENT OF SCHEDULES

A. Construction Progress Schedule:

1. Show the complete sequence of construction by activity.

2. Show the dates for the beginning of, and completion of, each major element of construction in no more than a two week increment scale. Specifically list, but not limited to:
   a. Receiving Materials
   b. Construction Activity
   c. Testing
   d. Restoration
   e. Startup
   f. Record Drawings
   g. Permit Close-out
   h. Punch List
   i. Owner Activities, Including Inspections

3. Show projected percentage of completion for each item, as of the first of each month.

4. Show projected dollar cash flow requirements for each month of construction.

5. Use of float suppression techniques such as preferential sequencing or logic, special lead/lag logic restraints, and extended activity times are prohibited, and use of float time disclosed or implied by use of alternate float-suppression techniques shall be shared to proportionate benefit of the Owner and Contractor.

6. Pursuant to above float-sharing requirement, no time extensions will be granted nor delay damages paid until a delay occurs which (i) impacts Project's critical path, (ii) consumes available float or contingency time, and (iii) extends work beyond contract completion date.

7. If the Contractor provides an accepted schedule with an early completion date, the Owner reserves the right to reduce the duration of the work to match the early completion date by issuing a deductive Change Order at no change in Contract Price.

B. Submittal Schedule for Shop Drawings and Samples in accordance with Section 01340. Must show:

1. The dates for Contractor's submittals.
2. The dates submittals will be required for owner furnished products, if applicable.
3. The dates approved submittals will be required from the Engineer.

C. A list of all long lead items (equipment, materials, etc).

1.05 PROGRESS REVISIONS

A. Indicate progress of each activity to date of submission.

B. Show changes occurring since previous submission of schedule:

1. Major changes in scope.
2. Activities modified since previous submission.
3. Revised projections of progress and completion.
4. Other identifiable changes.

C. Provide a narrative report as needed to define:

1. Problem areas, anticipated delays, and the impact on the schedule.
2. Corrective action recommended, and its effect.
3. The effect of changes on schedules of other prime contractors.

1.06 SUBMISSIONS

A. Submit initial schedules to the Engineer within 10 days after the effective date of the Agreement.

1. The Engineer will review schedules and return review copy within 21 days after receipt.
2. If required, resubmit within 7 days after return of review copy.

B. Submit a minimum of five (5) copies of revised monthly progress schedules with that month's application for payment.

1.07 DISTRIBUTION

A. Distribute copies of reviewed schedules to:

1. Owner (Two copies)
2. Engineer (Two copies)
3. Job Site File (One copy)
4. Subcontractors (As needed)
5. Other Concerned Parties (As needed)

B. Instruct recipients to report promptly to the Contractor, in writing, any problems anticipated by the projections shown in the schedule.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01340

SHOP DRAWINGS, WORKING DRAWINGS, AND SAMPLES

PART 1 - GENERAL

1.01 DESCRIPTION

A. The contractor shall submit to the Engineer for review, such working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this article called data), and material samples (hereinafter in this article called samples) as are required for the proper control of work, including but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings.

B. The Contractor shall submit five (5) copies of shop drawings or other data to the Engineer.

C. Within thirty (30) calendar days after the effective date of the Agreement, the Contractor shall submit to the Engineer a complete list of preliminary data for which Shop Drawings are to be submitted. Included in this list shall be the names of all proposed manufacturers furnishing specific items. Review of this list by the Engineer shall in no way expressed or implied relieve the Contractor from submitting complete Shop Drawings and providing materials, equipment, etc., fully in accordance with the Specifications. This procedure is required in order to expedite final review of Shop Drawings.

D. The contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and Engineer. This log should include the following items:

1. Submittal-Description and Number assigned.
2. Date to Engineer.
3. Date returned to Contractor (from Engineer).
4. Status of Submittal (Approved/Resubmit/Rejected).
5. Date of Resubmittal and Return (as applicable).
6. Date material released (for fabrication).
7. Projected date of fabrication.
8. Projected date of delivery to site.
9. Status of O & M submittal.

1.02 RELATED SECTIONS

A. Section 01310 - Construction Schedules

B. Section 01720 - Project Record Documents

C. Section 01730 - Operating and Maintenance Data

D. Other Sections as applicable.

1.03 CONTRACTOR'S RESPONSIBILITY

A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the Contract Documents.

B. Determine and verify:

1. Field measurements
2. Field construction criteria
3. Catalog numbers and similar data
4. Conformance and Specifications

C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies, and equipment. This schedule shall indicate those that are critical to the progress schedule.

D. Designate in the construction schedule, or in a separate coordinated schedule, the dates for submission and the dates that reviewed Shop Drawings, Working Drawings and Samples will be needed.

E. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, approved by the Engineer.

F. The Contractor shall submit to the Engineer all shop drawings, working drawings and samples sufficiently in advance of construction requirements and shall account for Engineers Shop Drawing review time accordingly.

G. The Contractor shall submit two (2) copies of descriptive or product data submittals to complement shop drawings for the Engineer plus the number of copies which the Contractor requires. The Engineer will retain two (2) sets. All blueprint shop drawings shall be submitted with one (1) set of reproducible and four (4) sets of print. The Engineer will review the drawings and return to the Contractor the set of marked-up drawings with appropriate review comments.

H. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the review and Approval by Engineer of the necessary Shop Drawings.

1.04 ENGINEER'S REVIEW OF SHOP DRAWINGS

A. The Engineer's review of drawings, data and samples submitted by the Contractor will cover only general conformity to the Specifications, external connections, and dimensions which affect the installation. The Engineer's review and exception if any, will not constitute an approval of dimensions, quantities, and details of the material, equipment, device, or item shown.

B. The review of drawings and schedules will be general, and shall not be construed:

1. As permitting any departure from the Contract requirements;

2. As relieving the Contractor of responsibility for any errors, including details, dimensions, and materials;

3. As approving departures from details furnished by the Engineer, except as otherwise provided herein.

C. If the drawings or schedule as submitted describe variations and/or show a departure from the Contract requirements which Engineers finds to be in the interest of the Owner and to be minor as not to involve a change in the Contract Price or time for performance, the Engineer may return the reviewed drawings without noting an exception.

D. When reviewed by the Engineer, each of the Shop Drawings will be identified as having received such review being so stamped and dated. Shop Drawings stamped "REJECTED" and with required corrections shown will be returned to the Contractor for correction and resubmittal.

E. Resubmittals will be handled in the same manner as the first submittals. On resubmittals, the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.

F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.

G. The Engineer will review one submittal and one re-submittal after which cost of review will be borne by the Contractor. The cost of engineering shall be equal to the Engineer's charges to the Owner under the terms of the Engineer's agreement with the Owner.

H. When the Shop Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.

I. No partial submittals will be reviewed. Submittals not complete will be returned to the Contractor and will not be considered "Rejected" until resubmitted.

J. The Engineer shall return Shop Drawing submittals to the Contractor within twenty-one (21) days calendar days from the date the Engineer receives them.

1.05 SHOP DRAWINGS

A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, erection and setting drawings and schedule drawings, manufacturer's scale drawings, and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature, and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.

B. Drawings and schedules shall be checked and coordinated with work of all trades involved, before they are submitted for review by the Engineer and shall bear the Contractor's stamp of approval as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval shall be returned to the Contractor for resubmission.

C. Each Shop Drawing, shall have a blank area 3 1/2 inches by 3 1/2 inches, located adjacent to the title block. The title block shall display the following:

1. Number and title of the drawing.
2. Date of drawing or revision.
3. Name of project building or facility.
4. Name of contractor and subcontractor submitting drawing.
5. Clear identification of contents and location of work.
6. Specification title and number.

D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the Contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility for executing the work in accordance with the Contract, even though such drawings have been reviewed.

E. Data on materials and equipment include, without limitation, materials and equipment lists, catalog data sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.

F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name, address, and telephone number of the manufacturer's representative and service company so that service and spare parts can be readily obtained. In addition, a maintenance and lubrication schedule for each piece of equipment shall be submitted along with each shop drawing submittal.

G. All manufacturers or equipment supplier who proposes to furnish equipment or products under Divisions 11, 12, 13, 14, 15 and 16 shall submit an installation list to the Engineer along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and has been in operation for a period of at least five (5) years.

H. Only the Engineer will utilize the color "red" in marking Shop Drawing submittals.

I. Before final payment is made, the Contractor shall furnish to Engineer two (2) sets of record shop drawings all clearly revised, complete and up to date showing the permanent construction as actually made for all reinforcing and structural steel, miscellaneous metals, process and mechanical equipment, piping, electrical system and instrumentation system.

1.06 WORKING DRAWINGS

A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities, ground water control systems, forming and false-work; for underpinning; and for such other work as may be required for construction, but does not become an integral part of the project.

B. Copies of working drawings as noted in subparagraph 1.06A above, shall be submitted to the Engineer where required by the Contract Documents or requested by the Engineer, and shall be submitted at least thirty (30) calendar days (unless otherwise specified by the Engineer) in advance of their being required for work.

C. Working drawings shall be signed by a Registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. The Contractor assumes all risks of error; the Owner and Engineer shall have no responsibility, therefore.

1.07 SAMPLES

A. The Contractor shall furnish, for the approval of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until approved by the Engineer.

B. Samples shall be of sufficient size and quantity to clearly illustrate:

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

attachment devices.

2. Full range of color, texture and pattern.

3. A minimum of two samples of each item shall be submitted.

C. Each sample shall have a label indicating

1. Name of Project

2. Name of Contractor and Subcontractor

3. Material or Equipment Represented

4. Place of Origin

5. Name of Producer and Brand (if any)

6. Location in Project

(Samples of finished materials shall have additional marking that will identify them under the finished schedules.)

D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required in subparagraph 1.07B above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the Engineer. Approval of a sample shall be only for the characteristics or use named in such approval and shall not be construed to change or modify any Contract requirements.

E. Approved samples not destroyed in testing shall be sent to the Engineer or stored at the site of the work. Approved samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the approved samples. Samples which failed testing or were not approved will be returned to the Contractor at his expense, if so requested at time of submission.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

DOCUMENT 01370

SCHEDULE OF VALUES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within 10 days after the effective date of the Agreement.

B. Upon request of the Engineer, support the values with data which will substantiate their correctness.

C. The Schedule of Values shall be used as the basis for the Contractor's Applications for Payment.

1.02 RELATED SECTIONS

A. Section 01152 - Applications for Payment

B. Other Sections as applicable.

1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

A. Present schedule on an 8-1/2 inch x 11 inch white paper; Contractor's standard forms and automated printout will be considered for approval by the Engineer upon Contractor's request. Identify schedule with:

1. Title of Project and location
2. Engineer and Project number
3. Name and Address of Contractor
4. Contract designation
5. Date of submission

B. Schedule shall list the installed value of the component parts to include individual equipment, piping, electrical, construction items, paving, of the Work (as required) in sufficient detail to serve as a basis for computing values for progress payments during construction and for additions and deletions to the Work.

C. For the various portions of the Work:

1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.

D. The sum of all values listed in the schedule shall equal the total Contract Sum.

E. Schedules are subject to Engineer's approval wherein additional line item detail may be required.

PART 2 - PRODUCTS (NOT USED)

PART 3 - PRODUCTS (NOT USED)

END OF SECTION

SECTION 01380

CONSTRUCTION PHOTOGRAPHS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Employ competent photographer to take construction record photographs for preconstruction conditions, periodically during course of Work, and post-construction.

1.02 RELATED SECTIONS

A. Section 01152 - Application for Payment

B. Section 01720 - Project Record Documents

C. Other Sections as applicable.

1.03 PHOTOGRAPHY REQUIRED

A. Provide photographs taken on cutoff date for each scheduled Application for Payment.

B. View and Quantities Required:

1. Take a minimum of 24 exposures of the site and adjacent property at preconstruction, monthly, and post-construction.

2. Aerial photography shall be acceptable in addition to ground level exposures for items out of sight of aerial photography.

C. Negatives:

1. Remain property of photographer

2. Require that photographer maintain negatives for a period of two years from Date of Completion of entire project.

3. Photographer shall agree to furnish additional prints to Owner and the Engineer at commercial rates applicable at time of purchase.

1.04 COSTS OF PHOTOGRAPHER

A. Contractor shall pay costs for specified photography and prints.

1. Parties requiring additional photography or prints will pay photographer directly.

PART 2 - PRODUCTS

2.01 PRINTS

A. Color:

1. Paper: Single weight, color print paper
2. Finish: Smooth surface, glossy
3. Size: 8 inch x 10 inch

B. Identify each print on back, listing:

1. Name of Project
2. Orientation of View
3. Date and time of exposure
4. Name and address of photographer
5. Photographer's numbered identification of exposure.

PART 3 - PRODUCTS

3.01 TECHNIQUE

A. Factual presentation

B. Correct exposure and focus

1. High resolution and sharpness
2. Maximum depth-of-field
3. Minimum distortion

3.02 VIEWS REQUIRED

A. Photograph from locations to adequately illustrate condition of construction and state of progress.

1. At successive periods of photography, take at least one photograph from the same overall view as previously.
2. Consult with the Engineer at each period of photography for instructions concerning views required.

3.03 DELIVERY OF PRINTS

A. Deliver **3** sets of prints to the Engineer to accompany each Application for payment.

PART 4 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01381

AUDIO/VIDEO PRE-CONSTRUCTION RECORD

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall provide a continuous color audio/video CD of the entire length of the proposed project prior to construction. The Contractor shall furnish to the Engineer and the Owner two (2) copies each of the CD, which becomes a project record document.

1.02 RELATED SECTIONS

A. As applicable.

1.03 SCHEDULE REQURIED

A. Video recordings shall not be made more than 30 days prior to construction. No construction shall begin prior to review and approval of the CDs by the Engineer and the Owner. CD's not conforming to the Specifications shall be resubmitted at no additional charge.

1.04 PROFESSIONAL VIDEOGRAPHERS

A. The Contractor shall engage the services of a professional videographer. The color audio-visual tapes shall be prepared by a responsible commercial firm known to be skilled and regularly engaged in the business of pre-construction color audio-visual documentation.

PART 2 - PRODUCTS

A. The finished product shall be a bright, sharp, clear picture free of distortion and show in sufficient detail acceptable to the Engineer.

B. The video shall be of the CD format. CDs shall be color and compatible with any standard compact disc player.

PART 3 - EXECUTION

A. The video recording shall show all surface features located within the construction zone. These features shall include, but not be limited to, roadways, sidewalks, outside of houses (front and sides), driveways, culverts, walls, fences and landscaping.

B. CDs shall be labeled and identified by project title and project number.

C. Where station numbering is uses, coverage shall begin at the lowest station number and be continuous until the highest station number is reached. Otherwise, the entire length of the project shall be documented including each plan sheet.

END OF SECTION

SECTION 01410

MATERIALS AND INSTALLATION TESTING

PART 1 - GENERAL

1.01 DISCRIPTION

A. Contractor shall employ and pay for the services of an independent testing laboratory to perform materials and installation testing of the type and frequency specified in the Contract Documents including, but not limited to, Geotechnical Testing Services and concrete testing.

B. Geotechnical Testing Services shall include, but not be limited to, periodic site inspections, soil proctor tests, soil classification tests and soil densities or compaction tests.

C. The engineer may, at any time, elect to have materials and equipment tested for conformity with the Contract Documents.

D. Contractor shall include cost of testing in the Contract Price.

E. Piping pressure test and bacteriological testing shall be in accordance with the applicable Section.

1.02 RELATED SECTIONS

A. Section 01050 – Field Engineering and Surveying

B. Section 02200 – Earthwork

C. Other Sections as applicable.

1.03 REFERENCES

A. FDOT Design Standards.

B. FDOT Standard Specifications for Road and Bridge Construction.

C. City of Weston Engineering Design Standards, City of Sunrise Design Standards.

1.04 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

A. Laboratory is not authorized to:

1. Release, revoke, alter or enlarge on requirements of Contract Documents
2. Approve or accept any portion of the Work
3. Perform any duties of the Contractor

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CONTRACTOR'S RESPONSIBILITIES

A. Provide all testing required by the Contract Documents as well as laws, ordinances, rules, regulations, orders, or approvals of public authorities.

B. Employment of the laboratory shall in no way relieve Contractor's obligations to perform the Work of the Contract.

C. Cooperate with laboratory personnel and provide access to Work and to Manufacturer's operations.

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

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

F. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contractor Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor, and no extra charge to the Owner shall be allowed on account of such testing and certification.

G. Furnish incidental labor and facilities:

1. To provide access to Work to be tested
2. To obtain and handle samples at the Project site or at the source of the product to be tested
3. To facilitate inspections and tests
4. For storage and curing of test samples

H. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.

1. When tests or inspections cannot be performed after such notice, reimburse Owner for laboratory personnel and travel expenses incurred due to Contractor's negligence.

I. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling, and testing required for the Contractor's convenience.

J. If the Owner requests tests in addition to those specified in the contract, and if the test results indicate the material or equipment complies with the Contract Documents, the Owner shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the Contractor may pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

K. The Contractor shall pay costs for additional trips to the project by the agency when scheduled times for tests and inspections are canceled and agency is not notified sufficiently in advance of cancellation to avoid the trip.

3.02 TESTING

A. The Contractor shall obtain the services of a professional testing laboratory approved by the Engineer to perform the following type of tests and test frequencies. Copies of all reports are to be sent to the Engineer as soon as possible.

B. Density tests for trench backfill at a minimum rate of three (3) tests per lift in 1,000 feet of trench, but not less than two (2) tests per lift if less than 500 feet of trench, at Engineer's discretion based on field observation.

C. Density tests for subgrade compaction at a minimum rate of three (3) tests in 1,000 feet of roadway, but not less than two (2) tests, at Engineer's discretion based on field observation.

D. Density tests for limerock base at a minimum rate of three (3) tests per day on each course of completed compacted base, but not less than two (2), at Engineer's discretion based on field observation.

E. Density tests for roadway crossings at the rate of one test per lane per lift of compacted material, beginning one foot above the normal water table.

F. If in the opinion of the Engineer, suitable compaction has not been achieved around structures, density tests may be required.

G. Concrete compressive strength at the rate of three (3) cylinders per the lesser of 50 cubic yards or per day.

H. Should the above test results indicate deficiencies, the Engineer may order additional tests at the Contractor's expense, and all reworked areas shall be retested at the Contractor's expense.

I. Testing in the County right-of-way shall meet the requirements of the Florida Department of Transportation.

END OF SECTION

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SECTION 01505

CONTROL OF WORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Contractor shall furnish personnel and equipment which will be efficient, appropriate and a quantity large enough to secure a satisfactory quality of work and a rate of progress which will ensure the completion of the work within the time stipulated in the Proposal. If at any time such personnel appear to the Engineer to be inefficient, inappropriate, or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the Contractor to increase the efficiency, change the character or increase the personnel and equipment, and the Contractor shall conform to such order. Failure of the Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01015 – General Requirements

C. Section 01030 – Special Project Procedures

D. Other Sections as applicable.

1.03 PIPE LOCATIONS

A. Pipeline shall be located substantially as indicated on the Drawings, but the Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 OBSTRUCTIONS

A. The attention of the Contractor is drawn to the fact that during digging at the Project site, the possibility exists of the Contractor encountering various water, sewer, gas, telephone, electrical, or other lines not shown on the Drawings. The Contractor shall exercise extreme care before and during digging to locate and flag these lines so as to avoid damage to the existing lines. Should damage occur to an existing line, The Contractor shall repair the line at no cost to the Owner.

B. The Contractor shall protect all existing utilities and improvements not designated for removal and shall restore damaged or temporarily relocated utilities and improvements to a condition equal to or better than they were prior to such damage or temporary relocation, all in accordance with requirements of the Contract Documents.

C. The Contractor shall verify the exact locations and depths of all utilities shown and the Contractor shall make exploratory excavations of all utilities that may interfere with the work. All such exploratory excavations shall be performed as soon a practicable after award of the contract and, in any event, a sufficient time in advance of construction to avoid possible delays to the Contractor's work. When such exploratory excavations show the utility location as shown to be in error, the Contractor shall so notify the Engineer.

D. The number of exploratory excavations required shall be that number which is sufficient to determine the alignment and grade of the utility. Test pits shall be dug at the Contractor's expense, as directed.

E. The Contractor shall protect all Underground Utilities and other improvements which may be impaired during construction operations. It shall be the Contractor's responsibility to ascertain the actual location of all existing utilities and other improvements that will be encountered in its construction operations, and to see that such utilities or other improvements are adequately protected from damage due to such operations. The Contractor shall take all possible precautions for the protection of unforeseen utility lines to provide for uninterrupted service and to provide such special protection as may be necessary.

F. In case it shall be necessary to move the property of any public utility or franchise holder, such utility company or franchise holder will, upon request of the Contractor, be notified by the Owner to move such property within a specified reasonable time. When utility lines that are to be removed are encountered within the area of operations, the Contractor shall notify the Engineer a sufficient time in advance for the necessary measures to be taken to prevent interruption of service.

G. Where the proper completion of the work requires the temporary or permanent removal and/or relocation of an existing utility or other improvement which is indicated, the Contractor shall remove and, without unnecessary delay, temporarily replace or relocate such utility or improvement in a manner satisfactory to the Engineer and the owner of the facility. In all cases of such temporary removal or relocation, restoration to former location shall be accomplished by the Contractor in a manner that will restore or replace the utility or improvement as nearly as possible to its former locations and to as good or better condition than found prior to removal.

H. Existing utility lines that are indicated or the locations of which are made known to the Contractor prior to excavation and that are to be retained, and all utility lines that are constructed during excavation operations shall be protected from damage during excavation and backfilling and, if damaged, shall be immediately repaired or replaced by the Contractor at the Contractor's expense. Sewer laterals are included.

I. All repairs to a damaged utility or improvement are subject to inspection and approval by an authorized representative of the utility or improvement owner before being concealed by backfill or other work.

J. All power, telephone or the communication cable ducts, gas and water mains, irrigation lines, sewer lines, storm drain lines, poles, and overhead power and communication wires and any other cables encountered along the line of the work

shall remain continuously in service during all the operations under the Contract, unless other arrangements satisfactory to the Engineer are made with the owner of said pipelines, duct, main, irrigation line, sewer, storm drain, pole, or wire or cable. The Contractor shall be responsible for and shall repair all damage due to its operations, and the provisions of this Section shall not be abated even in the event such damage occurs after backfilling or is not discovered until after completion of the backfilling.

1.05 OPEN EXCAVATIONS

A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights, and other means to prevent accidents to persons, and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. The length of open trench will be controlled by the particular surrounding conditions but shall always be confined to the limits prescribed by the Engineer. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the Engineer may require special construction procedures such a limiting the length of open trench or prohibiting stacking excavated material in the street and requiring that the trenches shall not remain open overnight.

B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be well lighted at night.

1.06 TEST PITS

A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor at his cost at the direction of the Consultant. Test pits shall be backfilled immediately after their purpose has been satisfied and the surface restored and maintained in a manner satisfactory to the Consultants.

1.07 UTILITY CROSSINGS

A. It is intended that wherever existing utilities such as service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated on the Drawings. However, when in the opinion of the City or Consultant this procedure is not feasible, he may direct the use of fittings.

1.08 SITE CLEANLINESS

A. Dust Abatement - The Contractor shall furnish all labor, equipment, and means required and shall carry out effective measures wherever and as often as necessary to prevent its operation from producing dust in amounts damaging to property, cultivated vegetation, or domestic animals, or causing a nuisance to persons living in or occupying buildings in the vicinity. The Contractor shall be responsible for any damage resulting from any dust originating from its operations. The dust

abatement measures shall be continued until the Contractor is relieved of further responsibility by the Engineer.

B. Rubbish Control - During the progress of the work, the Contractor shall keep the site of the work and other areas used by it in a neat and clean condition, and free from any accumulation of rubbish. The Contractor shall dispose of all rubbish and waste materials of any nature occurring at the work site and shall establish regular intervals of collection and disposal of such materials and waste. The Contractor shall also keep its haul roads free from dirt, rubbish, and unnecessary obstructions resulting from its operations. Disposal of all rubbish and surplus materials shall be off the site of construction in accordance with local codes and ordinances governing locations and methods of disposal, and in conformance with all applicable safety laws, and to the particular requirements of Part 1926 of the OSHA Safety and Health Standards for Construction.

C. Sanitation

1. Toilet Facilities - Fixed or portable chemical toilets shall be provided wherever needed for the use of employees. Toilets at construction job sites shall conform to the requirements of Part 1926 of the OSHA Standards for Construction.

2. Sanitary and Other Organic Wastes - The Contractor shall establish a regular daily collection of all sanitary and organic wastes. All wastes and refuse from sanitary facilities provided by the Contractor or organic material wastes from any other source related to the Contractor's operations shall be disposed of away from the site in a manner satisfactory to the Engineer and in accordance with all laws and regulations pertaining thereto.

1.09 RELOCATIONS

A. The Contractor shall be responsible for the relocation of structures, including but not limited to light poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. The cost of all such relocations shall be included in the bid for the project and shall not result in any additional cost to the Owner.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 COOPERATION WITHIN THIS CONTRACT

A. All firms or persons authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.

B. Cutting and patching, drilling, and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the Engineer.

3.02 PROTECTION OF CONSTRUCTION AND EQUIPMENT

A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.

B. Further, the Contractor shall take all necessary precaution to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the Owner.

3.03 PRIVATE LAND

A. The Contractor shall not enter or occupy private land outside of easements, except by written permission of the land owner.

3.04 RESTORATION

A. Temporary restoration shall be completed within five days of pipe installation. Temporary restoration shall include all driveways, sidewalks, and roadways. They shall be swept clean and be maintained free of dirt and dust. All areas disturbed by the construction activities shall be restored to proper grade, cleaned up, including the removal of debris, trash, and deleterious materials. All construction materials, supplies, or equipment, including piles of debris shall be removed from the area. All temporarily restored areas shall be maintained by the Contractor. These areas shall be kept clean and neat, free of dust and dirt, until final restoration operations are completed. The Contractor is responsible to utilize dust abatement operations in the temporarily restored areas as required, to the satisfaction of the Consultant.

B. Wherever sidewalks or private roads have been removed for purposes of construction, the Contractor shall place suitable temporary sidewalks or roadways promptly after backfilling and shall maintain them in satisfactory condition for the period of time fixed by the authorities having jurisdiction over the affected portions before proceeding with the final restoration or, if no such period of times is so fixed, the Contractor shall maintain said temporary sidewalks or roadways until the final restoration thereof has been made.

C. Final restoration shall be completed within thirty days of pipe acceptance. Final restoration shall include the completion of all required pavement replacement of roadways, driveways, curbs, gutters, sidewalks and other existing improvements disturbed by the construction; final grading, placement of sod, pavement marking, etc., all complete and finished, acceptable to the Consultant.

In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with the adjacent undisturbed pavement.

D. The Contractor shall test an installed section of pipeline within five calendar days

from completion of the pipeline. A section of pipe is defined as a pipe section which can be isolated by valves for appurtenances is satisfactorily completed, the Contractor shall provide the Consultant with a "Schedule of Existing Facilities Restoration" which will be reviewed and be acceptable to the Consultant. The schedule shall show the existing facilities to be restored and schedule of beginning and completion dates for each item of restoration. The work for completing the final restoration of existing facilities for a tested section of work shall be completed within 30 days of acceptance of the pipeline testing.

END OF SECTION

SECTION 01510

TEMPORARY UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish, install, and maintain temporary utilities required for construction, remove on completion of work.

B. Pay all fees associated with temporary utilities including water consumption charges.

1.02 RELATED SECTIONS

A. Section 01010 - Summary of Work

B. Other Sections as applicable.

1.03 REQUIREMENTS OF REGULATORY AGENCIES

A. Comply with National Electric Code.

B. Comply with Federal, State and Local codes and regulations and with utility company requirements.

C. Comply with County Health Department and Environmental Regulations.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Materials may be new or used but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

A. Arrange with utility company, provide service required for power and lighting, and pay all costs for service and for power used in the construction, testing and trial operation prior to final acceptance of the work by the Owner.

B. Install circuit and branch wiring, with the area distribution boxes located so that power and lighting is available throughout the construction by the use of construction type power cords.

C. Provide adequate artificial lighting for all areas of work when natural light is not adequate to work, and all areas accessible to the public.

2.03 TEMPORARY WATER

A. Arrange with the City of Sunrise to provide water for construction purposes.

B. Install branch piping with taps located so that water is available throughout the construction by the use of hoses.

C. Install at each and every connection to the Owner water supply a backflow preventer meeting the requirements of ANSI A40.6 and AWWA C511. Contractor shall be required to meter and pay for all water used.

2.04 TEMPORARY SANITARY FACILITIES

A. Provide sanitary facilities in compliance with laws and regulations.

B. Service, clean and maintain facilities and enclosures.

PART 3 - EXECUTION

3.01 GENERAL

A. Maintain and operate systems to assure continuous service.

B. Modify and extend systems as work progress requires.

3.02 REMOVAL

A. Completely remove temporary materials and equipment when their use is no longer required.

B. Clean and repair damage caused by temporary installations or use of temporary facilities.

C. Restore permanent facilities used for temporary services to specified condition.

END OF SECTION

SECTION 01530

EXISTING UTILITIES

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for specifications related to construction in the vicinity of existing utilities.

1.01 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01015 – General Requirements

C. Section 01030 – Special Project Procedures

D. Other Sections as applicable.

1.02 CONTRACTOR RESPONSIBILITIES

A. The term existing utilities shall be deemed to refer to both publicly-owned and privately-owned utilities including, but not limited to, electric power and lighting, telephone, water, gas, storm drains, process lines, sanitary sewers, and all appurtenant structures.

B. Prior to underground construction, the Contractor is required by the Underground Facility Damage Prevention and Safety Act, Chapter 556 FS to contact Sunshine 811, for the location of underground utilities.

C. Where existing utilities and structures are indicated in the Contract Documents, it shall be understood that all of the existing utilities and structures affecting the work may not be shown and that the locations of those shown are approximate only. It shall be the responsibility of the Contractor to ascertain the actual extent and exact location of existing utilities and structures. In every instance, the Contractor shall notify the proper authority having jurisdiction and obtain all necessary directions and approvals before performing any work in the vicinity of existing utilities.

D. The Contractor shall be responsible for uncovering and exposing existing utilities sufficiently in advance of pipe laying operations to confirm elevation, size, material, and clearance separation(s). If, upon excavation, an existing utility is found to be in conflict with the proposed construction or be of a size or material different from what is shown on the plans, the Contractor shall immediately notify the Engineer, who will in turn prepare a recommendation. Failure of the Contractor to perform advance investigations shall not relieve it of any claims for delay or damages.

E. The work shall be carried out in a manner to prevent disruption of existing services and to avoid damage to the existing utilities. Temporary connections shall be provided, as

required, to insure uninterruption of existing services. Any damage resulting from the work of this Contract shall be promptly repaired by the Contractor at his own expense in a manner approved by the Engineer and further subject to the requirements of any authority having jurisdiction. Where it is required by the authority having jurisdiction that they perform their own repairs or have them done by others, the Contractor shall be responsible for all costs thereof.

F. Where excavations by the Contractor require any utility lines or appurtenant structures to be temporarily supported and otherwise protected during the construction work, such support and protection shall be provided by the Contractor. All such work shall be performed in a manner satisfactory to the end the respective authority having jurisdiction over such work.

1.03 NOTIFICATION BY THE CONTRACTOR

A. Prior to any excavation in the vicinity of any existing underground facilities, including all water, sewer, storm drain, gas, petroleum products, or other pipelines; all buried electric power, communications, or television cables; all traffic signal and street lighting facilities; and all roadway and state highway rights-of-way the CONTRACTOR shall notify the respective authorities representing the owners or agencies responsible for such facilities not less than three days nor more than seven days prior to excavation so that a representative may be present during such excavation.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 RESTORATION OF PAVEMENT

A. General: All paved areas including concrete, asphaltic concrete, berms cut or damaged during construction shall be replaced with similar materials and of equal thickness to match the existing adjacent undisturbed areas, except where specific resurfacing requirements have been called for in the Contract Documents. All pavements which are subject to partial removal shall be neatly saw-cut in straight lines.

B. Temporary Resurfacing: Wherever required by the public authorities having jurisdiction, the CONTRACTOR shall place temporary surfacing promptly after backfilling and shall maintain such surfacing for the period of time fixed by said authorities before proceeding with the final restoration of improvements.

C. Permanent Resurfacing: In order to obtain a satisfactory junction with adjacent surfaces, the CONTRACTOR shall saw-cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with adjacent undisturbed pavement.

END OF SECTION

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SECTION 01540

SECURITY

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. This Section provides for requirements of security, entry control, personnel identification and miscellaneous restrictions

1.02 RELATED SECTIONS

A. Section 01010 - Summary of Work

B. Other Sections as applicable.

1.03 SECURITY PROGRAM

A. Protect Work, existing premises and Owner's operations from theft, vandalism and unauthorized entry.

B. Initiate program in coordination with Owner's existing security system at job mobilization.

C. Maintain program throughout construction period until Owner occupancy as directed by Engineer.

1.04 ENTRY CONTROL

A. Restrict entrance of persons and vehicles into project site and existing facilities.

B. Allow entrance only to authorized persons with proper identification.

C. Maintain log of workmen and visitors, make available to Owner on request.

D. Coordinate access of Owner's personnel to site in coordination with Owner's security forces.

1.05 PERSONNEL IDENTIFICATION

A. Become familiar with Owner and Engineer representatives.

B. Restrict access to job site to these representatives.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01550

SITE ACCESS AND STORAGE

PART 1 - GENERAL

1.01 GENERAL

A. This section provides general specifications for the contractors' access to the site and limitations on storage or lay-down area.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Section 01030 – Special Project Procedures

C. Section 01505 – Control of Work

D. Other Sections as applicable.

1.03 HIGHWAY LIMITATIONS

A. The Contractor shall make his own investigation of the condition of available public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress to the site of the work.

1.04 TEMPORARY ACCESS RESTORATION

A. All areas disturbed by the construction activities shall be restored to proper grade, cleaned up, including the removal of debris, trash, and deleterious materials.

B. Temporary restoration shall include all driveways, sidewalks and roadways. They shall be swept clean and be maintained free of dirt and dust

C. All construction materials, supplies, or equipment, including piles of debris shall be removed from the area.

D. All temporarily restored areas shall be maintained by the Contractor. These areas shall be kept clean and neat, free of dust and dirt, until final restoration operations are completed.

E. Temporary restoration shall be completed within five days of pipe installation or as specified in other Sections or as required by the owner.

F. The Contractor is responsible to utilize dust abatement operations in the temporarily restored areas as required, to the satisfaction of the Engineer.

G. Final restoration shall include the completion of all required pavement replacement of roadways, driveways, curbs, gutters, sidewalks and other existing improvements disturbed by the construction; final grading, placement of sod, pavement marking, etc., all complete and finished, acceptable to the Engineer.

H. In order to obtain a satisfactory junction with adjacent surfaces, the Contractor shall saw cut back and trim the edge so as to provide a clean, sound, vertical joint before permanent replacement of an excavated or damaged portion of pavement. Damaged edges of pavement along excavations and elsewhere shall be trimmed back by saw cutting in straight lines. All pavement restoration and other facilities restoration shall be constructed to finish grades compatible with the adjacent undisturbed pavement.

1.05 CONTRACTOR'S WORK AND STORAGE AREA

A. Contractors on-site work and storage area plan shall be submitted for Owners approval no later than 30 days after NTP.

1. Owner approval of the work area and storage area plan is required prior to commencement of construction.

B. The Contractor shall make his own arrangements for any necessary off-site storage or shop areas necessary for the proper execution of the work.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. The Work to be performed under this section shall include furnishing all materials and labor necessary to regulate vehicular and pedestrian traffic.

B. Provide, operate and maintain equipment, services and personnel, with traffic control and protective devices, as required to expedite vehicular traffic flow around the construction area.

C. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.

1.02 REFERENCES

A. The Work under this Contract shall be in strict accordance with the following codes and standards.

1. The applicable municipality

2. Broward County Traffic Engineering Division

3. Florida Department of Transportation Design Standards and Specifications

4. OSHA Safety and Health Standards for Construction.

5. Federal Highway Administration Manual of Uniform Traffic Control Devices for Streets and Highways (MUTCD)

6. Federal Highway Administration Traffic Controls for Street and Highway Construction and Maintenance Operations

1.03 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Section 01030 – Special Project Procedures

C. Section 01505 – Control of Work

D. Other Sections as applicable.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 MAINTENANCE OF TRAFFIC

A. For the maintenance and protection of vehicular and pedestrian traffic in public or private streets and ways, the Contractor shall provide, place, and maintain all necessary barricades, traffic cones, warning signs, lights and other safety devices in accordance with the requirements of the "Manual of Uniform Traffic Control Devices, Part VI - Traffic Controls for Street and Highway Construction and Maintenance Operations," published by U.S. Department of Transportation, Federal Highway Administration (ANSI D6.1).

B. The Contractor shall provide a Maintenance of Traffic Plan, sealed by a Professional Engineer registered in the State of Florida. The plan, and subsequent revisions, must be approved by the Broward County or the Florida Department of Transportation and the applicable local municipality.

C. The Contractor shall take all necessary precautions for the protection of the work and the safety of the public. All barricades and obstructions shall be illuminated at night, and all lights shall be kept burning from sunset until sunrise. The Contractor shall station such guards or flaggers and shall conform to such special safety regulations relating to traffic control as may be required by the public authorities within their respective jurisdictions. All signs, signals, and barricades shall conform to the requirements of OSHA and Subpart G, Part 1926, of the OSHA Safety and Health Standards for Construction.

D. The Contractor shall remove traffic control devices when no longer needed, shall repair all damage caused by installation of the devices, and shall remove post settings and backfill the resulting holes to match grade.

3.02 CORRECTIONS

A. Upon notification by the owner either verbally or in writing, the contractor shall correct any noted deficiencies within one hour.

B. Inspection of all traffic control items shall be accomplished at least twice per day. One of these inspections shall be at the end of the work day or at night.

3.03 TRAFFIC AND VEHICULAR ACCESS:

A. Emergency Vehicles: No single family residence, multi-family residence, apartment, commercial building or place of employment shall be without access to emergency vehicles for a period longer than three hours. The Contractor shall notify in writing the Engineer, the police, fire and other emergency departments and agencies when and where work is to be accomplished that will affect their operations at least two days in advance of such work.

B. Commercial Properties: Access to commercial property shall not be blocked for a period of more than 30 minutes during the time such properties are open for business.

C. Residential Property: Access to residential property shall not be blocked for a period of more than 4 hours.

3.04 ROAD CLOSURE

A. No roads shall be blocked to traffic without adequate detour facilities for a period of more than 30 minutes or as directed by the governing authority.

B. At least seven days prior to a proposed road closure, the contractor shall submit to the City Engineer a complete traffic control plan. This plan shall include the following minimum information:

1. Sketch of work site and all area roads, streets and mark driveways.

2. Proposed detour route.

3. All necessary traffic control devices to be used.

4. Emergency contractor contact person name and phone to be available 24 hours a day.

5. Estimated times/dates of road closure.

3.05 CONSTRUCTION IN OTHER THAN STATE HIGHWAY RIGHT-OF-WAY:

A. Construction within right-of-way other than State highway shall be made in full compliance with all requirements of the Florida Department of Transportation and to the satisfaction of the local governing bodies. All necessary barricades, detours, lights and other protective measures shall be provided for the protection of both pedestrian and vehicular traffic.

B. The Contractor shall provide and maintain such other warning signs and barricades in areas of and around their respective work as may be required for the safety of all those employed in the work or those visiting the site.

3.06 FLAGMEN

A. Provide qualified and suitably equipped flagmen when construction operations encroach on traffic lanes, as required for regulation of traffic.

3.07 FLARES AND LIGHTS

A. Provide lights as required to clearly delineate traffic lanes and to guide traffic as required.

B. Provide lights for use by flagmen in directing traffic.

C. Provide illumination of critical traffic and parking areas as required.

3.08 CONSTRUCTION PARKING CONTROL

A. Control vehicular parking to preclude interference with public traffic or parking, access by emergency vehicles, Owner's operations, or construction operations.

B. Monitor parking of construction personnel's private vehicles.

C. Maintain free vehicular access to and through parking areas and driveways.

D. Prohibit parking on or adjacent to access roads, or in non-designated areas.

END OF SECTION

SECTION 01600

MATERIAL AND EQUIPMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Material and equipment incorporated into the Work.

1. Conform to applicable specifications and standards.

2. Comply with size, make, and type and qualify specified, or as specifically approved in writing by the Engineer.

3. Manufactured and Fabricated Products.

a. Design, fabricate, and assemble in accord with the best engineering and shop practices.

b. Manufacture like part of duplicate units to standard sizes and gauges, to be interchangeable.

c. Two or more items of the same kind shall be identical, by the same manufacturer.

d. Products shall be suitable for service conditions.

e. Equipment capacities, sizes, and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.

4. Do not use material or equipment for any purpose other than that for which it is designed or is specified.

1.02 RELATED SECTIONS

A. Section 01030 – Special Project Procedures

B. Section 01340 – Shop Drawings, Product Data, and Samples

C. Section 01720 – Project Record Documents

D. Other Sections as applicable.

1.03 APPROVAL OF MATERIALS

A. Only new materials and equipment shall be incorporated in the work. All materials and equipment furnished by the Contractor shall be subject to the inspection and approval of the Engineer. No material shall be delivered to the work without prior approval of the Engineer.

B. Within 30 days after the effective date of the Agreement, the Contractor shall submit to the Engineer, data relating to materials and equipment he proposes to furnish for the work. Such data shall be in sufficient detail to enable the Engineer to identify the particular product and to form an opinion as to its conformity to the

specifications. The data shall comply with Paragraph 1.07 of this Section.

C. Facilities and labor for handling and inspection of all materials and equipment shall be furnished by the Contractor. If the Engineer requires, either prior to beginning or during progress of the work, the Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the specifications. Such samples shall be furnished, stored, packed, and shipped as directed at the Contractor's expense. Except as otherwise noted, the Owner will make arrangements for and pay for the tests.

D. The Contractor shall submit data and samples sufficiently early to permit work. Any delay of approval resulting from the Contractor's failure to submit samples or data promptly shall not be used as a basis of claim against the Owner or the Engineer.

E. In order to demonstrate the proficiency of workmen or to facilitate the choice among several textures, types, finishes, and surfaces, the Contractor shall provide such samples of workmanship or finish as may be required.

F. The materials and equipment used on the work shall correspond to the approved samples or other data.

1.04 MANUFACTURER'S INSTRUCTIONS FOR INSTALLATION

A. When Contract Documents require that installation of work shall comply with manufacturer's printed instruction, obtain, and distribute copies of such instructions to parties involved in the installation, including copies to the Engineer.

1. Maintain one set of complete instructions at the job site during installation and until completion.

B. Handle, install, connect, clean, condition, and adjust products in strict accord with such instructions and in conformity with specified requirements.

1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with Engineer for further instructions.

2. Do not proceed with work without clear instructions.

C. Perform work in accord with manufacturer's instructions. Do not omit any preparatory step or installation procedure unless specifically modified or exempted by Contract Documents.

1.05 TRANSPORTATION AND HANDLING

A. Arrange deliveries of Products in accord with construction schedules; coordinate to avoid conflict with work and conditions at the site.

1. Deliver Products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.

2. Immediately upon delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals, and that

Products are properly protected and undamaged.

B. Provide equipment and personnel to handle Products by methods to prevent soiling or damage to Products or packaging.

1.06 STORAGE AND PROTECTION

A. The Contractor shall furnish a covered, weather-protected storage structure, providing a clean, dry, noncorrosive environment for all mechanical equipment, valves, electrical and instrumentation equipment, and special equipment to be incorporated into this project. Storage of equipment shall be performed to allow easy access and be in strict accordance with the "instructions for storage" of each equipment supplier and manufacturer including weather/humidity protection, connection of heaters, placing of storage lubricants in equipment, blocking, or skid storage, etc. Corroded, damaged, or deteriorated equipment and parts shall be replaced before acceptance of the project.

B. Store Products in accord with manufacturer's instructions, with seals and labels intact and legible.

1. Store products subject to damage by the elements in weather-tight enclosures.

2. Maintain temperature and humidity within the ranges required by manufacturer's instructions.

3. Store fabricated products above the ground, on blocking or skids, to prevent soiling or staining. Cover products which are subject to deterioration with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

4. Store loose granular materials in a well drained area on solid surfaces to prevent mixing with foreign matter.

C. All materials and equipment to be incorporated in the work shall be handled and stored by the Contractor before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, theft or damage of any kind whatsoever to the material or equipment.

D. Cement, sand, and lime shall be stored under a roof, off the ground, and shall be kept completely dry at all times. All structural and miscellaneous steel and reinforcing steel shall be stored off the ground, or otherwise, to prevent accumulations of dirt or grease, and to minimize rusting. Brick, block, and similar masonry products shall be handled and stored in a manner to reduce breakage, chipping, cracking, and spalling to a minimum.

E. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrications, and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half-load, once weekly, for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

F. All materials which, in the opinion of the Engineer, have become so damaged as to be unfit for the use intended or specified, shall be promptly removed from the site of

the work, and the Contractor shall receive no compensation for the damaged material or its removal.

G. Arrange storage in a manner to provide easy access for inspection. Make periodic inspections of stored Products to assure that Products are maintained under specific conditions, and free from damage or deterioration.

H. Contractor shall be responsible for protection after installation by providing substantial coverings as necessary to protect installed products from damage from traffic and subsequent construction operations.

I. The Contractor shall be responsible for all materials, equipment, and supplies sold and delivered to the Owner under this Contract, until final inspection of the work and acceptance thereof by the Owner. In the event any such material, equipment, and supplies are lost, stolen, damaged, or destroyed prior to final inspection and acceptance, the Contractor shall replace same without additional cost to the Owner.

J. Should the Contractor fail to take proper action on storage and handling of equipment supplied under this Contract within seven days after written notice to do so has been given, the Owner retains the right to correct all deficiencies noted in previously transmitted written notice and deduct the cost associated with these corrections from the Contractor's Contract. These costs may be comprised of expenditures for labor, equipment usage, administrative, clerical, engineering, and any other costs associated with making the necessary corrections.

1.07 SUBSTITUTIONS AND PRODUCT OPTIONS

A. Products List

1. Within 30 days after the effective date of the Agreement, submit to the Engineer a complete list of major products proposed to be used, with the name of the manufacturer and the installing subcontractor.

B. Contractor's Options

1. For Products specified only by reference standard, select any product meeting that standard.

2. For Products specified by naming several products or manufacturers, select any one of the products or manufacturers named, which complies with the specifications, subject to the bid procedures outlined under other applicable contract documents.

3. For products specified by naming one or more Products or Manufacturers and an "or equal", the Contractor must submit a request for substitutions of any Product or Manufacturer not specifically named.

C. Substitutions

1. For a period of 30 days after the effective date of the Agreement, the Engineer will consider written requests from Contractor for substitution of Products.

2. Submit a separate request for each Product, supported with complete data, with drawings and samples as appropriate, including:

a. Comparison of the qualities of the proposed substitution with that specified.

b. Changes required in other elements of the work because of the substitution.

c. Effect on the construction schedule.

d. Cost data comparing the proposed substitution with the Product specified.

e. Any required license fees or royalties.

f. Availability of maintenance service, and source of replacement materials.

3. The Engineer shall be the judge of the acceptability of the proposed substitution.

4. No substitutions will be considered by the Engineer after 30 days from the Contract Date.

D. Contractor's Representation

1. A request for a substitution constitutes a representation that Contractor:

a. Has investigated the proposed Product and determined that it is equal to or superior in all respects to that specified.

b. Will provide the same warranties or bonds for the substitution as for the Product specified.

c. Will coordinate the installation of an accepted substitution into the Work, and make such other changes as may be required to make the Work complete in all respects.

d. Waives all claims for additional costs, under his responsibility, which may subsequently become apparent.

E. The Engineer will review requests for substitutions with reasonable promptness, and notify Contractor, in writhing, of the decision to accept or reject the requested substitution.

1.08 SPECIAL TOOLS

A. Manufacturers of equipment and machinery shall furnish any special tools (including grease guns or other lubricating devices) required for normal adjustment, operations and maintenance, together with instructions for their use. The Contractor shall preserve and deliver to the Owner these tools and instructions in good order no later than upon completion of the Contract.

1.09 STORAGE AND HANDLING OF EQUIPMENT ON SITE

A. Because of the long period allowed for construction, special attention shall be given to the storage and handling of equipment on site. As a minimum, the procedure outlined below shall be followed.

1. Equipment shall not be shipped until approved by the Engineer. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer, unless upon arrival it is to be stored as specified in Paragraph 1.06. Operation and maintenance data, as described in Paragraph 1.08 of Section 01730 shall be submitted to the Engineer for review prior to shipment of equipment.

2. All equipment having moving parts, such as gears, electric motors, etc. and/or instruments, shall be stored in a temperature and humidity controlled building approved by the Engineer, until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.

4. Manufacturer's storage instructions shall be carefully studied by the Contractor and reviewed with the Engineer by him. These instructions shall be carefully followed and a written record of this kept by the Contractor.

5. Moving parts shall be rotated a minimum of once weekly to ensure proper lubrication, and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half-load, once weekly for an adequate period of time to ensure that the equipment does not deteriorate from lack of use.

6. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance. Mechanical equipment to be used in the work, if stored for longer than ninety (90) days, shall have the bearings cleaned, flushed, and lubricated prior to testing and start up, at no extra cost to the Owner.

7. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested, and accepted in a minimum time period. As such, the manufacturer will guarantee the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.10 WARRANTY

A. For all major pieces of equipment, submit a warranty from the equipment manufacturer as specified in Section 01740.

1.11 SPARE PARTS

A. Spare parts for certain equipment provided under Division 11 through 16 have been specified in the pertinent sections of the Specifications. The Contractor shall collect and store all spare parts so required in an area to be designated by the Engineer. In addition, the Contractor shall furnish to the Engineer an inventory listing all spare

parts, the equipment they are associated with, the name and address of the supplier, and the delivered cost of each item. Copies of actual invoices for each item shall be furnished with the inventory to substantiate the delivered cost.

1.12 LUBRICANTS

A. During testing and prior to acceptance, the Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract.

1.13 GREASE, OIL AND FUEL

A. All grease, oil, and fuel required for testing of equipment shall be furnished with the respective equipment. The Owner shall be furnished with a year's supply of required lubricants including grease and oil of the type recommended b the manufacturer with each item of the equipment supplied under Division 11 through 16.

B. The Contractor shall be responsible for changing the oil in all drives and intermediate drives of each mechanical equipment after initial break-in of the equipment, which in no event shall be any longer than three weeks of operation.

1.14 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other acceptable materials.

1.15 FASTENERS

A. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor. Bolts shall have suitable washers and, where so required, their nuts shall be hexagonal.

B. All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel unless otherwise specifically indicated or specified.

C. Unless otherwise specified, stud, tap, and machine bolts shall be of the best quality refined bar iron. Hexagonal nuts of the same quality of metal as the bolts shall be used.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

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SECTION 01670

TESTING PIPING SYSTEMS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Perform specified services using Contractor's qualified personnel or employ and pay for a qualified organization to perform specified services.

1.02 RELATED SECTIONS

A. Other Sections as applicable.

1.03 DESCRIPTION

A. Perform testing of piping systems in accordance with the latest edition of the AWWA and as specified below.

B. Provide instrument required for testing of piping systems.

1. Make instruments available to Engineer to facilitate spot checks during testing.

2. Retain possession of instruments; remove from site at completion of services.

C. Provide all water required for flushing and testing. The Contractor shall obtain a construction meter from the City (City of Sunrise) at current rates and pay for meter rental and all water used.

D. Provide all necessary pumping equipment and other equipment, materials and facilities required for proper completion of the flushing and testing specified.

E. Source and quality of water, procedure and test equipment shall be acceptable to the Engineer. Length of tested line shall not exceed 2,000 feet.

F. All tests shall be made in the presence of the Engineer. Notify Engineer at least 48 hours before any Work is to be inspected or tested.

G. If inspection or test shows defects, the piping system(s) shall be repaired or replaced and inspection repeated, until such piping is acceptable to the Engineer.

H. All pipe, fittings, valves and joints shall be carefully examined during test. Leaky joints shall be tightened by remaking the joint.

I. Sections of the system may be tested separately. It shall be distinctly understood that any defect which may subsequently develop in section already tested and accepted shall promptly be corrected and that section retested.

J. Disposal of the water used for testing shall be subject to the approval of the Engineer.

1.04 QUALITY ASSURANCE

A. The organization which performs the testing shall, prior to testing, provide their qualifications and demonstrate their ability to perform the services to the satisfaction of the Engineer.

1.05 SUBMITTALS

A. Preliminary

1. Submit three copies of documentation to confirm compliance with Quality Assurance provisions:

a. Organization supervisor and personnel training and qualifications.

b. Specimen copy of each of the report forms proposed for use.

B. At least fifteen days prior to Contractor's request for final inspection, submit three copies of final reports on applicable reporting forms, for review.

1. Each individual final reporting form must bear the signature of the person who recorded data and that of the supervisor of the reporting organization.

2. Identify instruments of all types which were used and last date of calibration of each.

1.06 JOB CONDITIONS

A. Prior to start of testing of piping systems, verify that required "Job Conditions" are met:

1. System or system element installation is complete.

2. All required materials, water, instruments, etc. are on hand.

3. All other preparations are completed.

1.07 TESTING PROCEDURES

A. Gravity Sewer System:

1. Deflection Testing

a. Pipe shall be tested for excessive deflection by means of a "Go, No-Go" mandrel or sewer ball. A 7 1/2% Deflection Mandrel shall be pulled through each manhole section to determine if excessive deflection has taken place. If the mandrel fails to be pulled through the sewer pipe, the Contractor shall attempt to pull the mandrel through from the other end of the manhole section. If the mandrel fails to be pulled through, again, the Contractor shall repair or replace that portion of the sewer main which has exceeded the 7 1/2% allowable pipe deflection.

b. The Deflection Mandrel to be used for testing shall be submitted to

the Engineer for approval prior to use. Each mandrel shall be constructed and utilized in accordance with the Uni-Bell Handbook of P.V.C. Pipe and the North American Pipe Corporation.

c. Deflection Testing shall not take place until thirty days following the final backfilling over the pipe. This will allow time for settlement of all the backfill material. The Engineers representative shall be present at all deflection tests.

d. As an alternative to Deflection Mandrel testing, deflection testing may be performed by lamping if approved by the Owner and Engineer. Sewer lamping shall be witnessed by the Engineer and a representative from the City.

2. Exfiltration and Infiltration Testing

a. Leakage tests by exfiltration and infiltration, as described below, will be made on all pipe. The Engineer shall have the option of determining which test(s) shall be employed. Generally, if the groundwater table is below the bottom of the pipe an exfiltration test shall be used. All other pipe shall be tested for infiltration.

b. Exfiltration Test

1) Exfiltration tests will be made on the pipe before or after backfilling at the discretion of the Engineer. The length of the sewer to be tested shall be such that the head over the crown of the upstream end is not less than 2 feet and the head over the downstream crown is not more than 6 feet unless directed otherwise by the Engineer. The sewer shall be plugged by pneumatic bags or mechanical plugs in such a manner that the air can be released from the sewer while it is being filled with water. The test shall be continued for one hour and provisions shall be made for measuring the amount of water required to maintain the water at a constant level during this period. If test results are unsatisfactory, the Engineer may direct that additional tests are made on any or all of the pipe.

2) If any joint shows an appreciable amount of leakage, the jointing material shall be removed and joint remade. If any pipe is defective, it shall be removed and replaced. No amount of leakage will be accepted. If the amount of leakage indicates defective joints or broken pipes, they shall be corrected by the Contractor.

c. Infiltration Test

1) Pipe shall be tested for infiltration after the backfill has been placed. Infiltration tests shall be made under the supervision of the Engineer, and the length of line to be tested shall be as directed by the Engineer. There shall be no allowable leakage.

2) Manhole exfiltration leakage shall not exceed 4 gallons per day per unit.

3) Sewer pipe exfiltration leakage shall not exceed 10 gallons per day per inch diameter per mile in a two-hour test period for any length of section tested.

4) Visible manhole or sewer pipe infiltration leakage shall not be acceptable.

5) Rates of infiltration shall be determined by means of a V-notch weir to be provided and installed by the Contractor in an approved manner, and at such times and locations as may be directed by the Engineer.

6) If an inspection of the completed sewer or any part thereof shows any manholes, pipes, or joints which allow the infiltration of water in a noticeable stream or jet, the defective work or material shall be replaced or repaired as directed.

7) All water used in testing and flushing shall be furnished at the Contractor's expense.

3. The sanitary sewer system shall be televised prior to final acceptance by the Engineer or the City. Video recording and reporting shall be reviewed. Contractor shall be responsible for correcting any deficiencies prior to acceptance by the City or submittal to any permitting agency. Testing and corrections shall be at the Contractor's expense.

B. Pressure Piping Systems

1. Water piping shall pass a hydrostatic pressure test and a leakage test as defined below before acceptance. The pressure and leakage test shall be made after all jointing operations are completed and after backfilling is completed. All concrete reaction blocks, or other bracing and restraining facilities, shall be in place at least 14 days before the initial filling of the line.

2. The pressure and leakage tests may be applied to an individual section of line isolated between the existing line valves or may be applied to shorter sections of line at the Contractor's option. If shorter sections are tested, test plugs or bulkheads as required at the ends of the test section shall be furnished and installed by the Contractor at his expense, together with all anchors, braces, and other devices required to withstand the hydrostatic pressure on such plug or plugs, without imposing any hydraulic thrust on the pipeline or any part thereof. The Contractor shall be solely responsible for any and all damage to the pipeline, and/or to any other facility, which may result from the failure of test plugs furnished by him or supports therefore, in any case.

3. Hydrostatic Tests:

a. The section of line to be tested shall be slowly filled with water and all air expelled from the pipe. Care shall be taken that all air valves are installed and open in the section being filled, and that the rate of filling does not exceed the venting capacity of the air valves.

b. Hydrostatic test pressure shall be as follows:

System	Test Pressure
Wastewater Force Main	150 psi
Potable Water Main	150psi
Other Pressure Pipe	1.5 times maximum operation pressure at the lowest elevation of the test section.

c. After the pipe has been laid, all newly laid pipe of any valved section thereof shall be subjected to a hydrostatic pressure test.

1) Test pressure shall:

i. Not exceed pipe or thrust-restraint design pressures.

ii. Be of at least 2-hour duration.

iii. Not vary by more than ±5 psi (0.35 Bar) for the duration of the test.

iv. Not exceed twice the rated pressure of the valves or hydrants when the pressure boundary of the test section includes closed gate valves or hydrants. NOTE: Valves shall not be operated in either direction at differential pressures exceeding the rated pressures.

v. Not exceed the rated pressure of the valves when the pressure boundary of the test section includes closed valves.

2) Each valved section of pipe shall be filled with water slowly and the specified test pressure based on the elevation of the lowest point of the line or section under test and corrected to the elevation of the test gauge shall be applied by means of a pump connected to the pipe in a manner satisfactory to the Engineer. Valves shall not be operated in either the opening or closing direction at differential pressures above the rated pressure. The system shall be allowed to stabilize at the test pressure before conducting the leakage test.

d. Examination. Any exposed pipe, fittings, valves, hydrants and joints shall be examined carefully during the test. Any damaged or defective pipe fittings, valves or hydrants that are discovered following the pressure test shall be repaired or replaced with sound material and the test shall be repeated until it is satisfactory to the Engineer.

1) Leakage Test

i. A leakage test shall be conducted concurrently with the pressure test. Leakage shall be defined as the quantity of water that must be supplied into the newly laid pipe, or valved section thereof, to maintain pressure within 5 psi (0.35 Bar) of the specified test pressure after the air in the pipeline has been expelled and the pipe has been filled with water. Leakage SHALL NOT BE MEASURED BY A DROP IN

PRESSURE IN A TEST SECTION OVER A PERIOD OF TIME.

ii. No pipe installation will be accepted if the leakage is greater than that determined by the following formula:

$$L = \frac{SD * P^{1/2}}{148{,}000}$$

In which L is the allowable leakage, in gallons per hour; S is the length of pipe tested in feet; D is the nominal diameter of the pipe in inches; and P is the average test pressure during the leakage test in pounds per square inch.

(a) To obtain leakage in liter/hour, multiply the values in the table by 3.785.

(b) When testing against closed metal-seated valves, an additional leakage per closed valve of 0.0078 gal/h/in (0.0012 L/h/mm) of nominal valve size shall be allowed.

(c) When hydrants are in the test section, the test shall be made against the closed hydrant.

(d) Acceptance shall be determined on the basis of allowable leakage. If any test of pipe laid discloses leakage greater than that specified in Section "b" above, Contractor shall, at his own expense, locate and make repairs as necessary until the leakage is within the specified allowance.

(e) All visible leaks are to be repaired regardless of the amount of leakage.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 GENERAL

A. Prior to testing, pig and flush all piping systems with water to remove all debris in the system. Pigging of lines 12" and smaller is not required unless the line becomes contaminated.

B. No separate payment for testing shall be made.

END OF SECTION

SECTION 01700

CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Administrative and procedural requirements for project closeout.

1. Inspection procedures.
2. Project Record Document submittal.
3. Final cleaning.

B. Warranty and bond submittal.

C. Closeout submittals, warranties and bonds required for specific products of work.

1.02 RELATED SECTIONS

A. Section 01310 – Construction Schedules

B. Section 01370 – Schedule of Values

C. Section 01380 – Construction Photographs

D. Section 01710 – Cleaning

E. Section 01720 – Project Record Documents

F. Section 01740 – Warranties and Bonds

G. Other Sections as applicable.

1.03 SUBSTANTIAL COMPLETION

A. Before requesting inspection for certification of Substantial Completion, complete the following. List exceptions in the request.

1. If 100 percent completion cannot be shown, include a list of incomplete items, the value of incomplete construction, and reasons the Work is not complete.
2. Advise Owner of pending insurance change-over requirements.
3. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications and similar documents.
4. Obtain and submit releases enabling the Owner unrestricted use of the Work and access to services and utilities; include occupancy permits, operating certificates and similar releases.

5. Submit record drawings, maintenance manuals, and similar final record information.

6. Complete start-up testing of systems, and instruction of the Owner's operating and maintenance personnel. Discontinue or change over and remove temporary facilities from the site, along with construction tools, mock-ups, and similar elements.

B. When the Contractor considers the Work to be substantially complete, he shall submit a written notice to the Engineer that the Work, or designated portion of the Work, is complete and ready for inspection.

C. Within a reasonable time of receipt of a request for inspection, the Engineer will either proceed with inspection or advise the Contractor of unfulfilled requirements. When the Engineer and Owner concur that the Work, or designated portion of the Work, is substantially complete, the Engineer will prepare the Certificate of Substantial Completion following inspection.

D. Should the Engineer determine that the Work is not substantially complete, he will advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

1. The Engineer will repeat inspection when requested and assured that the Work has been substantially completed.

2. Results of the completed inspection will form the basis of requirements for final acceptance.

1.04 FINAL COMPLETION

A. When Contractor considers the Work to be complete, he shall submit written certification to the Engineer that the Work is completed and ready for final inspection. Include the following:

1. Submit the final payment request with releases and supporting documentation not previously submitted and accepted. Include certificates of insurance for products and completed operations where required.

2. Submit an updated final statement, accounting for final additional changes to the Contract Sum.

3. Submit a certified copy of the Engineer's final inspection list of items to be completed or corrected, stating that each item has been completed or otherwise resolved for acceptance, the list has been endorsed and dated by the Engineer.

4. Submit final meter readings for utilities, a measured record of stored fuel, and similar data as of the date of Substantial Completion, or when the Owner took possession of and responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit evidence of final, continuing insurance coverage complying with insurance requirements.

B. The Engineer will inspect the Work upon receipt of notice that the Work, including inspection list items from earlier inspections, has been completed, except items whose completion has been delayed because of circumstances acceptable to the - Engineer.

1. Upon completion of inspection, the Engineer will prepare a certificate of final acceptance, or advise the Contractor of Work that is incomplete, or of obligations that have not been fulfilled but are required for final acceptance.

2. If necessary, re-inspection process will be repeated.

1.05 RECORD DOCUMENT SUBMITTALS (REFER TO SECTION 01720 – RECORD DRAWINGS.)

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 FINAL CLEANING

A. Remove temporary protection and facilities installed for protection of the Work during construction.

B. Comply with regulations of authorities having jurisdiction and safety standards for cleaning. Do not burn waste materials. Do not bury debris or excess materials on the Owner's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems. Remove waste materials from the site and dispose of in a lawful manner.

C. Where extra materials of value remaining after completion of associated Work have become the Owner's property, arrange for disposition of these materials as directed.

END OF SECTION

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SECTION 01710

CLEANING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Execute cleaning, during progress of the Work, and at completion of the Work, as required by General Conditions.

1.02 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Other Sections as applicable.

1.03 DISPOSAL REQUIREMENTS

A. Conduct cleaning and disposal operations to comply with applicable codes, ordinances, regulations, and anti-pollution laws.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Use only those cleaning materials which will not create hazards to health or property, and which will not damage surfaces.

B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.

C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 - EXECUTION

3.01 DURING CONSTRUCTION

A. Execute periodic cleaning to keep the Work, the site and adjacent properties, free from accumulations of waste materials, rubbish and windblown debris, resulting from construction operations.

B. Provide on-site containers for the collection of waste materials, debris, and rubbish.

C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

END OF SECTION

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DOCUMENT 01720

PROJECT RECORD DOCUMENTS

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section includes the requirements for maintaining, recording, and submitting Project Record Documents including, but not limited to,

1. As-Built Drawings
2. Record Drawings
3. Record Specifications and other Contract Documents
4. Record Samples, Shop Drawings or Record Product Data

1.02 RELATED SECTIONS

A. Section 01050 – Field Engineering and Surveying

B. Section 01152 – Applications for Payment

C. Section 01340 – Shop Drawings, Working Drawings and Samples

D. Section 01700 – Project Closeout

E. Other Sections as applicable.

1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

A. Maintain at the site for the Owner and Engineers review one record copy of:

1. Drawings
2. Specifications
3. Addenda
4. Change Orders and other Modifications to the Contract
5. Engineer's Field Orders or Written Instructions
6. Approved Shop Drawings, Working Drawings, and Samples
7. Field Test Reports
8. Construction Photographs

B. Store Record Documents in the Contractor's field office apart from documents used for construction.

C. File Record Documents in accordance with the CSI format number system utilized in the Contract Documents.

D. Maintain Record Documents in a clean, dry, legible condition and in good order. Do not use Record Documents for construction purposes.

E. Make Record Documents available at all times for inspection by the Engineer.

F. As a prerequisite for monthly progress payments, the Contractor is to exhibit the currently updated Record Documents for review by the Engineer and the Owner.

1.04 RECORDING

A. Record Drawings:

1. Maintain a clean, undamaged set of prints of Contract Drawings to serve as the project Record Drawings.
2. Label each sheet "RECORD DRAWING" in neat large, printed letters with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.
3. The Record Drawings shall be presented at the same scale as the Contract Drawings.
4. The Record Drawings shall correctly and accurately show all changes from the Contract Drawings made during construction.
5. All information shall be verified and certified by an independent Professional Surveyor and Mapper registered in the State of Florida.
6. All vertical information shall be provided in the datum indicated in the Contract Drawings.
7. Horizontal and vertical locations referenced to baseline or permanent surface improvements.
8. Mark whichever drawing is most capable of showing conditions fully and accurately; where Shop Drawings are used, record a cross reference at the corresponding location on the Record Drawings.
9. Give particular attention to concealed elements that would be difficult to measure and record at a later date.
10. Mark new information that was not shown on Contract Drawings or Shop Drawings.
11. Note related Change Order numbers where applicable.
12. Organize Record Drawing sheets into manageable sets, bind with durable paper cover sheets, and print suitable titles, dates, and other identification on the cover of each set.
13. Do not use Record Drawings for construction purposes.
14. Record information concurrently with construction progress.

B. The Record Drawings and As-Built Drawings shall be neat and legible including the following:

1. Above ground piping and equipment:

   a. All equipment locations, dimensions and elevations as indicated in the Contract Drawings.

   b. All building and tank locations, dimensions and elevations as indicated in the Contract Drawings.

   c. All above ground piping size, material, class, lengths, dimensions, and elevations as indicated in the Contract Drawings.

   d. Horizontal locations of piping, fittings, valves, and appurtenances.

   e. Elevations of the top of pipe, fittings, valves and appurtenances.as indicated in the Contract Drawings and at 50' maximum increments.

   f. All changes from the original design.

2. Underground pressure pipe including potable water mains sanitary sewer force mains, drainage force mains and the like:

   a. All piping size, material, class, lengths, dimensions, bury depth and elevations as indicated in the Contract Drawings.

   b. Horizontal locations of piping, fittings, valves, and appurtenances.

   c. Elevations of the top of pipe, fittings, valves, and appurtenances.

   d. Elevations as indicated in the Contract Drawings and at 50' maximum increments.

   e. Lengths of restrained pipe.

   f. Water service locations.

   g. Meter sizes.

   h. All changes from the original design.

3. Gravity sanitary sewer:

   a. All piping size, material, class, lengths, slopes, dimensions, and elevations as indicated in the Contract Drawings.

   b. Horizontal locations of manholes.

   c. Rim, invert, and size of all manholes.

   d. Service terminal end locations.

e. Wet well construction including diameter, bottom, invert, and float elevations.

f. All changes to piping from the original design.

4. Stormwater Drainage:

a. All piping size, material, class, lengths, dimensions, and elevations as indicated in the Contract Drawings.

b. Horizontal locations of manholes and catch basins.

c. Rim, invert, bottom elevations, and size of all manholes and catch basins.

d. All surface elevations indicated on the Contract Drawings including, but not limited to, swales, berms, yards, sidewalks, and the like.

e. Horizontal location and elevation of all storm water retention or detention areas.

f. All changes from the original design.

5. Limerock base:

a. Upon completion of all underground utilities and limerock base, and before placement of asphalt, provide the following for Engineer review:

1) Finished limerock base elevations taken at the location of finished asphalt elevations as indicated in the Contract Drawings.
2) Additional elevations as required by the Engineer, including, but not limited to:
(a) Finished limerock base at centerline, edge of median and edge of pavement.
(b) Back of sidewalk or right of way.
(c) Bottom of swale or flow line of gutter.
(d) Top of curb.
(e) High points, low points, and grade breaks.
(f) Intersections.

6. Electrical, instrumentation and controls

a. Horizontal location of all electrical equipment and control cabinetry.

b. Elevations of the bottom of all electrical and control panels.

c. Horizontal location and elevation of all conduits including conduit size, route, and wire size.

d. Horizontal location of all light poles and junction boxes.

7. Miscellaneous:

   a. Horizontal location and elevation of all concrete slabs.

   b. Horizontal location, size, and material of all fencing.

   c. Location size and material of all existing utilities whether indicated on the Contract Drawings or not.

   d. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structure.

   e. Depths of various elements of foundation in relation to finish first floor datum.

   f. Field changes of dimensions and details.

   g. Details not on original contract drawings.

C. Record Specifications: Maintain one complete copy of the Project Manual, including addenda, and one copy of other written construction documents such as Change Orders and modifications issued in printed form during construction.

   1. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications.

   2. Give particular attention to substitutions, selection of options and similar information on elements that are concealed or cannot otherwise be readily discerned later by direct observation.

   3. Note related record drawing information and Product Data.

   4. Manufacturer, trade name, catalog number, and supplier of each product and item of equipment actually installed.

   5. Changes made by field order or by Change Order.

D. Record Product Data (Shop Drawings): Maintain one copy of each Product Data submittal.

   1. Mark these documents to show significant variations in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturer's installation instructions and recommendations.

   2. Give particular attention to concealed products and portions of the work which cannot otherwise be readily discerned later by direct observation.

   3. Note related Change Orders and mark-up of record drawings and Specifications.

E. Record Sample Submitted: Immediately prior to the date or dates of Substantial Completion, the Contractor will meet at the site with the Engineer and the Owner to

determine which of the submitted Samples that have been maintained during progress of the Work are to be transmitted to the Owner for record purposes. Comply with delivery to the Owner's Sample storage area.

F. Miscellaneous Record Submittals: Refer to other Specification Sections for requirements of miscellaneous record-keeping and submittals in connection with actual performance of the Work.

1.05 SUBMITTAL

A. Project Record Documents, demonstrating construction progress, shall be submitted with each Application for Payment.

B. Interim Project Record Drawings shall be submitted at significant project milestones including:

1. Construction of catch basins, manholes, pipes and appurtenances.
2. As required by the Engineer.

C. Project As-Built Drawings, demonstrating construction completion shall be submitted with the balance of Closeout documents at the conclusion of construction including:

1. Ten sets of signed and sealed sets of prints (As-builts) by a registered professional surveyor.
2. One compact disc copy of As-built drawings in AutoCAD format, and PDF format.

D. Accompany submittals with transmittal letter in duplicate, containing:

1. Date
2. Project Title and Number
3. Contractor's Name and Address
4. Title and Number of each As-Built drawing
5. Signature of Contractor or his Authorized Representative

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 01730

OPERATING AND MAINTENANCE DATA

PART 1 - GENERAL

1.01 DESCRIPTION

A. Compile product data and related information appropriate for Owner's maintenance and operation of products furnished under Contract.

1. Prepare operating and maintenance data as specified in this Section and as referenced in other pertinent sections of Specifications.

B. Instruct Owner's personnel in maintenance of products and in operation of equipment and systems.

1.02 RELATED SECTIONS

A. Section 01030 – Special Project Procedures

B. Section 01340 – Shop Drawings, Working Drawings and Samples

C. Section 01700 – Contract Closeout

D. Section 01720 – Project Record Documents

E. Section 01740 – Warranties & Bonds

F. Other Sections as applicable.

1.03 QUALITY ASSURANCE

A. Preparation of data shall be done by personnel:

1. Trained and experienced in maintenance and operation of described products.
2. Familiar with requirements of this Section.
3. Skilled as technical writers to the extent required to communicate essential data.
4. Skilled as draftsman competent to prepare required drawings.

1.04 FORM OF SUBMITTALS

A. Prepare data in form of an instructional manual for use by Owner's personnel.

B. Format

1. Size: 8 1/2 inches x 11 inches
2. Paper: 20 pound minimum, white, for typed pages.
3. Text: Manufacturer's printed data, or neatly typewritten.

4. Drawings:

    a. Provide reinforced punched binder tab, bind in with text.
    b. Reduce larger drawings and fold to size of text pages, but not larger than 11 inches x 17 inches.

5. Provide fly-leaf for each separate product, or each piece of operating equipment.

    a. Provide types of description of product, and major component parts of equipment.
    b. Provide indexed tabs.

6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:

    a. Title of Project
    b. Identity of separate structure as applicable.
    c. Identity of general subject matter covered in this manual.

C. Binders

1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. Maximum ring diameter shall be 2 inches.
3. When multiple binders are used, correlate the data into related consistent groupings.

1.05 CONTENT OF MANUAL

A. Neatly typewritten Table of Contents for each volume, arranged in systematic order.

1. Contractor, name of responsible principal, address, and telephone number.
2. A list of each product required to be included, indexed to content of the volume.
3. List, with each product, name, address, and telephone number of:

    a. Subcontractor of installer
    b. Maintenance contractor, as appropriate
    c. Identify area of responsibility of each
    d. Local source of supply for parts and replacement.

4. Identify each product name and other identifying symbols as set forth in Contract Documents.

B. Product Data

1. Include only those sheets which are pertinent to the specific product.
2. Annotate each sheet to:

    a. Clearly identify specific product or part installed.
    b. Clearly identify data applicable to installation.

c. Delete references to inapplicable information.

C. Drawings

1. Supplement product date with drawings as necessary to clearly illustrate:

a. Relations of component parts of equipment and systems.
b. Control and flow diagrams.

2. Coordinate drawings with information in Project Record Documents to assure correct illustration of completed installation.
3. Do not use Project Record Documents as maintenance drawing.

D. Written text, as required to supplement product date for the particular installation:

1. Organize in consistent format under separate headings for different procedures.
2. Provide logical sequence of instructions of each procedure.

E. Copy of each warranty, bond and service contract issued:

1. Provide information sheet for Owner's personnel, give:

a. Proper procedures in event of failure.
b. Instances which might affect validity of warranties or bonds.

1.06 MANUAL FOR MATERIALS AND FINISHES

A. Submit five copies of complete manual in final form.

B. Content for architectural products, applied materials and finishes.

1. Manufacturer's data, giving full information on products.

a. Catalog number, size, composition.
b. Color and texture designations.
c. Information required for re-ordering special-manufactured products.

2. Instructions for care and maintenance.

a. Manufacturer's recommendation for types of cleaning agents and methods.
b. Cautions against cleaning agents and methods which are detrimental to product.
c. Recommended schedule for cleaning and maintenance.

C. Content, for moisture-protection and weather-exposed products

1. Manufacturer's data, giving full information on products.

a. Applicable standards.

b. Chemical composition.
c. Details of installation.

2. Instructions for inspection, maintenance, and repair.

D. Additional requirements for maintenance data: Respective sections of Specifications.

E. Provide complete information for products specified.

1.07 MANUAL FOR EQUIPMENT AND SYSTEMS

A. Submit five copies of complete manual in final form.

B. Content, for each unit of equipment and system, as appropriate:

1. Description of unit and component parts

a. Function, normal operating characteristics and limiting conditions
b. Performance curves, engineering data and tests
c. Complete nomenclature and commercial number of replaceable parts

2. Operating procedures

a. Start-up, break-in, routine and normal operating instructions
b. Regulation, control, stopping, shut-down and emergency instructions
c. Summer and winter operating instructions
d. Special operating instructions

3. Maintenance Procedures

a. Routine operations
b. Guide to "trouble-shooting"
c. Disassembly, repair and reassembly
d. Alignment, adjusting and checking

4. Servicing and lubrication schedule

a. List of lubricants required.

5. Manufacturer's printed operating and maintenance instructions
6. Description of sequence of operation by control manufacturer
7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.

a. Predicted list of parts subject to wear
b. Items recommended to be stocked as spare parts

8. As-installed control diagrams by controls manufacturer
9. Each contractor's coordination drawings

a. As-installed color-coded piping diagrams

10. Charts of valve tag numbers, with location and function of each valve
11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage
12. Other data as required under pertinent sections of specifications

C. Contents, for each electric and electronic system, as appropriate

1. Description of system and component parts

a. Function, normal operating characteristics, and limiting conditions
b. Performance curves, engineering data and tests
c. Complete nomenclature and commercial number of replaceable parts

2. Circuit directories of panel-boards

a. Electrical service
b. Controls

3. As-installed color-coded wiring diagrams
4. Operating procedures:

a. Routine and normal operating instructions
b. Sequences required
c. Special operating instructions

5. Maintenance procedures

a. Routine operations
b. Guide to "trouble-shooting"
c. Disassembly, repair and reassembly
d. Adjustment and checking

6. Manufacturer's printed operating and maintenance instructions.
7. List of original manufacturer's spare parts, manufacturer's current prices, and recommended quantities to be maintained in storage.
8. Other data as required under pertinent sections of specifications.

D. Prepare and include additional data when the need for such data becomes apparent during instruction of Owner's personnel.

E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

F. Provide complete information for product specified.

1.08 SUBMITTAL SCHEDULE

A. Submit two copies of preliminary draft of proposed formats and outlines of contents of Operation and Maintenance Manuals within 30 days after Notice to Proceed.

1. The Engineer will review the preliminary draft and return one copy with

comments.

B. Submit two copies of completed data in final form no later than 30 days following the Engineer's review of the last shop drawing and submittal specified under Section 01340.

1. One copy will be returned with comments to be incorporated into final copies.

C. Submit specified number of copies of approved data in final form directly to the offices of the Engineer, Calvin, Giordano & Associates, within 30 calendar days of product shipment to the project site and preferably within 30 days after the reviewed copy is received.

D. Submit six copies of addendum to the operation and maintenance manuals as applicable and certificates as specified in paragraph 1.01B of Section 01030 within 30 days after final inspection and plant start-up test.

E. Final Operation and Maintenance submittals shall be in large three-ring binders organized by specification Section and plainly marked per paragraph 1.04Ca.

1.09 INSTRUCTION OF OWNER'S PERSONNEL

A. Prior to final inspection or acceptance, fully instruct Owner's designated operating and maintenance personnel in operation, adjustment, and maintenance of products, equipment and systems.

B. Operating and maintenance manual shall constitute the basis of instruction.

1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

1.10 ENGINEER'S O & M CHECKLIST

A. The Engineer will review Operation and Maintenance Manuals submittals on operating equipment for conformance with the requirements of this Section. The review will generally be based upon the *O&M Review Checklist* (presented on the pages at the end of this section for the benefit of the Contractor and his suppliers).

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

Calvin, Giordano & Associates, Inc.
EXCEPTIONAL SOLUTIONS™

O & M REVIEW CHECKLIST

EQUIPMENT SUBMITTED _____ DATE OF SUBMITTAL _____

MANUFACTURER _____ DEGREE OF APPROVAL _____

SPECIFICATION SECTION _____ DRAWING NUMBER _____

_____ Is the submittal correct for model/series/configuration originally submitted with shop drawings?

_____ Is the binding correct with assigned color/printing etc.?
(Pertains to final three volumes)

_____ Is the submittal properly indexed?

_____ Does the submittal pertain only to equipment being furnished?

_____ Is the submittal easily understood and instructively arranged?

_____ Does the submittal include start-up, shutdown and troubleshooting procedures?

_____ Are sufficient drawings and schematics included to supplement written descriptions?

_____ Is the listing of name plate data for each piece of supplied equipment provided and attached?

_____ Are all submitted "C" and "D" size drawings printed on paper that is 11 inches high and folded to 8 1/2 inches wide?

_____ Is proper and complete instruction for servicing included?

_____ Is there a suggested operating log sheet for equipment?

_____ Is schedule for lubrication provided?

_____ Is there a recommended preventative maintenance schedule?

_____ Are necessary safety precautions clearly indicated where they relate to the equipment?

_____ Is the Area Representative information provided, i.e., Name, Address, Telephone Number?

_____ Are specified spare parts indicated and listed?

The following are the points of rejection requiring resubmittal by Contractor:

_____

_____

_____

END OF SECTION

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SECTION 01740

WARRANTIES AND BONDS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Compile warranties and bonds as specified in the Contract Documents.

B. Co-execute submittals when so specified.

C. Review submittals to verify compliance with Contract Documents.

D. Submit to the Engineer for review and transmittal to Owner.

1.02 RELATED SECTIONS

A. Section 01030 - Special Project Procedures

B. Section 01700 - Contract Closeout

C. Other Sections as applicable.

1.03 SUBMITTAL REQUIREMENTS

A. Assemble warranties, bond, service, and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.

B. Number of original signed copies required: two (2) each.

C. Table of Contents: neatly typed, in orderly sequence. Provide complete information for each item.

1. Product or work item
2. Firm, with name of principal, address and telephone number
3. Scope
4. Date of beginning of Warranty, bond or service and maintenance contract
5. Duration of warranty, bond or service maintenance contract
6. Provide information for Owner's personnel:
    a. Proper procedure in case of failure
    b. Instances which might affect the validity of warranty or bond
7. Contractor, name of responsible principal, address, and telephone number

1.04 FORM OF SUBMITTALS

A. Prepare in duplicate packets.

B. Format:

1. Size 8 1/2 inches x 11 inches, punch sheets for standard 3-post binder

2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:

a. Title of Project

b. Name of Contractor

C. Binders: Commercial quality, three-post (3) binder, with durable and cleanable plastic covers and maximum post width of 2 inches.

1.05 WARRANTY SUBMITTAL REQUIREMENTS

A. For all equipment, submit a one-year warranty from the equipment manufacturer, unless otherwise specified. The manufacturer's warranty period shall be concurrent with the Contractor's for one year commencing at the time of acceptance by the Owner.

B. The Contractor shall be responsible for obtaining certificates for equipment warranty for all major equipment and which has a 1 HP motor, or which lists for more than $1,000. The Engineer reserves the right to request warranties for equipment not classified as major. The Contractor shall still warrant equipment not considered to be "major" in the Contractor's one-year warranty period even though certificates of warranty may not be required.

C. In the event that the equipment manufacturer or supplier is unwilling to provide a one-year warranty commencing at the time of Owner acceptance, the Contractor shall obtain from the manufacturer a two (2) year warranty commencing at the time of equipment delivery to the job site. This two-year (2) warranty from the manufacturer shall not relieve the Contractor of the one-year warranty starting at the time of Owner acceptance of the equipment.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION (NOT USED)

END OF SECTION

SECTION 02100

SITE PREPARATION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Section covers clearing, grubbing, stripping and demucking of the construction site, complete as specified herein.

B. Clear and demuck the area within the limits of construction as required.

1.02 RELATED SECTIONS

A. Section 02221 - Trenching, Bedding & Backfill for Pipe

B. Section 02510 - Walkways

C. Section 02513 - Asphaltic Concrete Paving

D. Other Sections as applicable.

PART 2 - PRODUCTS (NOT USED)

PART 3 - EXECUTION

3.01 CLEARING

A. The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Engineer shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, so as to provide for the safety of employees and others. Clearing for structures shall consist of topsoil and vegetation removal. Clearing for pipelines shall consist of vegetation removal.

3.02 GRUBBING

A. Grubbing shall consist of the complete removal of all stumps, roots larger than $1^1/_2$ inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

A. In areas so designated, topsoil, not muck shall be stockpiled. Topsoil stockpiled shall be protected until it is placed as specified. Any topsoil remaining after all work is in place shall be disposed of by the Contractor.

3.04 DEMUCKING

A. When encountered, organic material (muck) shall be excavated and removed. This material may be stockpiled temporarily but must be disposed of as directed by the Engineer or the Owner.

3.05 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by shipping such material and debris and disposing such material to a suitable location as required by the Engineer or the governmental agencies. Disposal by deep burial will not be permitted. The cost of disposal of material (including hauling) shall be considered a subsidiary obligation of the Contractor, the cost of which shall be included in the contract prices.

3.06 PRESERVATION OF TREES

A. Those trees which are designated by the Engineer or as shown on the drawings for preservation shall be carefully protected from damage. The Contractor shall erect such barricades, guards, and enclosures as may be considered necessary by him for the protection of the trees during all construction operations.

3.07 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

A. The Contractor shall exercise extreme care to avoid necessary disturbance of developed private property as applicable. Trees, shrubbery, gardens, lawn, and other landscaping, which in the opinion of the Engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.

B. All soil preparation procedures and replanting operations shall be under the supervision of nurseryman experienced in such operations.

C. Improvements to the land such as fences, walls, outbuildings, etc., which of necessity must be removed shall be replaced with equal quality materials and workmanship.

D. The Contractor shall clean up the construction site across developed private property directly after construction is complete upon approval of the Engineer.

3.08 PRESERVATION OF PUBLIC PROPERTY

A. The appropriate paragraphs of Articles 3.06 and 3.07 of these specifications shall apply to the preservation and restoration of all damaged areas of public lands, rights-of-way, easements, etc.

END OF SECTION

SECTION 02200

EARTHWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. Earthwork operations necessary to achieve the Work including, but not limited to, excavation of soil, grading, removal and replacement of unsuitable soil, fill, backfill, embankment and compaction more specifically described as follows:

1. Earthwork operations generally consists of excavation and embankment of soil materials from the existing elevations to the proposed elevations.

2. Embankment necessary to achieve the proposed elevations may consist of in situ soils, whether classified as suitable or unsuitable, or imported suitable soil material. All imported soil material for embankment is to be included in the Contract price.

3. Soil material categorized as sub-grade is to be imported suitable soil. The Owner reserves the right to decline imported sub-grade material should in-situ suitable material be encountered and seek a credit for imported, placed, and compacted sub-grade per the Unit Price Schedule.

4. Where unsuitable soil materials are encountered under or around pipes, pipe trenches, the Owner reserves the right to specify removal and replacement of unsuitable soil with imported suitable soil. All imported suitable soil material for placement under or around pipes, pipe trenches is to be included in the Contract price.

5. Where unsuitable soil materials are encountered under or around structural elements, restroom building, sidewalks, parking lot, playground area, basketball court area, outdoor fitness area, the Owner reserves the right to specify removal, disposal, and replacement of unsuitable soil with imported suitable soil. All costs for removal and disposal of unsuitable soils and replacement with imported suitable soil material under or around structural elements is to be paid out of the Owner's Contingency per the unit rate specified in the unit price schedule.

1.02 RELATED SECTIONS

A. Section 01410 – Materials and Installation Testing

B. Section 02100 – Site Preparation

C. Section 02210 – Finish Grading

D. Other Sections as applicable.

1.03 REFERENCES

A. FDOT Standard Specifications for Road and Bridge Construction

B. FDOT Design Standards

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

D. AASTHO M-145 - Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

1.04 PROJECT CONDITIONS

A. Locate existing underground utilities in areas of work. Provide adequate means of support and protection during earthwork operations.

B. Should uncharted, or incorrectly charted, piping or other utilities be encountered during excavation, consult utility owner immediately for directions. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

C. Do not interrupt existing utilities serving occupied facilities.

D. Use of Explosives: If the use of explosives is necessary for the execution of the Work, and the use of explosives is allowed by local government, the Contractor shall conduct his blasting operations in conformance with these specifications and all applicable state and local codes and regulations.

1. The contractor shall obtain a testing laboratory to perform pre and post blasting surveys of all nearby structures at no cost to the Owner.

E. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

PART 2 - PRODUCTS

2.01 SOIL MATERIALS

A. Satisfactory or Suitable Soil Materials: ASTM D2487 soil classification groups GW, GP, GP-GM and SW.

B. Unsatisfactory or Unsuitable Soil Materials: ASTM D2487 soil classification groups GM, GC, SW, SM, SC, CL, ML, OL, CH, MH, OH and PT.

C. Satisfactory and unsatisfactory soil materials for roadway embankment, including pipe trench backfill under roadways, shall meet the requirements as defined in AASHTO M-145 soil classification groups and FDOT index 505.

D. Satisfactory materials encountered during excavation, may be stored in segregated

stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

E. Sub-base material:

1. Satisfactory materials may be Select, Structural or Common fill.

F. Select or Structural Fill or backfill:

1. Select or structural fill material shall be a satisfactory soil material, well graded, consisting of a minimum of 60 percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressible percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressed material. Rock in excess of 2 inches in diameter shall not be permitted.

G. Common Fill:

1. Common fill material shall be a satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2 1/2 inches in diameter.

H. Course Aggregate:

1. Course aggregate, or gravel, shall be used for rock bedding, drainage rock or as otherwise depicted in the Drawings. Unless otherwise noted, course aggregate shall consist of washed and graded crushed rock meeting FDOT specification 901, size number 57 or approved equal.

I. Sand:

1. Where specified, sand, clean sand, silica sand or other nomenclature shall refer to silica sand meeting FDOT specification 902-2.

J. Satisfactory or suitable soil materials shall free of muck, clay, rock or gravel larger than 2-1/2 inches in any dimension, debris, trash, waste, frozen materials, broken concrete, masonry, rubble, vegetable or other similar materials or deleterious matter. Materials of this nature encountered during the excavation which, in the opinion of the Engineer, is not suitable for reuse shall be stockpiled for disposal as unsuitable materials.

K. Material substitutions may be permitted if accompanied by a geotechnical engineer's report substantiating the proposed substitution which is approved by the Engineer and is at no cost to the Owner.

PART 3 - EXECUTION

3.01 EXCAVATION

A. The contractor shall perform trench excavations in accordance with applicable trench safety standards and is responsible to determine any safety or safety related standards that apply to the Project. The Owner and Engineer are not responsible to review and/or assess safety precautions, programs and costs, and the means,

methods, techniques or technique adequacy, reasonableness of cost, sequences, and procedures of any safety precaution, including, but not limited to, compliance with any and all requirements of Florida Trench Safety Act.

B. Excavation is Unclassified, and includes excavation to sub-grade elevations indicated, regardless of character of materials and obstructions encountered.

C. Unauthorized Excavation: Removal of materials beyond indicated sub-grade elevations or dimensions without specific direction. Unauthorized excavation, as well as remedial work directed by Engineer, shall be at Contractor's expense.

D. Additional Excavation:

1. Where unsuitable soil materials are encountered under or around structural elements, restroom building, sidewalks, parking lot, playground area, basketball court area, outdoor fitness area, the Owner reserves the right to specify removal, disposal, and replacement of unsuitable soil with imported suitable soil. All costs for removal and disposal of unsuitable soils and replacement with imported suitable soil material under or around structural elements is to be paid out of the Owner's Contingency per the unit rate specified in the unit price schedule.

E. Stability of Excavations:

1. Slope sides of excavations to comply with local codes and ordinances having jurisdiction.
2. Shore and brace where sloping is not possible because of space restrictions or stability of material excavated.
3. Maintain sides and slopes of excavations in safe condition until completion of backfilling.

F. Shoring and Bracing:

1. Establish requirements for trench shoring and bracing to comply with local codes and authorities having jurisdiction.
2. Maintain shoring and bracing in excavations regardless of time period excavations will be open. Carry down shoring and bracing as excavation progresses.

G. Dewatering:

1. The bottom of the excavations shall be firm and dry and, in all respects, acceptable to the Engineer.
2. Prevent surface water and sub-surface or ground water from flowing into excavations. Do not allow water to accumulate in excavations.
3. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.
4. The Contractor shall obtain all dewatering permits as required from agencies having jurisdiction.

H. Stockpile satisfactory excavated materials where directed, until required for embankment, backfill or fill. Place, grade and shape stockpiles for proper drainage.

I. Excavation for Trenches: Dig trenches to the uniform width required for particular item to be installed, sufficiently wide to provide ample working room. Provide minimum 6 in. clearance on each side of pipe or conduit.

1. Excavate trenches to depth indicated or required for indicated flow lines and invert elevations.
2. Where rock is encountered, carry excavation 6 in. below scheduled elevation and backfill with a 6 in. layer of crushed stone or gravel prior to installation of pipe.
3. For pipes or conduit 5 in. or less, excavate to indicate depths. Hand excavate bottom cut to accurate elevations and support pipe or conduit on undisturbed soil.
4. For pipes or conduit 6 in. or larger, tanks and other work indicated to receive sub-base, excavate to sub-base depth indicated, or, if not otherwise indicated, to 6 in. below bottom of work to be supported.
5. Except as otherwise indicated, excavate for exterior water-bearing piping so top of piping is minimum 3'-6" below finished grade.
6. Grade bottoms of trenches as indicated, notching under pipe bells to provide solid bearing for entire body of pipe.

J. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Engineer.

3.02 COMPACTION

A. Areas to be compacted shall be moistened and compacted by either rolling, tamping or any other approved method by the Engineer in order to obtain the desired density.

B. Hydraulic compaction will require a geotechnical engineer’s recommendation, observation, and certification at the Contractors expense.

C. The Contractor shall inspect all compacted areas prior to further construction operations to ensure that satisfactory compaction has been obtained.

D. All sub-grade shall be compacted as indicated on the Drawings unless otherwise stated in the FDOT Standard Specifications for Road and Bridge Construction.

E. All embankment shall be compacted by proof-rolling to achieve 95% of AASHTO T-99.

F. All soil beneath structures shall be compacted to 98% of AASHTO T-180.

G. Hydraulic compaction shall be permitted if accompanied by a geotechnical engineer’s report substantiating the proposed methods. The geotechnical engineers report shall be submitted to the Engineer prior to any work and shall be at no cost to the Owner.

H. The frequency of testing shall be as indicated on the Drawings unless otherwise stated in the FDOT Standard Specifications for Road and Bridge Construction.

I. All earthwork testing shall be at the expense of the Contractor unless otherwise stated in the Contract Documents.

J. The Contractor shall instruct the testing laboratory to forward copies of all test reports to the Engineer.

K. Remove and replace, or scarify and air dry, soil material that is too wet to permit compaction to specified density.

3.03 EMBANKMENT, BACKFILL AND FILL

A. Place specified soil material in layers required to achieve proposed elevations:

1. Place materials in layers of 8 inches loose depth for material compacted by heavy compaction equipment and 4 in. in loose depth for material compacted by hand operated tampers.

2. Place materials in layers of 12 inches loose depth for material compacted by proof rolling equipment.

3. Under grassed areas, use satisfactory or unsatisfactory excavated or imported soil material if approved by the Engineer.

4. Under walks and pavements, use sub-base material, or satisfactory excavated or borrow material, or combination of both. Place shoulders along edges of sub-base course to prevent lateral movement with satisfactory excavated or borrow material.

5. Under steps, use sub-base material.

6. Under building slabs, use drainage fill material.

7. Under piping and conduit, use sub-base material where sub-base is indicated under piping or conduit; shape to fit bottom 90 degrees of cylinder.

B. Backfill excavations as promptly as work permits, but not until completion of the following:

1. Acceptance of construction below finish grade including waterproofing and perimeter insulation.

2. Inspection, testing, approval, and recording locations of underground utilities.

3. Removal of shoring and bracing, and backfilling of voids with satisfactory materials.

C. Remove all trash, roots, vegetation, debris, unsatisfactory soil materials, obstructions, and deleterious materials from ground surface prior to placement of fills. Plow strip, or break-up sloped surfaces steeper than 1 vertical to 4 horizontal so that fill material will bond with existing surface.

D. When existing ground surface has a density less than that specified for particular area classification, break up ground surface, pulverize, moisture-condition to optimum moisture content, and compact to required depth and percentage of

maximum density.

E. Before compaction, moisten or aerate each layer as necessary to provide optimum moisture content. Do not place backfill or fill material on surfaces that are muddy, frozen, or contain frost or ice.

F. Place backfill and fill materials evenly adjacent to structures, without wedging against structures or displacement of piping or conduit. Compaction equipment used within 10 ft. of buried walls and soil supported structures shall not exceed 2000 lbs.

3.04 GRADING

A. Grading Outside Building Lines: Grade areas adjacent to building lines to drain away from structures and to prevent ponding and as follows:

1. Finish to within not more than 0.10 ft. above or below required sub-grade elevations.

2. Walks: Shape surface to line, grade and cross-section, with finish surface not more than 0.10 ft. above or below required sub-grade elevation.

3. Pavements: Shape surface to line, grade and cross-section, with finish surface 1/2 in. above or below required sub-grade elevation.

4. Sod: Where sod abuts pavement, sidewalks, etc., finish surface below as required to accommodate thickness of sod as not to prohibit drainage.

B. Grading Surface of Fill under Building Slabs: Grade smooth and even, free of voids, compacted as specified, and to 1/2 in. below required elevation.

3.05 QUALITY CONTROL

A. Perform earthwork in compliance with applicable requirements of governing authorities having jurisdiction.

B. Contractor will engage soil testing and inspection service for quality control testing during earthwork operations.

C. Allow testing service to inspect and approve sub-grades and fill layers before further construction work is performed.

D. If in opinion of Engineer, based on testing service reports and inspection, sub-grade or fills which have been placed below specified density, provide additional compaction and testing at no additional expense to Owner.

3.06 CLEANING AND PROTECTION

A. Protect newly graded areas from traffic and erosion. Keep free of trash and debris.

B. Repair and re-establish grades in settled, eroded, and rutted areas to specified tolerances.

C. Remove excess excavated and waste materials, including unacceptable excavated

material, trash and debris, and legally dispose of it at no cost to the Owner.

END OF SECTION

SECTION 02205

CLEARING AND GRUBBING

PART 1 - GENERAL

1.01 DISCRIPTION

A. This Section includes removal and disposal of all designated trees, palms, brush, stumps, grass, roots, and other such protruding objects.

1.02 RELATED SECTIONS

A. Section 01410 – Materials and Installation Testing

B. Section 02100 – Site Preparation

C. Section 02200 - Earthwork

D. Section 02210 – Finish Grading

E. Other Sections as applicable.

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION

3.01 CLEARING AND GRUBBING

A. Clearing and Grubbing within areas specified in the Contract Documents or as directed by the Owner's representative included but not limited to the following:

1. Removal and disposal of all designated trees, palms, brush, stumps, grass, roots, and other such protruding objects.

2. Removal and disposal of fencing, existing pavement, and debris not required to remain or to be salvaged that is necessary to prepare the area for the proposed improvements.

3. Contractor shall notify all utility companies or utility owners, both public and private of their intent to perform such work and shall coordinate field location of utility lines prior to commencement of construction.

4. Other miscellaneous work considered necessary for the complete preparation of the overall project site is also included under this Section, included, but is not limited to, the following:

a. Leveling, harmonization and restoration of terrain outside the limits of construction for purposes of facilitating maintenance, proper grading and other post-construction operations.

b. Trimming of certain trees and shrubs within project limits for utilization in subsequent landscaping of the project.

B. Unless otherwise shown in the Drawings or Contract Documents, Clearing and Grubbing shall be done within the following areas:

1. All on-site areas.

2. All areas where any type of excavation is to be done.

3. All areas where any type of filling and embankment will be constructed.

4. All areas where any type of pavement will be constructed.

5. Other areas designated in the Plans or by the Specifications.

C. Depths of Removal

1. In the areas listed below all roots and other debris shall be removed to a depth of at least one foot below ground surface. The surface shall then be plowed to a depth of at least six inches and all roots exposed shall be removed to a depth of at least one foot. All stumps including subsurface roots shall be completely removed to the satisfaction of the Landscape Architect.

D. Trees to Remain: As an exception to the above provisions, where so directed by the Existing Tree Disposition Plan, the Landscape Architect or Engineer, desirable trees within the clearing limits shall be protected and left standing. No equipment shall stand, stop, or travel across or inside the drip line of any trees or vegetation designated to be saved or protected.

E. Boulders: Any rocks or boulders greater than two (2) inches in diameter laying on the top of the existing surface or otherwise encountered during the Clearing and Grubbing shall be removed and disposed of by the Contractor. No boulders or rock shall be left or placed on-site.

3.02 SELECTIVE CLEARING AND GRUBBING

A. Selective Clearing and Grubbing shall consist of removing and disposing of all vegetation, obstructions, etc. as provided above except that in non-structural areas where the Contractor so elects, roots may be cut off flush with the ground surface. Stumps shall be completely removed. Undergrowth shall be completely removed except in areas designated by the Landscape Architect for aesthetic purposes.

B. Desirable trees, that are designated by the Landscape Architect to remain, shall be protected and trimmed in such a way to avoid damage to limbs during construction. All pruning of trees and palms shall be performed by, or under the direct supervision of, a certified arborist.

3.03 ERADICATION OF EXOTIC VEGETATION

A. N/A

3.04 REMOVAL OF EXISTING STRUCTURES

A. Work specified in this Article shall include removal and disposal of existing sidewalks, footers, pipes, and structures of whatever type as specifically shown in the plans to be removed or as otherwise specified for removal in the Contract Documents. Also included are structures of whatever type or portions thereof which are encountered during construction operations. Where partial removal of a structure is approved by the Engineer, or Landscape Architect, the portion of the existing structure to remain shall be backfilled, plugged, or filled in such a way that will prevent the settlement, movement, erosion or collapse of the adjacent soils.

3.05 DISPOSAL OF MATERIALS

A. All materials from Clearing and Grubbing operations shall be legally disposed of off-site as determined by the Contractor.

B. All disposal costs shall be included in the Bid.

3.06 OWNERSHIP OF MATERIALS

A. Except as may be otherwise stated in the Contract Documents, or directed by the Owner's Representative, all buildings, structures, appurtenances and other materials removed by the Contractor shall become the property of the Contractor, to be disposed of in areas provided by him.

3.07 MEASUREMENT AND PAYMENT

A. Unless stated otherwise, the cost of Clearing and Grubbing shall be incidental to the cost of construction.

END OF SECTION

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SECTION 02210

FINISH GRADING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide all labor, materials, necessary equipment or services to complete the Finish Grading work, as indicated on the Contract Documents.

1.02 RELATED SECTONS

A. Section 02200 – Earthwork

B. Section 02410 – Shrub and Tree Relocation

C. Section 02420 – Soil Preparation and Soil Mixes

D. Section 02430 – Sodding

E. Section 02450 – Tree and Plant Protection

F. Section 02490 – Trees, Plants and Groundcover

G. Other Sections as applicable.

1.03 SITE INSPECTION

A. The Contractor shall visit the site and acquaint himself with all existing conditions. The Contractor shall be responsible for his own subsurface investigations, as necessary, to satisfy requirements of this Section. All subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the Engineer or Owner's Representative.

1.04 EXISTING CONTOURS

A. The existing elevations shown on the drawings are approximate only. The contractor is responsible for grading to meet existing elevations as required.

B. The contours and elevations established under contract will be the finished grades shown. The Contractor under this Contract shall perform the work for construction using the finished grades previously established and making whatever corrections and/or repairs to grades to make them consistent with the requirements of the drawings and specifications.

1.05 UTILITIES

A. Before starting site operations verify that the earlier contractors have disconnected

all temporary utilities which might interfere with the fine grading work.

B. Locate all existing, active utility lines traversing the site and determine the requirements for their protection. Preserve in operating condition all active utilities adjacent to or transversing the site that are designated to remain.

C. Observe rules and regulations governing respective utilities in working under requirements of this section. Adequately protect utilities from damage, remove or relocate as indicated, specified or required. Remove, plug or cap inactive or abandoned utilities encountered in excavation. Record location of active utilities.

1.06 QUALITY ASSURANCE

A. Requirements of all applicable building codes and other public agencies having jurisdiction upon the work.

B. Primary emphasis should be given to the aesthetic appearance and functioning of berming and swales, as directed by the Engineer or Owner's Representative. The Contractor shall employ skilled personnel and any necessary equipment to ensure that finish grading is smooth, aesthetically pleasing, drains well, and is ideal for receiving sod and plant materials.

C. As-build survey drawings of all finished grading are to be submitted to the Engineer for review prior to landscape installation or agency certifications.

PART 2 - MATERIALS

2.01 TOP SOIL

A. Refer to Related Sections for material specifications.

B. In areas to receive turf, rough grade shall be a minimum of 2 inches below finished grades.

C. Rough grade fill is to be fine, compacted, satisfactory fill material, with no rocks larger than 2-inches.

D. Both surface and subsurface, both before and after fill operations, shall be checked to confirm that percolation/compaction levels meet the needs of the proposed planting for that area.

PART 3 - EXECUTION

3.01 EXCAVATION

A. Excavate where necessary to obtain subgrades, percolation, and surface drainage as required.

B. All unsatisfactory soil materials are to be removed and replaced with satisfactory

soil materials.

C. Remove entirely any existing obstructions after approval by the Engineer’s or Owner's Representative.

D. Remove from site and dispose of debris and excavated material not required.

3.02 GRADING

A. The Contractor shall establish finished grades as shown on the Engineers grading plans, and as directed by Engineer and/or Owner's Representative, including areas where the existing grade has been disturbed by other work.

B. Finished grading shall be smooth, aesthetically pleasing, drain well and ready to receive sod and other plant material to full satisfaction of Engineer and Owner's Representative.

C. Finish grading accuracy is to be within 1/10 foot of specified elevations.

D. Finish grading is to be performed using hand rakeing throughout and shall remove all objectionable material and rocks greater than 1 inch in diameter.

E. A finish grading inspection is required prior to sod placement.

3.03 COMPACTION

A. Compact each layer of fill in designated areas with approved equipment in accordance with Section 02200.

1. In landscaped areas, compaction shall not exceed 85% of maximum density and no less than 75%.

2. In landscaped areas which are sloped at 1:4 or steeper, compaction shall not exceed 90% of maximum density and no less than 85%.

B. No backfill shall be placed against any masonry or other exposed building surface until permission has been given by the Owner's Representative, and in no case until the masonry has been in place seven days.

C. Compaction in limited areas shall be obtained by the use of mechanical tampers or approved hand tampers. When hand tampers are used, the materials shall be deposited in layers not more than four inches thick. The hand tampers used shall be suitable for this purpose and shall have a face area of not more than 100 square inches. Special precautions shall be taken to prevent any wedging action against masonry, or other exposed building surfaces.

3.04 CORRECTION OF GRADE

A. Bring to required grade levels areas where settlement, erosion, or other grade changes occur. Adjust grades as required to carry drainage away from buildings and to prevent ponding around the buildings and on pavements.

B. All soil surfaces shall have sufficient percolation and surface drainage to support grasses and plant material.

C. Contractor shall be responsible for stabilizing grades by approved methods prior to landscaping, and shall be responsible for correction of grades as mentioned above, and cleanup of any wash outs or erosion.

END OF SECTION

SECTION 02221

TRENCHING, BEDDING, AND BACKFILL FOR PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish labor, materials, equipment, and incidentals necessary to perform all excavation, backfill, fill, grading, and slope protection required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to, manholes, vaults, duct conduit, pipe, roadways, paving, bedding, backfilling, fill, required borrow; grading, disposal of surplus and unsuitable materials, and all related work such as sheeting, bracing, and dewatering.

1.02 RELATED SECTIONS

A. Section 01340 – Shop Drawings, Working Drawings and Samples

B. Section 02100 – Site Preparation

C. Section 02200 – Earthwork

D. Section 02220 – Structural Excavation, Backfill & Compaction (NOT USED)

E. Other Sections as applicable.

1.03 REFERENCES

A. FDOT Standard Specifications for Road and Bridge Construction

B. FDOT Design Standards

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

D. AASTHO M-145 - Standard Specification for Classification of Soils and Soil-Aggregate Mixtures for Highway Construction Purposes

1.04 JOB CONDITIONS

A. The Contractor shall examine the site and review the available test borings or undertake his own soil borings prior to submitting his bid, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of sub-soil quality or conditions at locations other than places shown and at the time the available test borings were made.

B. Existing Utilities: Locate existing underground utilities in the areas of work. If utilities are to remain in place, provide adequate means of protection during earthwork operations.

1. Should uncharted, or incorrectly charted, piping, or other utilities be encountered during excavation, consult the Engineer and the Owner of such piping or utility immediately for directions.

2. Cooperate with Owner and utility companies in keeping respective services and facilities in operation. Repair damaged utilities to satisfaction of utility owner.

3. Demolish and completely remove from site existing underground utilities indicated on the drawings to be removed.

C. Protection of Persons and Property: Contractor shall barricade open excavations occurring as part of this work and post with warning lights. Operate warning lights as recommended by authorities having jurisdiction.

1. Protect structures, utilities, sidewalks, pavements, and other facilities from damage caused by settlement, lateral movement, undermining, washout, and other hazards created by earthwork operations.

1.05 SUBMITTALS

A. The Contractor shall furnish the Engineer, for approval, a certificate of origin and compliance with specifications for any fill material obtained from off-site sources.

B. At the discretion of the Engineer, the Contractor shall furnish the Engineer, for approval, a representative sample of fill material obtained from on-site sources weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.

C. At the discretion of the Engineer, for each material obtained from off-site sources, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Satisfactory Soil Materials: ASTM D2487 soil classification groups GW, GP, SW, and SP.

B. Unsatisfactory Soil Materials: ASTM D2487 soil classification groups GM, GC, SM, SC, CL, ML, OL, CH, MH, OH and PT.

C. Satisfactory and unsatisfactory soil materials for roadway embankment, including pipe trench backfill under roadways, shall meet the requirements as defined in AASHTO M-145 soil classification groups and FDOT index 505.

D. Satisfactory materials encountered during excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials.

E. Sub-base material:

1. Refer to roadway section and/or specifications.

F. Select or Structural Fill or backfill:

1. Select or structural fill material shall be a satisfactory soil material, well graded, consisting of a minimum of 60 percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressible percent clean medium fine grain sized quartz sand, free of organic, deleterious and/or compressed material. Rock in excess of 1 inch in diameter shall not be permitted.

G. Common Fill:

1. Common fill material shall be a satisfactory soil material containing no more than 20 percent by weight finer than No. 200 mesh sieve. It shall be free from organic matter, muck, marl, and rock exceeding 2 1/2 inches in diameter.

H. Course Aggregate:

1. Course aggregate, or gravel, shall be used for rock bedding, drainage rock or as otherwise depicted in the Drawings. Unless otherwise noted, course aggregate shall consist of washed and graded crushed limerock meeting FDOT specification 901, size number 57 or approved equal.

I. Sand:

1. Where specified, sand, clean sand, silica sand or other nomenclature shall refer to silica sand meeting FDOT specification 902-2.

J. Satisfactory soil materials shall free of muck, clay, rock, or gravel larger than 2-1/2 inches in any dimension, debris, trash, waste, frozen materials, broken concrete, masonry, rubble, vegetable or other similar materials or deleterious matter. Materials of this nature encountered during the excavation which, in the opinion of the Engineer, is not suitable for reuse shall be stockpiled for disposal as unsuitable materials.

K. Material substitutions may be permitted if accompanied by a geotechnical engineer’s report substantiating the proposed substitution which is approved by the Engineer and is at no cost to the Owner.

PART 3 - EXECUTION

3.01 GENERAL

A. All excavation, backfill and grading necessary to complete the work shall be made by the Contractor and the cost thereof shall be included in the Contract price.

B. Material shall be furnished as required from off-site sources and hauled to site.

C. The Contractor shall take all necessary precautions to maintain the work area in a safe and workable condition.

D. The Contractor shall protect his work at all times by flagging, marking, lighting and barricading. It shall also be the Contractor's responsibility to preserve and protect all above and underground structures, pipelines, conduits, cables, drains, or utilities which are existing at the time he encounters them. Failure of the Drawings to show the existence of these obstructions shall not relieve the Contractor from this responsibility. The cost of repair of damage which occurs to these obstructions during or as a result of construction shall be borne by the Contractor without additional cost to the Owners.

3.02 DEWATERING

A. The bottom of the excavations shall be firm and dry and, in all respects, acceptable to the Engineer.

B. Prevent surface water and sub-surface or ground water from flowing into excavations. Do not allow water to accumulate in excavations.

C. Provide and maintain pumps, well points, sumps, suction and discharge lines, and other dewatering system components necessary to convey water away from excavations.

D. The Contractor shall obtain all dewatering permits as required from agencies having jurisdiction.

3.03 TRENCH EXCAVATION

A. Excavation for all trenches required for the installation of pipes shall be made to the depths indicated on the Drawings. Excavate trench to provide minimum of 30-inch clear cover over the pipe bell unless otherwise noted on the Drawings. Excavate in such manner and to such widths as will give suitable room for laying the pipe within the trenches, for bracing and supporting and for pumping and drainage facilities. The trench width at the top of the pipe shall not exceed the allowable as determined by the depth of cut and indicated on the Drawings.

B. Rock shall be removed to a minimum 8-inches clearance around the bottom and sides of all the pipe or ducts being laid.

C. Where pipe is to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench remains undisturbed.

D. Where the pipes or ducts are to be laid directly on the trench bottom the lower part of the trenches shall not be excavated to the trench bottom by machinery. The last of the material being excavated shall be done manually in such a manner that will give a flat bottom true to grade so that pipe can evenly and uniformly supported along its entire length on undisturbed material or bedding rock. Bell holes shall be made as required manually so that there is no bearing surface on the bells and pipes are supported along the barrel only.

E. The bottom of the excavations shall be firm and dry and, in all respects, acceptable to the Engineer. Excavate any organic soil material from the bottom of the trench and replace with rock bedding, at least 6 inches thick.

3.04 TRENCH PROTECTION

A. The contractor shall perform trench excavations in accordance with applicable trench safety standards and is responsible to determine any safety or safety related standards that apply to the Project. The Owner and Engineer are not responsible to review and/or assess safety precautions, programs and costs, and the means, methods, techniques or technique adequacy, reasonableness of cost, sequences, and procedures of any safety precaution, including, but not limited to, compliance with any and all requirements of Florida Trench Safety Act.

B. The Contractor shall construct and maintain sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, existing piping, and foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids form, they shall be immediately filled and compacted.

C. For pipe trench sheeting, no sheeting is to be withdrawn if driven below mid-diameter of any pipe, and no wood sheeting shall be cut off at a level lower than

1 foot above the top of any pipe unless otherwise directed by the Engineer. If during the progress of the work the Engineer decides that additional wood sheeting should be left in place, he may direct the Contractor in writing. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given by the Engineer for an alternate method of removal.

D. All sheeting and bracing not left in place, shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. All voids left or caused by withdrawal of sheeting shall immediately be refilled with sand or rammed with tools especially adapted to that purpose, by watering or otherwise as may be directed.

E. The right of the Engineer to order sheeting and bracing left in place shall not be construed as creating any obligation on his part to issue such orders, and his failure to exercise his right to do so shall not relieve the Contractor from liability for damages to persons or property occurring from or upon the work occasioned by negligence or otherwise growing out of a failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.

3.05 PIPE INTERFERENCES AND ENCASEMENT

A. The contractor shall abide by the following schedule of criteria concerning interferences with other utilities.

1. In no case shall there be less than 0.5 feet between any two pipelines and structures.

2. In no case shall there be Concrete Encasement allowed for water or wastewater pipes.

B. The Engineer shall have full authority to direct the placement of the various pipes and structures in order to facilitate construction, expedite completion and to avoid conflicts.

3.06 BACKFILLING

A. Do not backfill trenches until tests and inspections have been made and backfilling authorized by Engineer.

B. Perform backfill in lifts and compact as specified in the Drawings.

C. Backfilling over pipes shall begin as soon as practical after the pipe has been laid, jointed, and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.

D. Backfilling over ducts shall begin not less than three days after placing concrete encasement.

E. All backfilling shall be prosecuted expeditiously as detailed on the Drawings.

F. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of pipe.

G. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.

H. The Contractor shall take all precautions necessary to maintain the bedding in a compacted state and to prevent washing, erosion or loosening of this bed.

I. In areas where unsuitable soil is discovered in the pipe bedding, the unsuitable soil shall be removed and stockpiled for disposal by the contractor. Suitable soils shall be substituted at a depth as directed by the Engineer. If gravel is required by the Engineer as suitable bedding, the gravel shall be wrapped in filter fabric prior to backfill operations.

J. Gravel bedding shall not be used under any circumstances as a drain for ground water.

K. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least 1 foot above the bottom of the pipes:

1. Place structural fill in such areas for a distance of not less than 3 feet either side of the centerline of the pipe in level layers not exceeding 6-inches in depth.

2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the Engineer.

3.07 COMPACTION

A. Perform compaction and compaction tests as specified in the Drawings.

B. Hydraulic compaction shall be permitted if accompanied by a geotechnical engineer's report substantiating the proposed methods. The geotechnical engineer's report shall be submitted to the Engineer prior to any work and shall be at no cost to the Owner.

3.08 GRADING

A. Grading shall be performed at such places as are indicated on the Drawings, to the lines, grades and elevations shown or as directed by the Engineer and shall be made in such manner that the requirements for formation of embankments can be followed. All unacceptable material encountered, of whatever nature within the limits indicated, shall be removed and disposed of as directed. During the process of excavation, the grade shall be maintained in such condition that it will be well drained at all times. When directed, temporary drains and drainage ditches shall be installed to intercept or divert surface water which may affect the prosecution or condition of the work.

B. If at the time of excavation, it is not possible to place any material in its proper section of the permanent structure, it shall be stockpiled in approved areas for later use. No extras will be considered for the stockpiling or double handling of excavated material.

C. The right is reserved to make minute adjustments or revisions in lines or grades if found necessary as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction.

D. Stones or rock fragments larger than 2 1/2 inches in their greatest dimensions will not be permitted in the top 6 inches of the subgrade line of all fills or embankments.

E. All fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings, or as directed by the Engineer.

F. In cut, all loose or protruding rocks on the back slopes shall be barred loose or otherwise removed to line or finished grade of slope. All cut and fill slopes shall be uniformly dressed to the slope, cross-section and alignment shown on the Drawings or as specified by the Engineer.

G. No grading is to be done in areas where there are existing pipelines that may be uncovered or damaged until such lines which must be maintained are relocated, or where lines are to be abandoned, all required valves are closed and drains plugged at manholes.

H. The Contractor shall replace all pavement cut or otherwise damaged during the progress of the work as specified elsewhere herein or as shown on the Drawings.

3.09 DISPOSAL OF UNSUITABLE AND SURPLUS MATERIAL

A. All surplus and unsuitable excavated material shall be disposed of at the Contractor's cost in one of the following ways as directed by the Engineer.

1. Transport to soil storage area on Owner's property and stockpile or spread as directed by the Engineer.

2. Transport from Owner's property and legally dispose of. Any permit required for the hauling and disposing of this material beyond Owner's property shall be obtained prior to commencing hauling operations. Copies of all required permits shall be provided to the Engineer.

B. Suitable excavated material may be used for fill if it meets the specifications for common fill and is approved by the Engineer. Excavated material so approved may be neatly stockpiled at the site where designated by the Engineer provided there is an area available where it will not interfere with the operation of the facility nor inconvenience traffic or adjoining property owners.

END OF SECTION

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SECTION 02276

STORMWATER POLLUTION PREVENTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Implementation of the Stormwater Pollution Prevention Plan as depicted in the Drawings, as required by law and specified herein.

B. Permitting as required through the Florida Department of Environmental Protection (FDEP) - Florida's National Pollutant Discharge Elimination System (NPDES) program for construction activities.

C. Designing, providing, maintaining, and removing temporary erosion and sedimentation controls and/or Best Management Practices as necessary.

D. Temporary erosion controls may include, but are not limited to, mulching, netting, and watering, on site surfaces and spoil and borrow area surfaces and providing interceptor ditches at ends of berms and at those locations that will ensure erosion during construction will be either eliminated or maintained within acceptable limits as established by the Owner.

E. Temporary sedimentation controls include, but are not limited to, silt dams, traps, barriers, booms/curtains, and appurtenances at the foot of sloped surfaces and other areas that will ensure sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the Owner.

1.01 RELATED SECTIONS

A. Section 01010 – Summary of Work

B. Section 01015 – General Requirements

C. Section 01030 – Special Project Procedures

D. Other Sections as applicable.

1.02 REQUIRMENTS

A. Contractor shall obtain a Generic Permit for Stormwater Discharge from Large and Small Construction Activities (CGP) from the Florida Department of Environmental Protection (FDEP) for all construction disturbances in size greater than one (1) acre.

1. Disturbance includes clearing, grading and excavating.

2. Projects which disturb less than one (1) acre will not require a CGP but will require the appropriate Best Management Practices and directed by the Owner, Engineer or governing authorities.

B. Implement and maintain a Stormwater Pollution Prevention Plan (SWPPP).

1. The SWPPP found in the Drawings is pictorial in nature, is provided to depict the general layout of SWPPP elements and is not intended to depict all the possible requirements.

2. The Contractor is the entity that owns and operates the project and has authority to ensure compliance and is therefore considered the "Operator".

3. Neither the Owner nor the Engineer are responsible to specify, implement or maintain the SWPPP plan.

C. Contractor shall submit a CGP Notice of Intent (NOI) and the commencement of Construction.

D. Contractor shall submit reporting forms throughout the duration of Construction.

E. Contractor shall submit a CGP Notice of Termination (NOT) to discontinue permit coverage. An NOT may be submitted only when the site meets the eligibility requirements for termination specified in the CGP.

F. For additional information on the NPDES Stormwater Program including all regulations and forms cited in the brochure visit: www.dep.state.fl.us/water/stormwater/npdes/.

PART 2 - PRODUCTS

2.01 EROSION CONTROL

A. Mulch: FDOT type per Section 981-3.2, Green Mulch

B. Netting: Fabricated of material acceptable to the Owner.

C. Other means as necessary and approved by FDEP and the Owner.

2.02 SEDIMENTATION CONTROL

A. Bales: Clean, seed free cereal hay type

B. Netting: Fabricated of material acceptable to the Owner

C. Filter stone: Crushed stone conforming to Florida Department of Transportation specifications.

D. Other means as necessary and approved by FDEP and the Owner.

PART 3 - EXECUTION

3.01 EROSION CONTROL

A. Minimum procedures for mulching and netting are:

1. Apply mulch loosely to a thickness of between 3/4 inch and 1 1/2 inches.

2. Apply netting over mulched areas on sloped surfaces.

3.02 SEDIMENTATION CONTROL

A. Install and maintain silt dams, traps and barriers, and booms/curtains as shown on the approved schedule. Hay bales and fabric that deteriorates and filter stone that becomes dislodged shall be replaced as required.

3.03 PERFORMANCE

A. Should any of the temporary erosion and sediment control measures employed by the Contractor fail to produce results that comply with the requirements of the Owner, Contractor shall immediately take any and all necessary steps to correct the deficiency at his own expense.

END OF SECTION

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SECTION 02410

SHRUB AND TREE RELOCATION

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, necessary equipment, and services to complete the shrub and tree relocation work, as indicated on the drawings and as specified herein or both.

1.02 RELATED WORK

A. Section 02210 – Finish Grading

B. Section 02420 – Soil Preparation and soil mixes

C. Section 02490 – Trees Plants and Groundcover

1.03 DESCRIPTION

A. Plant materials to be relocated on site are designated on the drawings or as directed by the Landscape Architect.

B. The Contractor's crew utilized for the relocation of existing trees and shrubs shall have minimum five years experience in relocation of existing plant materials and be recognized by the Florida Nurserymen and Growers Association (FNGA).

C. Existing trees to remain shall be protected during all construction phases as noted on demolition tree deposition and/or landscape plans. Any trees or shrubs scarred or destroyed designated to remain will be replaced at the Contractor's expense, with equal or better.

D. Remove other trees, saplings, shrubs, bushes, vines and undergrowth as directed by the Landscape Architect to accommodate new plantings.

E. Resulting tree pits and shrub bed pits of relocated material shall be backfilled with clean 80% sand/20% muck planting soil mix and brought back flush with surrounding grade as required. It shall be the contractor’s responsibility to correct problems caused by erosion, wind, etc., in the reclaimed area where digging has occurred.

F. In areas where new plant material will replace relocated plant material, 80% sand/20% muck planting soil mix shall be used as backfill.

1.04 SUBMITTALS

A. Contractor to submit a schedule by day as to how many units can be dug and relocated to specified areas. Note for those materials that may require root pruning, the relocation schedule to begin at the end of the specified root-pruning period.

B. Contractor shall apply and secure any and all permits and/or licenses if required by any municipal, state, or federal agency or governing body prior to commencement of any work.

1.05 GUARANTEE

A. Guarantee all plant material for a period of twelve months after date of Final Completion.

B. Replacement plants under this guarantee shall be replaced within two weeks of rejection and guaranteed for twelve months from date of installation.

C. Repair damage to other plants, lawn or construction work during plant replacement at no cost to the Owner (this includes, but is not limited to, damage to curbs, walks, roads, fences, site furnishings, etc.).

1.06 TAGGING

A. Trees and shrubs within the designated areas for relocation shall be clearly marked by means of pink plastic surveyor's ribbons and coordinated with Landscape Architect and shall be inspected and approved by the Owner's representative prior to root pruning and/or digging.

1.07 ROOT PRUNING

A. Trees to be relocated shall be root pruned with clean sharp equipment at least 50% around root ball then the remaining 50% after 30 days for a total of at least 90 days prior to digging. No mechanical means (i.e., Backhoes) may be utilized for the root pruning only shovels or jackhammer type shovels shall be permitted. The specific requirements for root ball sizes shall be in accordance with the table below or to the drip line of the tree. The root-pruned trees shall be watered as specified hereinafter by Landscape Contractor as part of this contract.

B. Palms and shrubs to be relocated shall be root pruned at least 30 days prior to digging, with clean, sharp equipment. No mechanical means (i.e., Backhoes) may be utilized for the root pruning only shovels or jackhammer type shovels shall be permitted. Palms relocated by tree spade may forego the root-pruning requirement, but shall adhere to root ball size charts below. Palms shall be watered as shown on the contract drawings.

C. All trees and palms that has been root pruned shall be staked and guyed or braced per drawing immediately after root-pruning.

D. Root Ball Size Chart - Note: Root ball sizes shall be in accordance with minimum standards set forth in Grades and Standards for Nursery Plants Part II, Palms and Trees, Florida Department of Agriculture.

1. LARGE SHRUBS - Minimum Ball Sizes:

a.

DBH	Minimum Ball Diameter
1 " - 1-1 /2"	16"
1-1/2" - 1-3/4"	20"
1-3/4" - 2"	22"
2" - 2-1/2"	24"
2-1/2" - 3-1/2"	26"
3-1/2" - 4"	28"
4'° - 4-1/2"	30"
4-1/2" - 5"	32"
5" - 5-112"	34"

Larger sizes increase proportionately.

2. TREES - Minimum Ball Depth: All trees shall be root pruned to the dripline of the tree (8” to 10” per DBH) unless directed otherwise by Landscape Architect. No canopy shall be removed as part of this process.

3. PALMS - Minimum Ball Sizes:

a. Heavy Trunk Types:

DBH 4.5’ above ground	Minimum Ball Size (Measurements from Base of Trunk at Ground Level)
3"	6-1 /2"
4”	7"
5”	7-1/2"
6"	8”
7”	8-1/2"
8”	9”
9”	9-1/2”
10”	10”

b. Slender Trunk Types (Palms):

Maximum 2 feet Clear trunk wood	Minimum Ball Size (Measurements from Base of Trunk at Ground Level)

DBH measurements 4.5’ above ground	Minimum Ball Size (Measurements from Base of Trunk at Ground Level)
3"	6-1 /2"
4”	7"
5”	7-1/2"
6"	8”
7”	8-1/2"
8”	9”
9”	9-1/2”
10”	10”
Clear trunk wood 2-3 feet or more.	36"

c. Depth of Ball Minimum Ball Depth

1) Up to 2 ft 14" clear wood
2) 2 ft or more 22'° clear wood

d. Cluster Types

Minimum ball to exceed 8" beyond outer trunk.

Depth of Ball		Minimum Ball Depth
1)	1-6 ft clear trunk	22"
2)	7 ft or more clear trunk	30”

e. Roots must be sturdily established in ball that has been tightly wrapped and securely tied with twine or wire, or pinned.

f. Burlapping will not be required if the palm is dug from marl or heavy soil that adheres to roots and retains its shape without shattering, provided moistened material is used to cover the ball, the roots are not directly exposed to wind or sun, and the palm is planted within 24 hours after being dug.

g. When collected palms are grown on top of rock and are peeled off, the depth of the ball may be less than minimum ball size in chart, but width of ball and volume of roots should be sufficient to ensure normal recovery and continued growth.

1.08 WATERING

A. Following root pruning, trees designated for transplanting shall be watered for a period of five consecutive days following root pruning and then every other day until moving. Such watering shall thoroughly saturate the root ball to its full depth.

1.09 CROWN PREPARATION

A. Sabal Palms:

1. Cut off bottom fronds as necessary according to condition of palm and time of moving.

2. Cut off one or more unopened leaves on each side of tightly closed center leaf.

3. Tie several fronds in upright position to unopened center leaves.

4. Tie remaining fronds together using untreated cotton twine or 2-inch burlap strips.

NOTE: Another acceptable procedure is providing palms with a hurricane cut, which is to say that all fronds are cut with no damage to bud.

B. Cluster Type Palms

1. Wire against the palm trunk a piece of 2x4 lumber of sufficient length to give adequate support to open and unopened leaves. The lumber must also be long enough to extend upward from where the bud emerges to within 3/4 of length of all leaves and downward approximately the same distance from where it is wired to trunk.

2. Tie fronds in upright position to lumber using untreated cotton twine.

3. Trunks with little or no wood may have their fronds tied to another trunk that is supported by wood.

C. Shade and Flowering Trees:

1. Minimal trimming to the canopy shall occur. In so doing, preserve the basic shape and form of the tree, eliminate cross-branching and dead or diseased branches. Wrap 6 layers of burlapping around the trunk where nursery ties are to be placed.

2. Selected species shall have all leaves hand stripped following pruning and prior to moving at the direction of the landscape architect.

3. Trees moved with leaves intact may be treated with spray antidesiccant according to manufacturer's recommendations and upon Landscape Architect's direction prior to moving.

1.10 TREE SPADING/HAND DIGGING

A. Plant materials indicated to be relocated may be relocated by means of a tree spade. The specific requirements for root ball size shall be in accordance with root ball size charges, Section 1.08.

B. Burlapping will be required if trees, large shrubs, or palms will be relocated to an area not accessible by the tree spade equipment or if a tree spade is not used. Trees or palms that are dug by tree spade and then burlapped for relocation shall comply and be handled in same manner as new plant materials specified in Section 02490.

PART 2 - PRODUCTS "NOT APPLICABLE"

PART 3 - EXECUTION

3.01 HANDLING AND TRANSPORTATION

A. Trees, palms, and large shrubs shall be properly handled during moving so trunks will not be scarred or damaged and to avoid broken limbs. Broken limbs or scarred/damaged trunks shall cause plant to be unacceptable and rejected at Landscape Architect's option. Broken limbs and wounds which do not (in the Landscape Architect's judgment) cause the tree to be rejected shall be repaired under the following guidelines:

1. Properly prune dead, dying, or damaged branches with clean, sharp equipment.

2. Remove injured bark and wood of a tree wound with a clean, sharp knife to a point where healthy bark and wood make contact at their margins.

3. Inspect and treat wounds for insect and disease.

B. Transport plant material on vehicles of adequate size to prevent overcrowding, broken limbs, foliage damage or root ball damage.

C. Root ball should be kept moist during all phases of relocation.

D. Tree and palm crowns shall be protected with shade cloth to prevent desiccation and wind burn. Crowns shall be periodically sprayed with water to help ensure against desiccation.

E. Groundcovers designated as divisions will consist of healthy offshoots with adequate root mass to ensure successful transplant.

F. Inspect all plant material for insect/disease problems. Take appropriate action before loading to ensure all plant material is free of any harmful insect/disease problem. This precaution does not preclude rejection at the site. Apply pesticides in strict accordance with manufacturer's recommendations and all government standards.

G. Plant material shall be handled only in ways and means accepted by the industry and approved by the landscape Architect.

H. Plant material shall be planted the same day it is dug. Preparation of planting pits or beds shall be coordinated to ensure this schedule.

3.02 FERTILIZER

A. Relocated plant materials may be fertilized immediately after transplanting. The type of fertilizer should be a root stimulator such as 'Root Plus' or equal.

3.03 STAKING AND GUYING

A. Designated material shall be staked and guyed or braced per drawings.

3.04 WATERING

A. Contractor shall be responsible for the manual watering of relocated plant materials by providing a 90-day watering program (unless otherwise noted on the drawings), until they are established.

B. Following tree spading and/or relocation, trees and palms designated for transplanting shall be watered twice a day for the first two weeks, every two days for the third week to the sixth week following the installed date, every third day for the remainder of the 90-day period (unless otherwise noted on the drawings), completely saturating the root ball to its full depth.

END OF SECTION

SECTION 02420

SOIL PREPARATION AND SOIL MIXES

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide all labor, materials, necessary equipment and services to complete the soil preparation and soil mixes work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

B. Including, but not limited to:

1. Topsoil

2. Soil Conditioners

3. Planting Soil Mixes

1.02 RELATED WORK

A. Section 02410 – Shrub and Tree Relocation

B. Section 02430 – Sodding

C. Section 02450 – Tree and Plant Protection

D. Section 02490 – Trees, Plants and Groundcover

E. Other Sections as applicable.

1.03 QUALITY ASSURANCE

A. Testing Agency: Approved Independent testing laboratory utilizing EPA, ASTM, USGS methods.

B. Requirements or Regulatory Agencies: Conform to requirements of all Municipal, County and State agencies.

C. Reference standards.

1.04 SUBMITTALS

A. Test Reports: Test reports shall consist of pH range, major and minor element analysis, including but not limited to Ammonia,, Nitrate, Phosphorus, Potassium, Magnesium, Calcium, Sulfur, Boron, Zinc, Manganese, Iron, Copper and soluble salt and any other materials designed by the Landscape Architect. Recommendations shall be made by the testing agency as to the type and quantity of soil additives

required to bring the nutrient and ph to an acceptable or optimum range for planting. Reports shall be identified by project name, date, and soil mix type.

1. Results of topsoil (on-site existing soil) analysis.

2. Results of planting/top soil mix(es) analysis: One test required per each type of soil mix.

B. Certificates:

1. The Contractor must submit certificates from suppliers stating that the planting/topsoil mix, turfgrass sod and other landscape material used comply with requirements specified.

2. Manufacturer's certificate of fertilizer's chemical composition including but not limited to percentage and derivation of nitrogen, phosphorus, potassium, and micronutrients.

3. Testing laboratory certification that content of soil conditioners meet specification requirements.

C. Soil Samples:

1. Submit a one-pound sample of each soil mix specified.

D. All State, County and Municipal governmental regulations must be met including any licensing or certifications requirements for uses or applications.

E. Costs of all submittals, including but not limited to Test reports, Certificates, Licenses, and samples will be borne by the Contractor.

1.05 JOB CONDITIONS

A. Contractor shall become familiar with the site and the required work to complete this section in accordance with the drawings and what is specified herein.

B. Responsibility for finish grading shall occur under a separate contract. Any changes, modifications, or disturbances to the finish grading shall be corrected by the responsible contractor.

C. PROTECTION: Protect and avoid any damage whatsoever to existing walks, pavement, curbs, utilities, plant material, and any other existing work.

PART 2 - PRODUCTS

2.01 TOP SOIL

A. Topsoil shall be an 80-20 mix, 80% fresh water sand (medium to coarse grade) and 20% inland glades muck thoroughly mixed with a commercial shredder/blender or equivalent. It shall be suitable for ornamental plant growth and free from hard

clods, stiff clay, hardpan, gravel, subsoil, brush, large roots, weeds, refuse or other deleterious material, and of reasonably uniform quality. No site mixing will be acceptable.

B. Mechanical analysis: Topsoil and soil mixture(s) shall meet these specifications and the following mechanical analysis, and shall be proportioned by volume rather than by weight.

Sieve Size	% Passing By Dry Weight
1 inch	99-100
1/4 inch	97-99
No. 100	40-60

Materials larger than one-half inch shall be disposed of off the site or as directed by the architect. Existing leaf litter and plant material shall be excluded from topsoil and soil mix.

C. Maximum Soluble Salts: 300 ppm.

D. Sterilize topsoil to be used in soil mixture(s) to make free of all viable nut grass, and other undesirable weed seeds.

E. A sample of the sand and a sample of the 80-20 sand and muck mixture shall be submitted to the Owner for approval prior to installation.

F. The Landscape Architect has the right to reject topsoil utilized at anytime during the execution of work that does not meet specifications. Topsoil and planting soil will be tested at Owners request for suitability of horticultural use.

2.02 SOIL CONDITIONERS

A. Dolomitic Limestone: Approved product, designated for agriculture use.

B. Aluminum Sulfate: Manufacturer's standard commercial grade.

C. Florida Peat: Suitable for plant growth, capable of sustaining vigorous plant growth, and specifically pulverized for agricultural use. Florida peat shall be free of deleterious materials that would be harmful to plant growth, shall be free of nematodes, shall be of uniform quality, and shall have a pH value between 5.5 and 6.5 (as determined in accordance with ASTM E70). Florida peat shall be sterilized to make free of all viable nut grass and other undesirable weeds.

D. Pesticides: As recommended by applicable Agricultural Public Agencies.

E. Herbicides: As recommended by applicable Agricultural Public Agencies.

F. Soil Fumigants: As recommended by applicable Agricultural Public Agencies.

G. Fertilizer:

1. Specified commercial grade fertilizer to comply with State of Florida Fertilizer laws. Chemical designation shall be as specified with at least 50% of the nitrogen derived from a non-water soluble organic source and all potash to be derived from sulfate forms for all plantings excluding sod and plantings on the lake edges.

   Chemical designation shall be as specified with at least 80% of the nitrogen derived from a non-water-soluble organic source and all potash to be derived from sulfate forms for all sod and plantings on lake edges.

   The following minor elements shall be included:

2.2% ZnO	0.25% CuO
4.0% MgO	0.005% Fe203
0.5% MnO	0.1% B203

   a. Federal Specifications O-F0241 Type 1, Grade A or B.

   b. The chemical designation for granular fertilizer for all plantings shall be 12-8-8.

H. Water: Free or substances harmful to growth of plants. Water shall also be free of staining agents as well as elements causing odors.

I. Soil Sterilizers: As recommended by State and Local Agriculture agencies.

J. Sand: Clean, white, coarse-grained builders sand, free of substances harmful to growth of plants.

K. Supply complete information on all analysis/test methodologies and results; laboratory certifications, manufacturer's specifications, and agency approvals to Landscape Architect prior to placement of soil conditioners. Landscape contractor shall make all modifications and improvements to soil and soil mixes deemed necessary by Landscape Architect to meet requirements herein, and to ensure proper growing medium for all plant material without cost to Owner, prior to planting.

2.03 PLANTING SOIL MIXES

A. Planting soil shall be an evenly blended mixture of 80% sand/20% muck, (with any other soil conditions per Testing Agency recommendations) specified to each cubic yard of soil and thoroughly mix. Mix shall be suitable for plant growth and free from hard clods, stiff clay, hardpan, gravel, brush, large roots, nematodes, weeds, refuse, or other deleterious material, and of reasonably uniform quality.

B. Palms: Planting soil mixture to be placed as backfill around the root balls of all Palms shall consist of a mixture as specified above.

   Note: Bottom 1/4 of planting pit shall be backfilled with clean, coarse-grained builder’s sand.

C. Trees, Shrubs, and Groundcovers: Planting soil mixture to be placed as backfill around the root balls of all trees, shrubs, and groundcovers shall consist of a mixture of 80% sand and 20% muck.

D. Sterilize planting soil mixtures to make free of all viable nut grass, and other undesirable weed seeds.

E. All planting soil mixes shall be thoroughly blended to form a uniform planting medium suitable for exceptional plant growth.

F. Test PH of existing soil and planting soil mixtures by method acceptable to current industry standards. If pH is not between 6.0 and 7.0, add approved soil conditioner/additive to bring PH within that range.

G. Supply complete information on all analysis/test methodologies and results; laboratory certifications, manufacturer's specifications, and agency approvals and recommendations shall be made by the testing agency as to the type and quantity of soil additives required to bring the nutrient and pH to an acceptable or optimum range for planting to Landscape Architect prior to placement of soil mixtures. In addition, provide Landscape Architect with thoroughly mixed sample of all soil mixes for approval prior to placement (note PH ranges). Landscape Contractor shall make all modification and improvement to soil mixes deemed necessary by Landscape Architect to meet requirements herein, and to ensure proper growing medium for all plant material without cost to Owner, prior to planting.

PART 3 - EXECUTION

3.01 INSPECTIONS

A. Examine areas to receive soil preparation to assure work of other trades has been completed.

B. Verify that plants to remain undisturbed have been clearly identified and protected from injury during construction. If not, identify and protect plants to remain according to procedures set forth in Section 02490 - Trees, Plants and Groundcover. Refer to Protective Fencing on plans.

C. Remove all construction materials and debris from all areas to be landscaped, without additional expense to Owner, prior to subsoil preparation.

D. Do not proceed with soil preparation until all unsatisfactory conditions are corrected.

3.02 SITE PREPARATION

A. General: Within the entire area to be landscaped as shown on the drawings, the contractor shall complete the following site topsoil preparation items to eradicate all existing weed and/or natural groundcover. Initiate site topsoil preparation as stated herein and coordinate all work with the existing underground sprinkler system and electrical lines.

B. Post Emergence Herbicide: Apply "Roundup" as manufactured by Monsanto Corp. according to manufacturer's recommended rate and specification within the limits of all areas to be landscaped not specified as existing, to be relocated, or to be removed. Protect existing plants from overspray.

C. Pre-Emergence Herbicide: Apply "Ron-Star" or approved equal to all areas to be landscaped according to the manufacturer's recommended rate and specification. Contractor shall be responsible to re-apply appropriate herbicide to eradicate all remaining weeds and maintain a weed-free condition in all areas throughout all landscape planting operations.

3.03 PERFORMANCE

A. Subsoil: Remove all debris, gravel, rocks and other deleterious material, within 12 inches of surface in areas to receive topsoil mixture, from the project site. Fine grade subsoil to assure finish grades are achieved by adding the specified depth of topsoil/planting mixture.

B. Soil mixtures:

1. Remove rocks and other objects

2. Smooth soil mixtures to two 2 inches below top of surrounding paving, wherever planting beds abut paved surfaces.

3. Do not compact planting soil mixture, but do wet-soak planting areas to assure proper settlement. Replace topsoil/planting soil mixture to specified grade after watering, where necessary.

4. Smooth topsoil to two inches (2") below finish grade in areas to be sodded. Remove plant material not indicated as existing or be relocated in order to adhere to sod lines.

5. Prior to installing planting soil, test tree pits and planting areas for percolation. If areas do not drain, it is the contractor's responsibility to assure percolation by approved means.

6. Remove limerock or soil cement in tree planter islands within paved parking areas at the depth specified on the plans. Do not damage sub-base material for paved surfaces. Assure percolation and then backfill with approved planting soil mix.

3.04 CLEAN-UP

A. Immediately clean up spills, soil and conditioners on paved and finished surface areas.

B. Remove debris and excess materials from project site immediately.

END OF SECTION

SECTION 02430

SODDING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide all labor, materials, necessary equipment and services to complete the turfgrass Sodding work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

1.02 RELATED SECTONS

A. Section 02200 – Earthwork

B. Section 02210 – Finish Grading

C. Section 02410 – Shrub and Tree Relocation

D. Section 02420 – Soil Preparation and Soil Mixes

E. Section 02450 – Tree and Plant Protection

F. Section 02490 – Trees, Plants and Groundcover

G. Other Sections as applicable.

1.03 QUALITY ASSURANCE

A. Standards: Federal Specifications (FS) 0-F-241c (1), Fertilizers, Mixed, Commercial.

B. Requirements or Regulatory Agencies: Conform to the requirements of the State Department of Agriculture.

1.04 SUBMITTALS

A. Growers Certifications:

1. Turfgrass Sod species and location of field from which turfgrass sod is cut.

2. Compliance with state and federal quarantine restrictions. Manufacturer's certification of fertilizer and herbicide composition.

3. All Contractors' licenses and or certifications for the uses and or application of herbicides, pesticides and fertilizers per the State, County, and governing municipality.

1.05 DELIVERY, STORAGE AND HANDLING

A. Deliver turfgrass sod on pallets.

B. Protect root system from exposure to wind or sun.

C. Protect turfgrass sod against dehydration, contamination, and heating during transportation and delivery. Such protection shall encompass the entire period during which the turfgrass sod is in transit, being handled, or in temporary storage. Evidence of inadequate protection against drying out shall be cause for rejection.

D. Do not deliver more turfgrass sod than can be installed within 24 hours.

E. Keep stored turfgrass sod moist and under shade, or covered with moistened burlap.

F. Do not break, tear, stretch, or drop turfgrass sod. The Landscape Architect may reject sod that has been damaged by poor handling.

G. Unless otherwise authorized by Landscape Architect, the Contractor shall notify the Landscape Architect at least 48 hours in advance of anticipated delivery date of the turfgrass sod. A legible copy of the invoice showing species and variety of the turfgrass sod included for each shipment shall be submitted to the Landscape Architect for approval.

1.06 JOB CONDITIONS

A. Begin installation of turfgrass sod after preceding related work is accepted.

B. Environmental Requirements:

1. Install turfgrass sod during months acceptable to the Landscape Architect.

2. Do not install turfgrass sod on saturated soil.

C. Protection: Erect signs and barriers against vehicular traffic on areas prepared for sod.

1.07 GUARANTEE

A. Guarantee turfgrass sod for period of twelve months after date of Final Approval.

B. Replacement turfgrass sod under this guarantee shall be guaranteed for twelve months from the date of installation.

C. Repair damage to other plants during turfgrass sod replacement at no cost to the Owner.

PART 2 - PRODUCTS

2.01 TURFGRASS SOD

A. Turfgrass Sod Species: Refer to species indicated on approved landscape plans.

1. Turfgrass Producers International Grade: Premium Grade Turfgrass Sod.

B. All turfgrass sod shall conform to the following requirements:

1. Furnish in pads that are not stretched, broken, or torn.

a. Turfgrass Sod pads shall be 18x24 inches in size (plus or minus 5%) with a 1-1/2 inch thickness (excluding top growth and thatch). Broken and torn or uneven ends will not be accepted.

2. Uniformly mowed height when harvested:

a. Turfgrass Sod - 2 inches in height.

3. Thatch: Maximum 1/2 inch uncompressed.

4. Inspected and found free of diseases, nematodes, pests, and pest larvae, by entomologist of State of Florida Department of Agriculture.

5. Weeds:

a. Free of horse grass, nut grass or other objectionable weeds or weed seeds.

6. Uniform in green color, leaf texture, and density.

2.02 WATER

A. Free of substances harmful to plant growth, objectionable odor or staining agents.

2.03 FERTILIZER

A. FS 0-F-241c(1), Grade A or B.

B. The Chemical designation for slow release granular fertilizer with minor trace elements in addition to 12% Nitrogen, 8% Phosphorous, and 8% Potassium (Lesco or approved equal) shall have at least 50% of the nitrogen from a non-water-soluble organic source for all plantings except on lake banks.

C. Apply and distribute by methods and rates as recommended by manufacturer.

D. All State, County, and Municipal governmental regulations must be met including any licensing or certification requirements for uses and/or applications.

2.04 HERBICIDES

A. As recommended by the State of Florida Department of Agriculture.

B. Post-emergent Herbicide: Roundup as manufactured by Monsanto Corp. or approved equal.

C. Pre-emergent Herbicide: Ron Star or approved equal.

D. When next to an aquatic water body, an approved aquatic herbicide or approved equal must be utilized that will meet the State, County or Municipal requirements.

E. All State, County and municipal governmental regulations must be met including any licensing or certification requirements for uses or applications.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify that excavation for turfgrass sod is 4 inches below finish grade and approved Planting/Top Soil Mix to depth of 2 or more inches for turfgrass sod (2 inches)to meet finish grade.

B. Water dry soil to depth of 6 inches 48 hours before turfgrass sodding.

3.02 INSTALLATION

A. All areas to be turfgrass sodded shall receive finish grading per Section 02210.

B. Transplant turfgrass sod within 48 hours after harvesting.

C. Turfgrass Sod coverage must provide 100% coverage at Final Approval.

D. Begin turfgrass sodding at bottom of slopes. When installing turfgrass sod adjacent to a water body, install turfgrass sod to the waterline.

E. Lay first row of turfgrass sod in straight line with long dimension of pads parallel to slope contours.

F. Butt side and end joints. Ensure that joints are tight, thereby eliminating the need to patch and/or top-dress to eliminate gaps.

G. Stagger end joints in adjacent rows.

H. Do not stretch or overlap rows.

I. Water turfgrass sod immediately after transplanting.

J. Top dressing for turfgrass sodded areas may be clean sand(sterilized), mined from fresh water sources. Sand mined from salt water is unacceptable. Sand shall be free from construction debris, weeds, turfgrass sod, biodegradable materials, noxious pests and diseases and other deleterious materials.

3.03 LAWN ESTABLISHMENT

A. Maintenance of sodded areas shall begin immediately after so installation and shall continue until final approval. Maintenance shall consist of protecting, watering, weeding, cutting, fertilizing, repairing eroded area and re-sodding dead and or damaged turfgrass sod.

B. Watering:

1. Keep turfgrass sod moist during first week after planting.

2. After first week, supplement rainfall to produce a total of 2 inches per day until final acceptance.

3. It is the contractors' responsibility to water all plant material.

C. Mowing:

1. Maintain turfgrass sod between 2 inches and 2-1/2 inches in height. When turfgrass sod reaches 3 inches in height, mow to 2 inches in height.

2. Do not cut off more than 40% of grass leaf in single mowing.

3. Remove all turfgrass sod clippings throughout.

D. Re-turfgrass sod areas which in the opinion of the Landscape Architect is required to establish a uniform stand of turfgrass sod.

E. Weed Eradication:

1. Apply specified or approved equal post-emergent herbicide per manufacture's rate and method of application to all areas to receive sod.

2. Apply specified or approved equal pre-emergent herbicide before sodding and between second and third mowing, per manufacturer's rate and method of applications.

3. Verify that the herbicide and applicant technique will not damage sod prior to application, and replace all damaged sod and any other landscaping due to herbicide at no cost to the owner.

F. Fertilizer: Apply fertilizer uniformly at manufacturer's recommended rate 30 days after turfgrass sodding and at three-month intervals thereafter. Water in to avoid "burning" or damaging turfgrass sod.

G. Establishment period shall extend until final acceptance by the Owner according to the conditions of the Contract.

3.04 CLEANING

A. Immediately clean spills from paved and finished surface areas.

B. Remove debris and excess materials from project site.

C. Dispose of protective barricades and warning signs at termination of lawn establishments.

END OF SECTION

SECTION 02450

TREE AND PLANT PROTECTION

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide all equipment and materials, and do all work necessary to protect existing trees and plants from damage as a result of the contractor's operations.

1.02 RELATED SECTIONS

A. Section 02410 – Shrub and Tree Relocation

B. Section 02420 – Soil Preparation and Soil Mixes

C. Section 02430 – Sodding

D. Section 02490 – Trees, Plants and Groundcover

E. Other Sections as applicable.

1.03 REFERENCED STANDARDS

A. Comply with applicable requirements of the following standards. Where these standards conflict with other specified requirements, the most restrictive requirements shall govern.

1. International Society of Arboriculture (ISA): Guide for Establishing Values of Trees and Other Plants

1.04 SUBMITTALS

A. Proposed methods, materials to be employed, and schedule for effecting tree and plant protection shall be submitted for approval.

1.05 DAMAGE PENALTIES

A. If any trees or shrubs are damaged, and replacement is required, a number and diameter of trees or shrubs of the same species and variety, as specified by the Owner, shall be furnished and planted by the Contractor. The total inch diameter of the replacement trees or shrubs shall equal the diameter of the tree of shrub to be replaced. The Contractor shall not be liable for any loss or damage which occurs while the Contractor is complying with instructions given by the Owner.

PART 2 - PRODUCTS

2.01 TREE PROTECTION FENCING

A. Tree protection fencing shall be mesh fence, 6 ft. high minimum, with 4"x4"x6' pressure treated wood posts.

B. Posts shall be spaced 10 ft. O/C (max)

C. Fencing other than that specified above shall be subject to the approval of the Engineer.

PART 3 - EXECUTION

3.01 INSTALLATION OF FENCING

A. Prior to the start of demolition work and clearing and grubbing operations, tree protection fencing shall be installed in accordance with the following:

1. Fencing shall be installed at the tree protection areas as directed by the Engineer or Owner.

2. Fencing shall be located along the cut and fill lines staked by the project surveyor and approved by the Engineer or Owner.

3.02 ROOT PRUNING

A. Prune minimum necessary to remove injured twigs and branches, deadwood, and suckers. Pruning shall be done with regard to natural form of plant material or as directed by the Engineer or Owner.

B. Do not prune prior to delivery to site.

C. All cuts one inch diameter or larger made during pruning of any plant material shall be painted with commercial grade sealant as approved and directed by Owner.

D. Pruning cuts shall be monitored to ensure proper healing and to prevent insect/disease infestation.

E. Landscape Contractor shall perform all specialized shearing and or pruning as directed by the Owner and as shown on the drawings at no additional cost to the Owner.

3.03 CLEARING WITHIN PROTECTION AREAS

A. Elective clearing within tree protection areas shall only be performed when and as directed by the Owner.

3.04 REMOVAL OF PROTECTION

A. Except as otherwise indicated or requested by Owner, temporary protection devices and facilities installed during course of the work shall be removed only after all work which may injure or damage trees and plants is completed.

END OF SECTION

SECTION 02490

TREES, PLANTS AND GROUNDCOVER

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Provide all labor, materials, necessary equipment and services to complete the Trees, Plants and Groundcover work, as indicated on the drawings, as specified herein or both, except as for items specifically indicated as "NIC ITEMS".

1.02 RELATED SECTONS

A. Section 02200 – Earthwork

B. Section 02210 – Finish Grading

C. Section 02410 – Shrub and Tree Relocation

D. Section 02420 – Soil Preparation and Soil Mixes

E. Section 02430 – Sodding

F. Section 02450 – Tree and Plant Protection

G. Other Sections as applicable.

1.03 QUALITY ASSURANCE

A. Inspection

1. Furnish plant materials inspected by State Department of Agriculture at the growing site and tagged or otherwise approved for delivery by Landscape Architect.

2. Inspection at growing site does not preclude right of rejection at project site.

B. Furnish plant materials certified by State Department of Agriculture to be free form harmful insects or apparent disease. Verify that all plant material is free of harmful insects and disease.

C. All plant material shall be Florida #1 or better as defined by the Florida Department of Agriculture "Codes and Standards for Nursery Plants Part I and II".

D. Plant material shall be shade or sun grown, and/or acclimatized depending on planting location.

1.04 SUBMITTALS

A. Certificate of inspection of plant material by State Authorities.

B. Test Reports: Analysis of samples from planting soil supply areas.

C. Maintenance Instruction: Prior to the end of the maintenance period, furnish three copies of written maintenance instructions to the Owner's Representative and Landscape Architect for maintenance and care of installed plants throughout their full growing season.

1.05 DELIVERY, STORAGE AND HANDLING

A. Inventory:

1. Verify that species of plants in holding area matches that on plant list and drawings.

B. Preparation for Delivery:

1. Prune head and/or roots of all trees under direction of Landscape Architect, and as required to assure safe loading, shipment and handling without damaging the natural form and health of the plant.

2. Balled and Burlapped (B&B) Plants:

a. Dig and prepare for shipment in manner that will not damage roots, branches, shape, and future development after replanting. Oak trees shall be root pruned 30 days prior to digging and hardened off at the supplier's nursery under mist for 30 to 60 days.

b. Ball with firm, natural balls of soil, per Florida Grades and Standards.

c. Wrap ball firmly with burlap or strong cloth and tie: ANSI Z60.1.

3. Specimen Plants: Exercise care in digging, wrapping, and binding of such specimens to assure safe loading, shipment and handling.

4. Bare Root Plants:

a. Refer to Section 02410 in its entirety for trees and palms.

C. Delivery:

1. Deliver soil conditioners (pesticides, herbicides, fumigants, and fertilizers) to site in original unopened containers bearing manufacturer's guaranteed chemical analysis, name, trade name, trademark, and conformance to state law. Store in designated areas only.

2. Deliver planting soil mixes and mulch in bulk with manufacturer's guaranteed mix, name, and conformance to State law. Store in designated areas only.

3. Deliver plants with legible identification labels.

   a. Label trees, evergreens, containers of like shrubs, or groundcover plants.

   b. State correct plant name and size indicated on Plant List.

   c. Use durable waterproof labels with water resistant ink which will remain legible for at least 60 days.

4. Protect during transport/delivery with shade cloth or other acceptable means to prevent wind burn.

5. Protect all plant material during delivery to prevent damage or desiccation to root ball or desiccation of crown and leaves.

6. Mist root balls, tree and palm crowns during delivery and handling to ensure against drying.

7. Remove unacceptable plant material immediately from job site.

D. Storage:

1. Balled and burlapped plant stock: Deliver direct from nursery.

2. Bare root plant material: Deliver direct from supplier.

3. Protect roots of all plant material from drying or other possible injury. Keep plant root ball and crown moist at all times.

4. Store plants in shade and protect from weather. Heel in trees in a vertical position as required. Irrigate all stored plants as required.

5. Maintain and protect plant material not to be planted within four hours. Plant palms upon delivery.

E. Handling:

1. Do not drop plants.

2. Do not pick-up container or balled plants by stems or trunks.

3. Do not use chains or cables on any trees or palms. Handle using nylon straps, 2 inche width min.

1.06 JOB CONDITIONS

A. Planting Season: Perform actual planting only when weather and soil conditions are suitable in accordance with locally accepted practice.

B. Verify that all existing trees to remain are properly identified and barricaded to prevent damage under this and future construction. Landscape Contractor shall be responsible for maintaining adequate identification and barricading of all existing plant material to remain throughout the installation and required maintenance period.

1.07 GUARANTEE

A. Guarantee all plant material as for one year after substantial completion.

B. Replacement plants under this guarantee shall be replaced within two weeks of rejection and guaranteed for twelve months from date of installation.

C. Repair damage to other plants, lawn or construction work during plant replacement at no cost to the Owner (this includes, but is not limited to, damage to curbs, walks, roads, fences, site furnishings, etc.).

1.08 SCHEDULING

A. Install trees, shrubs, and ground cover before lawns are installed.

B. Notify Landscape Architect of anticipated installation date at last two weeks in advance.

PART 2 - PRODUCTS

2.01 PLANT MATERIAL

A. Well-formed and shaped, true to type, and free from disease, insects, and defects such as knots, sun-scald, windburn, injuries, abrasion or disfigurement.

B. True to botanical and common name and variety: American Joint Committee on Horticultural Nomenclature, Standardized Plant Names, latest edition.

C. Minimum grade of Florida No. 1 in accordance with "Grades and Standards for Nursery Plants" published by the State of Florida Department of Agriculture.

All plants not listed in "Grades and Standards for Nursery Plants", published by the Division of Plant Industry, shall conform to a Florida No. 1 as to:

1. Health and vitality

2. Condition of foliage

3. Root system

4. Freedom from pests or mechanical damage

5. Heavily branched and densely foliated according to the accepted normal shape.

D. Nursery Grown: ANSI Z60.1-1969

1. Grown under climatic conditions similar to those in locality of project.

2. Container Grown Stock:

a. Growing in container for minimum 30 days before delivery, with sufficient root system for container.

b. Not root-bound or with root systems hardened off.

3. Use only ground cover plants well-established in removable containers, integral containers, or formed homogenous soil sections.

E. Minimum root ball sizes for all palms shall be as delineated within "Grades and Standards for Nursery Plants, Part II, Palms and Trees", published by the State of Florida Department of Agriculture.

1. All plants not listed in Grades and Standards for Nursery Plants, published by the Division of Plant Industry, shall conform to a Florida No. 1 as to:

a. Health and vitality

b. Condition of foliage

c. Root system

d. Freedom from pests or mechanical damage

e. Heavily branched and densely foliated according to the accepted normal shape of the species or sport.

2.02 PLANTING SOIL

A. Planting soil mixture for backfill around trees, shrubs, and groundcover shall be as specified in Section 02420 - Soil Preparation and soil mixes.

2.03 SOIL CONDITIONERS

A. Soil conditioners shall be as specified in Section 02420 - Soil Preparation and Soil Mixes.

1. As a fertilizer supplement to Phoenix Palms, a foliar spray shall be applied one week after installation (excluding summer months) and again at three-month intervals. The chemical designation shall be 8-6-6 with at least 95% of the nitrogen derived from a water-soluble, organic source. The potash source shall be derived from sulphate forms. The following minor elements shall be included:

.06% MG
.02% B
.05% CU
1.00% Fe
1.00% Mn

B. It shall be the responsibility of the contractor to supply and transport water to all landscape areas.

2.04 TOP MULCH

A. Shredded Eucalyptus, shredded, loose, substantially free of mineral waste materials, and showing an acid reaction.

B. Minimum organic matter by weight on an oven dry basis: 85%.

C. Processed specifically for use as top mulch around plant beds.

2.05 GUYING AND STAKING MATERIAL

A. Stakes for Tree Support:

1. Construction grade lumber.

2. Braces and Vertical Stakes: Nominal 2" x 2 ".

3. Stakes: Nominal 2" x 4" x 4'long and pointed at one end.

4. Cross Braces: Nominal 1" x 4" boards.

5. All above grade stakes shall be painted with one coat of brown paint. Paint to be approved by the Owner's Representative.

B. Guying Wires: Annealed, galvanized iron or galvanized steel 12 gauge wire. Wire shall be flagged with white or yellow surveyor tape minimum 2 per guy wire, (one flag near ground level and one flag near the middle of the length of wire).

C. Hose:

1. Type: New /12 inch diameter 2-ply reinforced rubber or plastic hose.

2. Minimum size: 3/4 in.

D. Turnbuckles:

1. Turnbuckles are recommended but not required. Landscape Contractor shall be responsible for keeping taut all guyed plant material and for keeping flagging in place. One turnbuckle per guy wire is required if used.

2. Method of tightening guy wires to be approved by Landscape Architect.

3. Guying to be tightened as needed, but always within two days of when found necessary.

2.06 SLOPE STABILIZATION

A. Landscape contractor shall be responsible to stabilize grades by approved methods where necessary at his own cost.

B. Contractor shall stabilize all sloped areas 3 to 1 or greater and areas found to be required to reduce surface erosion by the Owner's Representative with "Hold Gro" Erosion Control Fabric as manufactured by Gulf States Paper Company, Tuscaloosa, Alabama or approved equal. Contractor shall install erosion control fabric according to the manufacturer's instructions.

2.07 DRAINAGE GRAVEL

A. Drainage gravel shall be River Run Gravel and shall be of graduated sizes.

B. River Run Gravel shall be no smaller than one-half inch nor larger than two inches in any direction.

C. Gravel shall be installed as shown on drawings or to a minimum depth of 2 inches above drains, and 4 inches throughout planters.

D. Gravel shall be washed clean and contain no chemical elements harmful to plant growth.

E. Coral rock shall not be used.

PART 3 - EXECUTION

3.01 INSPECTION

A. Verify final grades have been established prior to beginning planting operation.

B. Inspect trees, shrubs, and ground cover plants for injury, insect infestation, and trees and shrubs for improper pruning.

C. Do not begin planting of trees until deficiencies are corrected, or plants replaced.

3.02 LOCATION/STAKING

A. Stake out locations for plants and outline of planting beds on ground.

B. Do not begin excavation until stake out of plant locations and plant beds are acceptable to the Landscape Architect.

C. All trees are to be located and staked for inspection by the Landscape Architect.

3.03 PREPARATION

A. Pits and Trenches:

1. Shape:

a. Vertical sides and flat bottom.

b. Plant pits to be square or circular.

2. Size:

a. For Trees:

1) Depth: Minimum 2 ft. from finish grade and increased as necessary to accommodate planting ball and at least 6 inch planting soil backfill below ball or roots.

2) Width or Diameter: 2 ft. greater than diameter of plating ball unless otherwise approved by Landscape Architect for special planting areas.

b. For Shrubs and Groundcovers:

1) Depth:

(a) 2- and 3-gallon plant material shall receive a minimum of 2" of planting soil mixture beneath the root ball.

(b) Plant materials sized 1 gallon or less, or materials planted 24 inches O.C. or less shall receive a full 12 inches of amended planting soil mix tilled to a minimum depth of 12 inches.

NOTE: All annuals beds shall receive a full 6 inches of amended planting soil mix tilled to a minimum depth of 6 inches.

(c) For plants not requiring soil mix the entire bed shall be tilled by mechanical means to a depth of 12 inches.

2) Width or Diameter:

(a) All 2- or 3-gallon material shall be placed within a minimum 13-1/2 inch planting hole, and backfilled with the specified planting soil mix.

(b) All plant material sized 1 gallon or less, or material planted 24 inches O.C. or less shall receive complete bed amending. That is excavation of existing soil to a minimum of 12 inches

Note: 6 inches for all annual beds below finished soil elevation, backfilling with a minimum 3 inches of planting soil mix, and then tilling with all required amendments to a depth of not less than 12 inches.

Note: 6 inches for all annual beds. All areas to be amended in such a manner shall be highlighted on contractor's record drawings.

3) Bring all beds and pits to smooth,even surface conforming to established grades after full settlement has occurred.
NOTE: Amending of and quantities of planting soil mixes as outlined above contingent with existing soil conditions.

B. Planting Beds:

1. Planting beds to a depth of 12 inch topsoil mixture.

2. Bring beds to smooth, even surface conforming to established grades after full settlement has occurred.

3. Use acceptable excess excavated topsoil to form watering berms around the plants.

C. Drainage percolation is available. Pits which are not adequately draining shall be excavated to a depth sufficient for drainage and backfilling with gravel or crushed rock. No allowances will be made for lost plants due to improper drainage. Landscape Contractor shall replace with same species size and specification at no cost to Owner.

3.04 PLANTING

A. General

1. Center plant in pit or trench.

2. Face for best effect, or as directed by Landscape Architect.

3. Set plant plumb and hold rigidly in position until soil has been tamped firmly around planting ball.

4. Use only planting soil backfill as specified hereinbefore.

5. Place sufficient planting soil under plant to bring top of planting ball to finish grade.

6. Backfill pit or trench with planting soil in 9 in. layers and water each layer thoroughly to settle soil and work soil completely around roots and planting ball.

7. After soil settles fill pit with planting soil, water, and leave pit surface even with finish grade.

8. Topsoil Berm:

a. Construct a topsoil berm 6 in. above finish grade forming a watering basin with a level bottom around each palm or tree.

b. Size: 2 ft. greater than diameter of planting ball.

c. Leave saucer for 3 months or as directed by Owner's Representative. At the end of 3 months regrade area and re-mulch 12 inches out from trunk (or planting bed) for all plantings. Remove excess from basin and clean area.

B. Balled Plants (B&B) and (WB&B)

1. Place in pit on planting soil backfill material that has been hand-tamped prior to placing plant.

2. Place with burlap intact so location of ground line at top of ball is same as at nursery where grown.

3. Remove binding at top 1/2 of planting ball and lay top of burlap back 6 inches. For wire balled trees, remove wire on top of ball.

4. Do not pull wrapping from under planting ball.

5. Do not plant if planting ball is cracked, broken or showing evidence of voids before or during planting process. Replace with plant of same species, size, and specification at no cost to Owner.

C. Container-Grown Plants

1. Can/Container Removal:

a. Cut cans on two sides with an acceptable can cutter.

b. Do not injure planting ball.

c. Do not cut cans with spade or ax.

d. Do not cut sides on knockout cans.

e. Carefully remove plants without injury or damage to planting ball.

f. After removing plant. Superficially cut edge roots with knife on three sides.

2. Dig planting holes to size as shown.

3. Hand place plants which are in containers less than one gallon in size.

4. Hand backfill and hand tamp leaving slight depression around bases of plants.

5. Do not cover top of root ball.

6. Water for settlement and replace required planting soil.

3.05 FERTILIZER APPLICATIONS

A. Apply granular fertilizer at time of planting and repeat 3 months from first application. Schedule fertilization with Landscape Architect.

B. Apply granular fertilizer at following rates, to planting bed and saucer areas around each tree, palm and shrub:

1. Trees:

a. Caliper 4 inches and larger:

5 lbs. per in. of Caliper

b. Caliper under 4 inches:

3 lbs. per in. of Caliper

c. Shrubs: 2 lbs. per 100 sq. ft. of area.

d. Ground Cover Plants: 2 lbs. per 100 sq. ft. of area.

e. Palms: 1 lb. per in. of palm trunk Caliper.

C. Broadcast under foliage canopy and incorporate into soil.

D. Water immediately until root structure of plant is wet. Assure protection from fertilizer burn.

E. Apply foliar nutrient spray at time of planting (summer excluded) and repeat three months from first application. Schedule fertilization with Landscape Architect. Drench palm leaves with foliar nutrient spray at the manufacturer's recommended rate to all Phoenix Palm species.

3.06 WEED CONTROL

A. Apply post-emergent herbicide, "Round-up" as manufactured by Monsanto Corp. or approved equal, per manufacturer's rate and method of application to all landscape bed areas as necessary.

B. Apply pre-emergent herbicide "Ron-Star" before mulching and again as necessary throughout required maintenance period to prevent weed seed germination.

C. The Landscape Contractor shall verify that the herbicide and application technique will not damage plant material prior to application, and shall replace, and/or repair damage to any plant injured by herbicide application at no cost to the Owner.

3.07 TOP MULCHING

A. Top mulch planting pits, trenches, and areas within two days after planting.

B. Cover watering basin or bed evenly with 3 inch compacted depth of top mulch material.

C. Water thoroughly, immediately after mulching.

D. "Cut in" mulch at plant bed/sod line.

E. Hose down planting area with fine spray to wash leaves of plants at least twice a week, or as required.

F. Exclude mulch from annual and Bromeliad beds.

3.08 GUYING AND STAKING OF TREES

A. Stake trees as shown on the drawings except where they are planted in special locations where guying is not feasible.

1. Stake Installation:

a. Drive stakes perpendicularly, 3 feet into ground at edge of root ball.

Do not drive stake through soil separator or drainage gravel if present. Do not drive stakes through root ball.

b. Number of stakes as shown.

2. Tying and Cross-bracing:

a. For trees over 4 inch caliper:

1) Stake and tie firmly with guy wire.
2) Separate guy wire from bark by hose section.

b. For trees under 4 inches in caliper:

1) Nail cross-brace between stakes.
2) Tie tree to cross-brace guy wire.
3) Separate guy wire from bark by hose section.

B. Stake palm trees as shown. Contractor shall have the option to deepen the burial of Sabal Palmetto and Washingtonia Robusta for stabilization in lieu of staking. (Note: The clear trunk height shall be required as specified on plans after installation. The Contractor shall still be responsible for and guarantee the installation against toppling and be responsible for any and all damage incurred to toppling over.)

C. Prune minimum necessary to remove injured twigs and branches, deadwood, and suckers. Pruning shall be done with regard to natural form of plant material or as directed by the landscape Architect.

1. Do not prune prior to delivery to site.

Note: Pruning is required for collected palms and trees per "Grades and Standards for Nursery Plants Part II, Palms and Trees" and Section 02481.

D. All cuts one inch diameter or larger made during pruning of any plant material shall be painted with commercial grade sealant as approved and directed by Landscape Architect.

E. Pruning cuts shall be monitored to ensure proper healing and to prevent insect/disease infestation.

F. Landscape Contractor shall perform all specialized shearing and or pruning as directed by the Landscape Architect and as shown on the drawings at no additional cost to the Owner.

3.09 MAINTENANCE

A. General:

1. Begin maintenance immediately after each item is planted and continue until final inspection and acceptance.

2. Maintain a health growing condition by pruning, watering, cultivating, weeding, mowing, mulching, tightening, and repairing of guys, resetting plants to proper grades or upright position, restoration of plant saucer, and

furnishing and applying such sprays as necessary to keep planting free of insects and diseases.

3. The root system of plants shall be watered at such intervals as will keep the surrounding soil in best condition for promotion of root growth and plant life.

4. Keep planting saucers and beds free of weeds, grass and other undesired vegetation growth.

5. Protect planting areas and plants against trespassing and damage of any kind for the duration of the maintenance period.

6. Insect plants at least once a week and perform maintenance promptly. Replace impaired or dead plants promptly. Do not wait until near the end of the guarantee period to make replacements of plants which have become unacceptable.

7. Remove soil ridges from around watering basins prior to end of maintenance period, as directed by the Landscape Architect.

B. Watering: Water when soil moisture is below optimum level for best plant growth.

3.10 CLEANING

A. Fill all pits/depressions in holding area and rough grade to meet surrounding elevations. Remove any organic or other debris resulting from the plant relocation process.

B. Sweep and wash all paved surfaces.

C. Remove planting debris from project site and holding area.

D. Remove soil conditioners, soil mixes, gravel, etc. from project site and holding area.

END OF SECTION

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SECTION 02510

WALKWAYS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Furnish all labor, materials and equipment necessary to complete all walkways and related items depicted in the Drawings and specified herein.

1.02 REFERENCES

A. FDOT Standard Specifications for Road and Bridge Construction.

B. ASTM C 171 – Specification for Sheet Materials for Curing Concrete

C. ACI 308 – Standard Practice for Curing Concrete

1.03 RELATED SECTIONS

A. Section 01340 – Shop Drawings, Working Drawings and Samples

B. Section 02200 – Earthwork

C. Section 02210 – Finish Grading

D. Other Sections as applicable.

PART 2 - PRODUCTS

2.01 MATERIALS

A. All materials for work under this Section, including concrete, sub-grade or foundation and joint material shall be as depicted in the Drawings.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All work shall be performed in accordance with the Reference standards.

B. Sub-grade or foundation installation and compaction specifications shall be as depicted in the Drawings.

C. Forms shall conform to the shapes, lines and dimensions of the members as depicted in the Drawings and shall be substantial and sufficiently tight to prevent leakage of mortar. They shall be properly braced or tied together so as to maintain position and shape.

D. Finishing:

1. Float concrete until 1/4-inch cement gel is brought to surface; steel trowel until dense surface is obtained.

2. Finish with broom at right angles to alignment of work, then round all exterior edges with 1/2-inch radius after brooming.

E. Curing:

1. The Contractor shall take appropriate precautions to retain moisture by applying materials to cover the walkways and provide water during the curing period or a minimum of six (6) consecutive days.

2. The Contractor shall remove and replace any concrete section which has been damaged, stained or otherwise has become unacceptable due to curing techniques.

3. Acceptable materials to cover walkways and retain moisture include burlap or cotton mats, bags and rugs.

a. The edges of materials shall be lapped and weighted down.

b. Water shall be applied by sprinkler or soaker hose.

c. Coverings shall not be allowed to dry out during the curing period.

d. Straw may be used in 6” thick layers covered with a tarp.

e. Plastic sheets may not be used.

f. Soil may not be used.

F. Cover walks until final clean-up to prevent damages.

G. Concrete walks shall be constructed to lines, widths, slope, grades and thickness as depicted in the Drawings.

H. Expansion joint material shall be placed to separate concrete for any pipes, structures, poles, etc.

3.02 CLEANUP

A. At the completion of the work, Contractor shall clean up all scraps, rubbish and surplus materials caused by this work and haul them away from the site and leave job in a neat, clean and orderly condition.

END OF SECTION

SECTION 02513

ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish all labor, materials, equipment and incidentals required and place asphaltic concrete pavement in accordance with the elevations and typical sections as depicted in the Drawings and specified herein.

1.02 RELATED SECTIONS

A. Section 01340 – Shop Drawings, Working Drawings and Samples.

B. Section 01410 – Materials and Installation Testing.

C. Section 02100 – Site Preparation.

D. Other Sections as applicable.

1.03 REFERENCES

A. The Work under this Contract shall be in strict accordance with the following codes and standards.

1. The applicable municipality,

2. The City of Weston,

3. Florida Department of Transportation Specifications (FDOT),

4. OSHA Safety and Health Standards for Construction.

1.04 SUBMITTALS

A. Submit mix design for approval in accordance with Section 01340.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Asphaltic concrete pavement shall conform to the following FDOT Standard Specifications:

1. Section 160 – Stabilization.

2. Section 200 – Limerock base.

3. Section 300 – Prime and tack coats.

4. Section 331 (2000) – Type S Asphalt.

5. Section 334 – Superpave asphalt concrete.

B. The materials of the asphaltic concrete surface shall conform the applicable sections of FDOT Standard Specifications for Asphaltic Concrete with the following exception:

1. Recycled asphalt may not be used for the final course.

PART 3 - EXECUTION

3.01 INSTALLATION

A. All asphalt installation shall be in accordance with FDOT Standard Specification 330 – Hot Mix Asphalt General Construction Requirements.

B. All soft and yielding material and other portions of the subgrade which will not compact readily shall be removed and replaced with suitable material and the whole subgrade brought to line and grade and to a foundation of uniform compaction and supporting power. The cost of removing and replacing unsuitable material shall be included in the bid for the paving.

C. The subgrade, in both cut and fill sections, shall be compacted to a density and LBR as indicated in the Drawings. Unless the subgrade material at the time of compacting contains sufficient moisture to permit proper compaction it shall be moistened as necessary and then compacted. Subgrade material containing excess moisture shall be permitted to dry to the proper consistency before being compacted. The subgrade shall be shaped prior to making the density tests. The required density shall be maintained until the base or pavement has been laid or until the aggregate materials for the base or pavement course have been spread in place.

D. The minimum compacted thickness of the limerock base shall be as depicted in the Drawings applied in four-inch maximum layers of equal depth unless otherwise depicted in the Drawings. The width of the limerock base shall be wider than the pavement as depicted in the Drawings.

E. Before the prime coat is applied, all loose material, dust, dirt or other foreign material which might prevent bond with existing surface shall be moved to the shoulders to the full width of the base by means of revolving brooms, mechanical sweepers, blowers, supplemented by hand sweeping or other approved methods. The glazed finish shall have been removed from the base. The prime coat shall be applied by a pressure distributor so that approximately 0.1 gallons per square yard is applied uniformly and thoroughly to a clean surface.

F. Prior to the application of the surface course, all loose material, dust, dirt and all foreign material which might prevent proper bond with the existing surface shall be removed to the full width of the repair by means of approved mechanical sweepers and supplemented by hand sweeping if required.

G. Apply bituminous tack coat at a rate between 0.02 and 0.10 gallons per square yard. Bituminous material shall be heated as per manufacturers' recommendations.

H. All manhole castings, valve boxes or other utility castings within the area to be surfaced shall be adjusted to the proposed surface elevation by the Contractor. The work shall be accomplished in such a manner as to leave the casting fixed permanently in its correct position.

3.02 PAVEMENT REPAIR

A. All damage to pavement as a result of the work (construction or maintenance) under this contract shall be repaired according to the plans and specifications at the Contractor's cost. Pavement shall be repaired to match the original surface material and original grade; however, the asphalt concrete thickness shall not be less than 1 inch. The repair shall include the preparation of the subgrade, the placing and

compacting of the limerock base, the preparation and priming of the base, the placing and maintaining of the surface treatment, all as specified herein and as shown on the Drawings.

B. The width of all repairs shall extend at least 12 inches beyond the limit of the damage or as shown on the Drawings. The edge of the pavement to be left in place shall be saw cut to a true edge and should provide a clean edge to abut the repair. The line of the repair shall be reasonably uniform with no unnecessary irregularities.

3.03 TESTING

A. Refer to Section 01410 – Materials and Installation Testing.

END OF SECTION

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SECTION 02525

PAVERS

PART 1 - GENERAL

1.01 SECTION INCLUDES

A. Furnish and install brick or concrete pavers and bedding material as depicted in the Drawings and specified herein.

B. Paver manufacturer, type, pattern, shape and color or texture is specified on the Drawings or as specified by the Owner.

C. Other necessary elements such as edge restraints, base and subbase material are not covered in this Section. Refer to typical roadway and paver installation plan and details in the Drawings.

1.02 RELATED SECTIONS

A. Section 01340 – Shop Drawings, Working Drawings, and Samples

1.03 REFERENCES

A. ASTM C 33 – Standard Specification for Concrete Aggregates

B. ASTM C 144 – Standard Specification for Aggregate for Masonry Mortar

C. ASTM C 902 – Standard Specification for Pedestrian and light Traffic Paving Brick

D. ASTM C 936 – Standard Specification for Solid Concrete Interlocking Paving Units

E. ASTM C1272 – Standard Specification for Heavy Vehicular Paving Brick

F. FDOT Standard Specifications for Road and Bridge Construction - Section 526 Architectural Pavers

G. Interlocking Concrete Paving Institute (ICPI)

1.04 SUBMITTALS

A. Furnish submittal materials prior to installation in accordance with Section 01340 – Shop Drawings, Working Drawings, and Samples and the following.

1. Full size samples of each paver size and color.

2. A certification from the paver manufacturer that the pavers meet the requirements of this specification.

3. A certified sieve analysis for gradation comparing results of the bedding and joint sand with the requirements of ASTM C 33 AND ASTM C 144.

4. An ICPI certification from the paver manufacturer for any concrete pavers specified herein

5. Paver Installation Subcontractor submittal:

a. A copy of Subcontractor’s current certificate of completion from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

b. Job references from projects of a similar size and complexity.

Provide Owner/Client/General Contractor names, postal address, phone, fax, and email address.

1.05 MOCK-UPS

A. Prior to installation, install a 6-foot by 6-foot paver area including typical edge restraint for the project. This area will be used to determine the quality expectation for the balance of the installation including the installation of the bedding material, joint sizes, lines, level, laying patterns and colors. The mock-up shall be approved by the Engineer prior to proceeding with the work.

1.06 STORAGE AND HANDLING

A. Cover stockpiled materials with waterproof covering to prevent exposure to rainfall.

1.07 QUALITY ASSURANCE

A. Paving Subcontractor Qualifications:

1. Utilize an installer having successfully completed concrete paver installation similar in design, material, and extent indicated on this project.

2. Utilize an installer holding a current certificate of completion from the Interlocking Concrete Pavement Institute Concrete Paver Installer Certification program.

B. Breakage

1. Broken, cracked or chipped pavers will not be accepted unless the amount of damage is within the guidelines of acceptability contained in the applicable ASTM standard.

1.08 MAINTENANCE

A. Provide additional pavers to the Owner for maintenance equivalent to 5% of the total project area.

PART 2 - MATERIALS

2.01 PAVER MATERIALS

A. Where there are existing pavers, the Contractor shall remove, store, preserve, and reinstall the same pavers after subsurface or nearby work is complete.

B. For installations on roadways and commercial driveways, provide brick pavers meeting the requirements of ASTM C 1272, type F, application PX and having a minimum thickness of 3 1/8 inch. Concrete pavers are not allowed for this application.

C. For installation on sidewalks, medians and residential driveways, provide brick or concrete pavers, as specified, having a minimum thickness of 2 3/8 inch meeting the requirements of ASTM C 902, class MX, type I, application PX, or ASTM C 936 and FDOT 526.

D. Bedding and joint sand will be clean, non-plastic bedding sand, free from deleterious or foreign matter, natural or manufactured from crushed rock.

1. Bedding sand shall meet the requirements of ASTM C 33.

2. Joint sand shall meet the requirements of ASTM C 144.

PART 3 - INSTALLATION

A. Spread the bedding material evenly over the base course which has been compacted and accepted by the Engineer. Screed to a nominal 1" thickness; not to exceed 1 ½ inch. Do not disturb the screeded bedding material. Ensure placement of sufficient bedding material to stay ahead of the laid pavers.

B. Do not use bedding material to fill depressions in the base course.

C. Lay pavers in the pattern(s) shown in the plans and maintain straight pattern lines.

D. Cut pavers at edges as necessary to achieve the pattern indicated on the drawings. All cut pavers exposed shall be no smaller than one-third of a whole paver.

E. Do not install bedding materials or pavers during heavy rain or over wet substrata.

F. Joints between the pavers shall be a minimum of 1/16 inch to a maximum of 3/16 inch wide.

G. Fill the gaps at the edges with cut or edge pavers.

H. Compacting bedding and joint sand:

1. Use a low amplitude vibratory compactor capable of 5,000 foot-pounds with 7-100 Hz frequencies to vibrate and compact pavers into bedding sand. A minimum of three passes is required until pavers no longer compact into the bedding sand to the satisfaction of the Engineer.

2. Vibrate the pavers, sweeping dry joint sand into the joints and vibrating, until the joints are full. Do not vibrate within 3 feet of the unrestrained edges of pavers.

3. At the end of each day, all work within 6 feet of the laying face must be left fully compacted, with sand-filled joints and covered with plastic sheets.

4. Surface shall be broom clean after removal of excess joint sand.

I. Leave the final surface elevation of pavers 1/8 to ¼ inch above adjacent surfaces including sidewalks, drainage inlets, concrete collars, gutters, channels, etc.

J. Do not permit the final surface of pavers to deviate more than 3/8 inch under a 10-foot-long straightedge, or more than 1/8 inch between adjacent pavers.

3.02 PROTECTION

A. All paver work shall be protected as necessary until Owner acceptance.

END OF SECTION

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SECTION 02617

REINFORCED CONCRETE PIPE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Furnish all labor, materials, equipment, and incidentals required and install reinforced concrete pipe (RCP) and appurtenances as described herein.

1.02 RELATED SECTIONS

A. Section 01015 – General Requirements

B. Section 01025 – Measurement and Payment

C. Section 01340 – Shop Drawings, Working Drawings and Samples

D. Section 02221 – Trenching, Bedding and Backfill for Pipe

E. Other Sections as applicable

1.03 REFERENCES

A. FDOT Standard Specifications for Road and Bridge Construction

B. FDOT Design Standards

C. ASTM C 76 - Standard Specification for Reinforced Concrete Culvert, Storm Drain, and Sewer Pipe

D. ASTM C 507 - Standard Specification for Reinforced Concrete Elliptical Culvert, Storm Drain, and Sewer Pipe

E. Standards and Specifications of the allocable local municipality.

1.04 QUALIFICATIONS

A. All RCP and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished and has been in the business of manufacturing RPC pipe for a minimum of then (10) years.

B. All RCP shall be manufactured and installed in accordance with the best practices and methods and shall comply with the Drawings and Specifications

1.05 SUBMITTALS

A. Shop drawings shall be submitted to the Engineer in accordance with Section 01340 and shall include dimensioning and technical specification for all piping to be furnished.

1.06 TOOLS

A. Special tools, solvents, lubricants, and caulking compounds required for normal installation shall be furnished with the pipe.

PART 2 - PRODUCTS

2.01 MATERIALS

A. RCP shall conform to the requirements of FDOT Standard Specifications Section 430 and Section 449. Pipe Joints shall be Rubber Gasket Joints. Pipe Joints and Rubber Gaskets shall conform to the requirements of FDOT Standard Specifications Section 942.

B. All pipes shall be bundled or packaged in such a manner as to provide adequate protection for the ends, threaded, or flanged, during transportation from the manufacturer.

C. Round RCP shall meet the requirements of ASTM C 76 as modified in FDOT Standard Specifications, Section 449.

D. Elliptical RCP shall meet the requirements of ASTM C 507, Class HE-III, except for the exceptions and modifications as specified in FDOT Standard Specifications, Section 449.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Pipe and fittings shall be installed in accordance with the requirements of the Manufacturer and Section 430 of FDOT Standard Specifications, these Specifications as well as the requirements of the Owner and City of Weston.

B. Bedding shall conform to the detail drawings and specifications. Blocking under the pipe is not allowed.

C. All pipe joints shall be wrapped per the filter fabric jacket requirements of FDOT Design Standard Index 280.

D. All connections to existing pipe shall be performed in accordance with the concrete jacket requirements of FDOT Design Standard Index 280.

END OF SECTION

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SECTION 02623

GEOTEXTILE FILTER FOR SUBSURFACE DRAINAGE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install geotextile filter for subsurface drainage and appurtenances as described herein.

1.02 RELATED WORK

A. Section 01015 – General Requirements

B. Section 01025 – Measurement and Payment

C. Section 01340 – Shop Drawings, Working Drawings and Samples

D. Section 02221 – Trenching, Bedding and Backfill for Pipe

E. Other Sections as applicable

1.03 REFERENCES

A. American Association of State Highway and Transportation Officials (AASHTO) "Standard Specification for Geotextile Specification for Highway Applications" Designation M 288-00.

B. AASHTO Test Standards:

1. T 88 – Standard Test Method for Particle Size Analysis of Soils

2. T 90 – Standard Test Method for Determining the Plastic Limit and Plasticity Index of Soils

3. T 99 – Standard Practice for Determination of the Moisture Density Relations of Soils Using a 5.5 lb hammer and 12 in drop (Standard Proctor)

C. American Society for Testing and Materials (ASTM):

1. ASTM D 123 – Standard Terminology Relating to Geotextiles

2. ASTM D 276 – Standard Test Method for Identification of Fibers in Textiles

3. ASTM D 4354 – Practice for Sampling of Geosynthetics for Testing.

4. ASTM D 4355 – Test Method for Deterioration of Geotextiles from Exposure to Ultraviolet Light and Water (Xenon-Arc Type Apparatus).

5. ASTM D 4439 – Terminology for Geotextiles.

6. ASTM D 4491 - Test Methods for Water Permeability of Geotextiles by Permittivity.

7. ASTM D 4533 – Test Method for Index Trapezoid Tearing Strength of Geotextiles.

8. ASTM D 4632 – Test Method for Grab Breaking Load and Elongation of Geotextiles.

9. ASTM D 4751 – Test Method for Determining Apparent Opening Size of a Geotextile.

10. ASTM D 4759 – Practice for Determining the Specification Conformance of Geosynthetics.

1.04 DESCRIPTION

A. This section is applicable to placing a geotextile against soil to allow for long-term passage of water into a subsurface drain system while retaining the in-situ soil.

1.05 QUALIFICATIONS

A. All geotextile filter for subsurface drainage and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. All geotextile filter for subsurface drainage shall be manufactured and installed in accordance with the best practices and methods and shall comply with these Specifications as well as the requirements of the Owner and City of Weston.

1.06 SUBMITTALS

A. Shop drawings (as applicable) shall be submitted to the Engineer in accordance with Section 01340 and shall include dimensioning and technical specification for all piping to be furnished.

B. Certification:

1. The Contractor shall provide the Engineer a certificate stating the name of the geotextile manufacturer, product name, style, chemical compositions of filaments or yarns and other pertinent information to fully describe the geotextile.

2. The Manufacturer is responsible for establishing and maintaining a quality control program to assure compliance with the requirements of the specification. Documentation describing the quality control program shall be made available upon request.

a. Minimum Average Roll Value (MARV): Property value calculated as typical minus two standard deviations. Statistically, it yields a 97.7

percent degree of confidence that any sample taken during quality assurance testing will exceed value reported.

b. Maximum Average Roll Value (MaxARV): Property value calculated as typical plus two standard deviations. Statistically, it yields a 97.7 percent degree of confidence that any sample taken during quality assurance testing will be below the value reported.

3. The manufacturer's certificate shall state that the furnished geotextile meets MARV requirements of the specification as evaluated under the manufacturer's quality control program. A person having legal authority to bind the Manufacturer shall attest to the certificate.

C. Manufacturing Quality Control (MQC) test results shall be provided upon request.

1.07 DELIVERY, STORAGE, AND HANDLING

A. Geotextile labeling, shipment and storage shall follow ASTM D 4873.

B. Product labels shall clearly show the manufacturer or supplier name, style name, and roll number.

C. Each shipping document shall include a notation certifying that the material is in accordance with the manufacturer's certificate.

D. Each geotextile roll shall be wrapped with a material that will protect the geotextile from damage due to shipment, water, sunlight, and contaminants.

E. The protective wrapping shall be maintained during periods of shipment and storage. If the wrapping is damaged prior to installation, the outer wrap of geotextile material must be discarded before installation.

F. During storage, geotextile rolls shall be elevated off the ground and adequately covered to protect them from the following: Site construction damage, extended exposure to ultraviolet (UV) radiation, precipitation, chemicals that are strong acids or strong bases, flames, sparks, temperatures in excess of 71 deg C (160 deg F) and any other environmental condition that might damage the geotextile.

PART 2 - PRODUCTS

2.01 MANUFACTURERS

A. Mirafi 140N by US Fabrics, 3904 Virginia Ave, Cincinnati, Ohio 45227
Phone (513) 271-6000

B. US 120NW by US Fabrics, 3904 Virginia Ave, Cincinnati, Ohio 45227
Phone (513) 271-6000.

C. Approved equal.

2.02 MATERIALS, QUALITY ASSURANCE SAMPLING, TESTING, AND ACCEPTANCE

A. Geotextile

1. The geotextile construction shall be polypropylene, staple fiber, needle punched nonwoven heat set on one side to ensure consistent roll width and roll-out.

2. Resistant to ultraviolet degradation and to biological and chemical environments normally found in soils.

3. Minimum Average Roll Values:

Property	**Test Method**	**Units**	**Property Requirement**
Grab Tensile Strength	ASTM D 4632	N (lbs)	534 (120)
Grab Elongation	ASTM D 4632	Percent	50
Trapezoidal Tear	ASTM D 4533	N (lbs)	222 (50)
Apparent Opening Size (Maximum Average Roll Value)	ASTM D 4751	mm (US Std. Sieve)	0.212 (70)
Permittivity	ASTM D 4491	sec-1	1.70
CBR Puncture	ASTM D-6241	N (Ibs)	1380 (310)
Water Flow Rate	ASTM D 4491	l/min/m^2 (gpm/ft^2)	5500 (135)
UV Resistance	ASTM D 4355	Percent	70 at 500 hours

4. Quality Control

a. Manufacturing Quality Control (MQC): Testing shall be performed at a laboratory accredited by GAI-LAP for tests required for the geotextile, at frequency exceeding ASTM D 4354.

5. Sewing Thread (if required)

a. Sewing thread shall consist of high strength polypropylene or polyester (Nylon shall not be used).

b. The thread shall be of a contrasting color to the geotextile.

2.03 QUALITY ASSURANCE SAMPLING, TESTING, AND ACCEPTANCE

A. Geotextile:

1. Geotextiles shall be subject to sampling and testing to verify conformance with this specification. Sampling for testing shall be in accordance with ASTM D 4354.

2. Acceptance shall be in accordance with ASTM D 4759 based on testing of either conformance samples obtained using Procedure A of ASTM D 4354 or based on manufacturer's certifications and testing of quality control samples obtained using Procedure B of ASTM D 4354.

B. Sewn Seams (if required):

1. For seams that are to be sewn in the field, the Contractor shall provide at least a 2-meter (6 ft) length of sewn seam for sampling by the Engineer before the geotextile is installed.

2. For seams that are sewn in the factory, the Engineer shall obtain samples of the factory seams at random from and roll of geotextile that is to be used on the project.

3. If seams are to be sewn in both directions, samples of seams from both directions shall be provided.

4. For seams that are field sewn, the seams sewn for sampling shall be sewn using the same equipment and procedures as will be used for the production seams.

5. The seam assembly description shall be submitted by the Contractor along with the sample of the seam. The description shall include the seam type, sewing thread, and stitch density.

PART 3 - EXECUTION

3.01 PREPARATION

A. Trench excavation shall be completed in accordance with details of the project plans.

B. In all instances excavation shall be performed in such a way so as to prevent large voids from occurring in the sides and bottom of the trench.

3.02 INSTALLATION

A. In the placement of the geotextile for drainage applications, the geotextile shall be placed loosely with no wrinkles or folds, and with no void spaces between the geotextile and the ground surface. Successive sheets of geotextiles shall be overlapped a minimum of 300 mm (12 in), with the upstream sheet overlapping the downstream sheet.

B. In trenches equal to or greater than 300 mm (12 in) in width, after placing the drainage aggregate the geotextile shall be folded over the top of the backfill material in a manner to produce a minimum overlap of 300 mm (12 in). In trenches less than 300 mm (12 in), but greater than 100 mm (4 in) wide, the overlap shall be equal to the width of the trench. Where the trench is less than 100 mm (4 in) the geotextile overlap shall be sewn or otherwise bonded. All seams shall be subject to the

approval of the Engineer.

C. Should the geotextile be damaged during installation or drainage aggregate placement, a geotextile patch shall be placed over the damaged area extending beyond the damaged area a distance of 300 mm (12 in), or the specified seam overlap, whichever is greater.

D. Placement of drainage aggregate should proceed immediately following placement of the geotextile. The geotextile should be covered with a minimum of 300 mm (12 in) of loosely placed aggregate prior to compaction. If a perforated collector pipe is to be installed in the trench, a bedding layer of drainage aggregate should be placed below the pipe, with the remainder of the aggregate placed to the minimum required construction depth.

E. The aggregate should be compacted with vibratory equipment to a minimum of 95 percent Standard AASHTO T99 density.

3.03 PROTECTION

A. Atmospheric exposure of the geotextile to the elements following lay down shall be limited to 14 days to prevent damage.

END OF SECTION

SECTION 02630

STORM DRAINAGE

PART 1 - GENERAL

1.01 DESCRIPTION

A. This Section provides for materials, installation and testing of storm drainage piping and structures.

1.02 RELATED SECTIONS

A. Section 02617 – Reinforced Concrete Pipe

B. Section 02631 – High Density Polyethylene (HDPE) Pipe

C. Other Sections as applicable.

1.03 REFERENCES

A. Standards and Specifications of the applicable local municipality.

B. Federal Highway Administration - Manual of Uniform Control Devices (MUTCD)

C. FDOT Design Standards.

D. FDOT Standard Specifications for Road and Bridge Construction.

E. City of Weston Design Standards.

F. The Occupational Safety and Health Administration (OSHA)The Manual of Uniform Traffic Control Devices (MUTCD).ASTM C487 - Standard Specification for Circular Precast Reinforced Concrete Manhole Sections

PART 2 - PRODUCTS

2.01 MATERIALS

A. All drainage structures, including headwalls, shall be precast concrete as manufactured by U.S. Precast Corporation, or approved equal. Block catch basins will be allowed only with approval of the Engineer. The minimum wall and slab thickness shall be 8 inches and the minimum reinforcing shall be No. 4 bars at 12 inches each way, unless otherwise indicated.

B. Concrete for all drainage structures, including headwalls, shall be FDOT Class II in accordance with Standard Specification 346 and ASTM C478.

C. Reinforced concrete pipe (RCP) for storm sewer shall conform to ASTM L70-79, Table III, Wall B, or latest revision. All pipes shall have modified tongue and groove

joints, and have rubber gaskets, unless otherwise specified.

D. Corrugated aluminum pipe (CAP) shall be helical type, manufactured in conformance with ASTM B-209 and AASHTO M-193, as manufactured by Kaiser Aluminum, Inc., or approved equal. The corrugation pattern and gauge shall be as follows:

DIAMETER	CORRUGATION	GAUGE
12" x 21"	2 2/3" x 1/2"	16
24" x 27"	2 2/3" x 1/2"	16
30"	2 2/3" x 1 1/2"	14
36" x 54"	3" x 1"	14
60" x 72"	3" x 1"	12

E. Pipe couplings for CAP shall be 12" wide (minimum), 24" for 60" diameter or larger. Split bands of the same alloy as the pipe and may be one gauge lighter than the pipe. Polyurethane or other manufacturer supplied sealant shall be used with the couplings.

F. Corrugated polyethylene pipe shall be manufactured in accordance with AASHTO M252 and M294 as manufactured by ADS or approved equal.

G. The rip rap headwalls, which will be provided on an as needed basis, shall be constructed of sand/cement with a minimum 2000 psi compressive strength to meet FDOT standards. The bags shall be permeable burlap, cloth or paper. A concrete cap shall be poured on top of sand/cement rip rap bags with a minimum 3000 psi compression strength.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Pipe and fittings shall be installed in accordance with the requirements of the manufacturer.

B. All pipe shall be carefully laid true to line and grade. Any deflection proposed by the Contractor must be approved by the Engineer prior to placement.

C. Pipe shall be placed on stable granular material, free of rock formation, other foreign formations, and in accordance with the detail drawings.

D. Blocking under pipe is not permitted.

E. The Contractor shall avoid unnecessary crossing by heavy construction vehicles during construction.

F. The contractor shall notify the local water control district at least 24 hours prior to the start of the construction and inspection

3.02 STORM DRAINAGE PRE-TREATMENT/EXFILTRATION SYSTEM

A. Any conflict with existing or proposed utilities shall immediately be brought to the

attention of the Engineer. Any impermeable material encountered in the excavation for the perimeter field collector pipes shall be removed as directed by the Engineer.

B. The trench liner shall be used on the sides and bottom of perimeter collector pipe ditch or in accordance with the local drainage authority. The Contractor shall take extreme care in backfilling to avoid bunching of the fabric.

C. Perforated 12" HDPE pipe shall have 3/8 inch perforations 360° around the pipe with approximately 120 perforations per foot of pipe.

D. Perforated pipe shall terminate four feet (4') from the drainage structure. The remaining four feet (4') shall be non-perforated pipe.

3.03 TESTING

A. All drainage piping shall be lamped to the satisfaction of the Engineer prior to acceptance.

B. At the conclusion of the Work, the Contractor shall thoroughly clean all of the pipe and structures, whether existing or proposed, within the area of work or as directed by the Engineer. All debris, obstructions, defective pipes, brick and mortar, joints, etc. shall be cleaned and repaired prior to acceptance.

C. All drainage pipes and structures shall be maintained in working condition and kept clean until contract close-out.

END OF SECTION

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SECTION 02631

HIGH DENSITY POLYETHELENE (HDPE) PIPE

PART 1 - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals required and install High Density Polyethylene pipe (HDPE) and appurtenances as described herein.

1.02 RELATED WORK

A. Section 01015 – General Requirements

B. Section 01025 – Measurement and Payment

C. Section 01340 – Shop Drawings, Working Drawings and Samples

D. Section 02221 – Trenching, Bedding and Backfill for Pipe

E. Other Sections as applicable

1.03 DESCRIPTION OF SYSTEM

A. A black high-density polyethylene corrugated pipe with an integrally formed smooth invert used to convey storm water. Corrugation shall be either annular or spiral.

B. HDPE drainage piping shall be installed as indicated on the Drawings.

1.04 QUALIFICATIONS

A. All HDPE and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, and qualified in the manufacture of the items to be furnished. All HDPE shall be manufactured and installed in accordance with the best practices and methods and shall comply with these Specifications as well as the requirements of the Owner and City of Weston.

1.05 SUBMITTALS

A. Shop drawings shall be submitted to the Engineer in accordance with Section 01340 and shall include dimensioning and technical specification for all piping to be furnished.

1.06 INSPECTION

A. The manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The manufacturer shall furnish to the Engineer a notarized affidavit

stating all pipe meets the requirements of AASHTO M252 and M294.

B. The quality of the finished pipe shall be subject to inspection and approval by the Engineer and other representatives of the Owner. Pipe rejected after delivery shall be marked for identification and shall be removed from the project at once.

1.07 TOOLS

A. Special tools, solvents, lubricants, and sealing compounds, etc. required for normal installation shall be furnished with the pipe.

PART 2 - PRODUCTS

2.01 HIGH DENSITY POLYETHYLENE PIPE

A. Pipe shall comply with the requirements for test methods, dimensions, and markings found in AASHTO Designations M252 and M294. Pipe and fittings shall be made from virgin PE compounds which conform with the requirements of cell class 324420C as defined and described in ASTM D3350.

B. The minimum parallel plate stiffness values, when tested in accordance with ASTM D2412, shall be as follows:

Diameter	Pipe Stiffness	Diameter	Pipe Stiffness
4” (100 mm)	50 psi (340 kN/m^2)	18” (450 mm)	40 psi (280 kN/m^2)
6” (100 mm)	50 psi (340 kN/m^2)	24” (600 mm)	34 psi (240 kN/m^2)
8” (100 mm)	50 psi (340 kN/m^2)	30” (750 mm)	28 psi (200 kN/m^2)
10” (100 mm)	50 psi (340 kN/m^2)	36” (900 mm)	22 psi (150 kN/m^2)
12” (100 mm)	50 psi (340 kN/m^2)	42” (1050 mm)	19 psi (140 kN/m^2)
15” (100 mm)	42 psi (290 kN/m^2)	48” (1200 mm)	17 psi (120 kN/m^2)

2.02 PIPE FITTINGS

A. The fittings shall not reduce or impair the overall integrity or function of the pipeline. Fittings may be either molded or fabricated. Common corrugated fittings include in-line joint fittings, such as couplers and reducers, and branch or complimentary assembly fittings such as tees, wyes, and end caps. These fittings may be installed by various methods, such as snap-on, screw-on, bell and spigot, and wrap around. Couplings shall provide sufficient longitudinal strength to preserve pipe alignment and prevent separation at the joints. Only fittings supplied or recommended by the pipe manufacturer shall be used. A neoprene or rubber gasket shall be supplied at each coupling joint.

2.03 MANHOLE CONNECTIONS

A. HDPE pipe shall be grouted into the concrete manhole wall using an approved non-shrink grout.

PART 3 - EXECUTION

3.01 INSTALLATION, HANDLING PIPE AND FITTINGS

A. Care shall be taken in loading, transporting, and unloading to prevent injury to the pipe. Pipe and fittings shall not be dropped. All pipe and fittings shall be examined before laying, and no piece shall be installed which is found to be defective. Any damage to the pipe shall be cause to reject it.

B. All pipe and fittings shall be subjected to a careful inspection prior to being installed.

C. If any defective pipe is discovered after it has been installed it shall be removed and replaced with a sound pipe in a satisfactory manner at no additional expense to the Owner. All pipe and fittings shall be thoroughly cleaned before laying, shall be kept clean until they are used in the work, and when installed, shall conform to the lines and grades required.

END OF SECTION

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SECTION 02830

CHAIN LINK FENCE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Fence framework, fabric, and accessories.

B. Excavation for post bases; concrete foundation for posts and center drop for gates.

C. Manual gates and related hardware.

D. Procurement of municipal fence permit with Contractor provided detail drawings sealed by a Professional Engineer registered in the State of Florida.

1.02 REFERENCES

A. ANSI/ASTM A123 - Zinc (Hot Dip Galvanized) Coating on Iron and Steel Products.

B. ANSI/ASTM F567 - Installation of Chain-Link Fence.

C. ASTM A120 - Pipe, Steel, Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless, for Ordinary Uses.

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

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

F. ASTM C94 - Ready - mixed Concrete.

1.03 SYSTEM DESCRIPTION

A. Fence Height: As indicated on the plans.

B. Line Post Spacing: At intervals not exceeding 10 feet.

1.04 QUALITY ASSURANCE

A. Perform Work in accordance with ANSI/ASTM F567 and Florida Building Code.

1.05 QUALIFICATIONS

A. Manufacturer: Company specializing in manufacturing the products specified in this Section with minimum three years documented experience.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Framing (Steel): ASTM A120; Schedule 40 steel pipe, standard weight, welded joints permitted.

B. Fabric Wire (Steel): ASTM A392 zinc coated wire fabric.

C. Concrete: ASTM C94; Normal Portland Cement, 3,000 psi strength at 28 days, 3 inch (75 mm) slump.

2.02 COMPONENTS

A. Line Posts: 2.375 inch outside diameter.

B. End, Corner and Pull Posts: 2.875 inch outside diameter.

C. Gate Posts: Up to 6 foot gate leaf - 4.0 inch outside diameter. From 6 foot to 13 foot leaf - 6.625 inch outside diameter.

D. Top, Brace Rail: 1.66 inch diameter, plain end, sleeve coupled.

E. Gate Frame: 1.90 inch outside diameter for welded fittings and truss rod fabrication.

F. Fabric: 2 inch diamond mesh interwoven wire, 6 gage, top and bottom selvages twisted tight.

G. Truss Rods: 3/8 inch diameter steel.

H. Tension Band: 1/8 inch thick steel..

I. Tension Bar: steel; minimum cross-section of 3/16 inch x 3/4 inch.

J. Tension Wire: 6 gage steel.

K. Tie Wire: 9 gage steel wire.

2.03 ACCESSORIES

A. Caps: Cast steel galvanized; sized to post diameter, set screw retainer.

B. Fittings: Sleeves, bands, clips, rail ends, tension bars, fasteners and fittings; steel.

C. Gate Hardware: For double swing gates, provide center gate stop and drop rod; for single swing gates, include fork latch; 3 - 180 degree non-lift off gate hinges per leaf and hardware for padlock.

D. Vinyl Inserts: Match existing inserts for color and installation pattern.

2.04 FINISHES

A. Components and Fabric: Galvanized to ANSI/ASTM A123; 2.0 oz/sq. ft coating.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Install framework, fabric, accessories and gates in accordance with ANSI/ASTM F567.

B. Set corner, end, gate and line posts plumb, in concrete footings with top of footing 2 inches above finish grade. Slope top of concrete for water runoff.

C. Line post footing depth below finish grade: ANSI/ASTM F567.

D. Corner, pull, gate and end post footing depth below finish grade: ANSI/ASTM F567.

E. Brace each gate, end and corner post to adjacent line post with horizontal center brace rail and diagonal truss rods. Install brace rail, one bay from end and gate posts.

F. Provide top rail through line post and splice with 6 inch long rail sleeves.

G. Install bottom brace rail or tension wire (to be specified by the City) between all terminal (end, corner and gate), and line posts.

H. Stretch fabric between terminal posts or at intervals of 300 feet maximum, whichever is less.

I. Position bottom of fabric 2 inches above finished grade.

J. Fasten fabric to stop rail, line posts, braces, and bottom rail/tension wire with tie wire at maximum 15 inches on centers.

K. Attach fabric to end, corner, pull and gate posts with tension bars and tension bands.

L. Install support arms sloped outward and attach barbed wire (where applicable); tension and secure.

M. Install gate with fabric and barbed wire overhang (where applicable); to match fence. Install three hinges per leaf, latch, catches, and drop bolt.

N. Provide concrete center drop to footing depth and drop rod retainers at center of double gate openings.

3.02 ERECTION TOLERANCES

A. Maximum Variation From Plumb: 1/4 inch.

B. Maximum Offset From True Position: 1 inch.

C. Components shall not infringe adjacent property lines.

END OF SECTION

SECTION 02950

GEOTECHNICAL REPORT

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REPORT OF
GEOTECHNICAL EXPLORATION

GATOR RUN PARK
1101 PARK ROAD
WESTON, FLORIDA 33327

FOR

CALVIN GIORDANO & ASSOCIATES, INC.
1800 ELLER DRIVE, SUITE 600
FORT LAUDERDALE, FLORIDA 33316

PREPARED BY

NUTTING ENGINEERS OF FLORIDA, INC.
2051 NW 112TH AVENUE, SUITE 126
MIAMI, FLORIDA 33172

ORDER NO. 101.188

MARCH 2024

March 20, 2024

Mr. Michael Connor
Calvin Giordano & Associates, Inc.
1800 Eller Drive, Suite 600
Fort Lauderdale, Florida 33316
Phone: 954-921-7781 Email: mconner@cgasolutions.com

Subject: Report of Geotechnical Exploration
Gator Run Park
1101 Park Road
Weston, Florida 33327

Dear Mr. Connor:

Nutting Engineers of Florida, Inc. (NE), has performed a Geotechnical Exploration for the proposed park upgrades at the above referenced site in Weston, Florida. This evaluation was performed to develop information regarding subsurface conditions at specific test locations which along with proposed construction information provided were used to develop opinions regarding earthwork procedures and foundations for support of the proposed construction. This report presents our findings and recommendations based upon the information examined at the time of this evaluation.

PROJECT INFORMATION

Per our conversation on November 7, 2023 and review of the rendering provided, we understand that plans for this project include a playground upgrade, multi-purpose courts, and paver parking area at the referenced site. The site is currently covered by grass covered land, paved walkways, and lines of trees.

Based on current site elevations, we estimate that less than one foot of fill may be required to bring the site up to construction grade; however, the final pad elevation shall be determined by a professional architect, civil engineer, or other qualified party.

NE should be notified in writing by the client of any changes in the proposed construction along with a request to amend our foundation analysis and/or recommendations within this report as appropriate.

GENERAL SUBSURFACE CONDITIONS

Soil Survey Maps

As part of the geotechnical exploration, we have reviewed available Soil Conservation Service (SCS) survey maps for Broward County. These SCS maps provide qualitative information about potential general shallow soil conditions in the project vicinity. This information was derived from approximately 6 ft. deep manual auger borings, aerial photo and surface feature interpretation at some point in the past (mid 1980's to early 1970's). The SCS data may or may not reflect actual current site conditions. A review of the Soil Survey for Broward County revealed that at the time the survey was conducted, the soils at the site were described as Lauderhill muck. These soils can be best described as nearly level, very poorly drained, organic soils underlain by limestone at depths ranging from 20 to 40 inches below the ground surface. We note that the maximum depth of the survey is approximately 6 feet.

Subsurface Exploration

NUTTING ENGINEERS OF FLORIDA, INC. performed three (3) Standard Penetration Test (SPT) borings (ASTM D-1586) to a depth of ten feet below land surface. In addition, one (1) Double Ring Infiltration Test (ASTM D-3385-11) was also performed directly at the ground surface for six hours when sufficient steady state was achieved. The locations of the tests are indicated on the attached Approximate Test Location Plan, presented in the Appendix. The test boring and double ring testing reports are also presented in the Appendix. The test locations were established in the field using approximate methods; namely, a measuring wheel and available surface controls. Therefore, the locations should be considered approximate.

Test Boring Results

In general, the test borings recorded a surface layer of topsoil in the upper three to sixteen inches, underlain by fill soils comprised of dark brown organic silty sand and light brown, brown, and dark brown silty sand with or without traces of organics and limestone fragments to a depth of about two and half to four feet. Below the fill at B-1 and B-2 were silty sand soils with or without organic silt, extending to depths of about three to five feet. Below the fill at B-3, and the silty sand at B-1 and B-2, soft to hard light brown limestone with various amounts of fine sand was encountered to a depth of ten feet, the maximum depth explored. Please see the enclosed soil classification sheet in the Appendix of this report for additional important information regarding these descriptions, the field evaluation and other related information.

Note: Substantially different subsurface conditions may exist at other areas of the site. Buried debris may or may not be identified or adequately delineated by soil borings. Test pit excavation can provide more insight into such conditions and rock lithology if present. Such conditions may be revealed during site development activities (e.g. proof rolling, utility & foundation excavation activities) or other related activities. Should unusual soil conditions be encountered during the earthwork operations, we should be notified to evaluate the condition.

Laboratory Testing and Results

Soil samples obtained from the drilling operations were preserved in jars and visually classified in the laboratory by a geotechnical engineer to confirm the field classifications. Selected soil samples of the silty sand and organic soils recovered from Borings B-1 through B-3 were subjected to testing to determine natural moisture contents, organic contents and percentage of material passing the No. 200 sieve to estimate the engineering properties of these soils. Results of the tests are tabulated below:

LABORATORY RESULTS

Test Boring #	*Soil Description*	*Sample Depth Interval (Feet)*	*Moisture Content (%)*	*Organic Content (%)*	*Percent Passing No. 200 Sieve (%)*
B-1	ORGANIC SILTY SAND	2 – 3	71.5	16.3	16.6
B-1	SILTY SAND	3 – 4	30.9	-	16.8
B-2	SILTY SAND with ORGANIC SILT	5 – 6	47.1	6.6	19.6
B-3	SILTY SAND, trace organics	2 – 4	29.9	5.2	19.8

Groundwater Information

The immediate groundwater level was measured at the boring locations at the time of drilling. The groundwater level was encountered at depths of approximately three to five feet below the existing ground surface.

The immediate depth to groundwater measurements presented in this report may not provide a reliable indication of stabilized or more long term depth to groundwater at this site. Water table elevations can vary dramatically with time through rainfall, droughts, storm events, flood control activities, nearby surface water bodies, tidal activity, pumping and many other factors. For these reasons, this immediate depth to water data should not be relied upon alone for project design considerations.

Infiltration Results

One (1) Double Ring Infiltration Test was performed in general accordance with ASTM D3385 in order to analyze, by others, the drainage capabilities of the existing soils at the test location to facilitate design of water retention areas. The test returned a steady-state infiltration rate of 1.02 inches/hour. See the appendix for detailed flow rates and approximate test location.

ANALYSIS AND RECOMMENDATIONS

The recommendations presented below are under the premise that a well monitored and controlled site clearing, and demucking operation within area of the proposed structures will be performed under the supervision and direction of Nutting Engineers of Florida, Inc. The allowable soil bearing pressure for the structures cannot be verified by this office if performed by others. Full-time observation of the demucking operations will be required. If monitoring is not properly performed, alternative site preparation recommendations may be required. Additional exploration with test pits can be performed to help further delineate the extents to which demucking will be required.

The recommendations reported herein are based upon the known project information at this time. Once additional design information becomes available along with discussions with all interested parties in order to determine the best method of construction, additional comprehensive geotechnical exploration, and/or analysis may be required. earthwork recommendations may change dependent upon final design information provided and the results of the additional field-testing and/or analysis.

Foundation Design Analysis

The test borings performed in the vicinity of or within the proposed improvements for the project suggest that organic and loose silty sand soils are present beginning at approximately three to twenty-four inches and terminating at depths of up to about two and a half to five feet. Depending on the specific improvement, this material will need to be properly removed and replaced with clean structural fill prior to development of the proposed structures. Additional exploration with test pits between and beyond the borings could be performed to help further delineate the amount of demucking that will be required.

Once the site has been properly demucked and backfilled and developed up to construction grades in accordance with the recommendations presented in this report, the site may be developed with the proposed improvements using a shallow foundation system designed for an allowable soil bearing pressure of 3,000 pounds per square foot.

If footings are part of the new improvements, we recommend a minimum width of 24 inches for continuous footings and 36 inches for individual footings, even though the soil bearing pressure may not be fully developed in all cases. We recommend that the bottom of footings be at least 12 inches below the lowest adjacent finished grade.

If a floor slab is constructed, it is our opinion that the floor slab system may be constructed as a slab on grade. We recommend that a vapor barrier be placed between the soil and concrete. Reinforcing for the floor slab should be in accordance with the structural engineers requirements.

Settlement Analysis

We performed a settlement evaluation based upon an improved soil profile following completion of the demucking, backfilling, and compaction using a moderately sized vibratory compactor for the construction. This method should improve the soils to provide an allowable bearing capacity of 3,000 pounds per square foot. It was estimated that upon proper completion, long-term total settlements should be on the order of approximately one inch. Differential settlements should be approximately one-half of the total settlement. Most of this settlement should occur upon the application of the dead load during construction.

In order to maintain the calculated settlement throughout the life of the structures it would be necessary to grade the site such that stormwater is directed away from the foundations. Any ditch/ravine nearby/adjacent to walls and foundations should be avoided.

Site Preparation

The general site clearing (surficial topsoil, trees, grass, root zones, and any unsuitable soils as determined by the Geotechnical Engineer will need to be completely removed within the construction area and to a lateral distance of at least five feet beyond the footprint limits where practical. A Nutting Engineer's representative should be present to observe that the stripping operations are performed as we have discussed herein.

We note that demucking operations are contractor dependent and that the total amount of material removed may depend on the operator's ability to effectively remove the soils without over-excavation. It will be very important that we monitor these operations in order to ensure that the operator does not over excavate. This will save on costs and avoid the potential for confusion.

Once the construction area has been cleared, and upon approval by the geotechnical engineer, the underlying organic and silty sand material within the proposed structures should be demucked until the underlying limetone formation is exposed and removed from the site. **As noted in previous sections, the amount of required demucking across the approximate footprints of the proposed structures could be better determined by performing exploration with test pits to help further delineate the extents to which demucking would be required.** Based on the test borings, we anticipate these soils will be encountered at depths beginning at approximately three to twenty-four inches and terminating at depths of up to about two and a half to five feet. A representative of Nutting Engineers must observe the operation on a full-time basis to ensure that the engineering intent has been accomplished.

The level of the water table at the time of the site observation was approximately three to five feet below the existing ground surface. Therefore, we anticipate that the excavation may fall below the water table. We note that the water table will fluctuate due rainfall and other factors. We note that the water table should be at least two feet below the bottom of excavation during any compaction operations.

Backfilling Without Dewatering: If dewatering is not performed, we recommend that the organic/silty soils be removed until suitable soils are encountered as determined by the Nutting Engineers representative. Once this has been performed and the bottom of the overexcavation has been approved, fill consisting of clean sand and limestone having a Limerock Bearing Ratio (LBR) of at least 40 may be placed to an average elevation of at least 2 feet above water surface. Additional fill above this level shall have no more than 10 percent passing the No. 200 sieve, with a maximum particle size of 3 inches, and as approved by Nutting Engineers.

Once the fill has been brought to an average elevation of at least 2 feet above the water surface, the soils should be compacted with at least twenty passes (ten in the north/south direction, ten in the east/west direction) or until ground surface subsidence has been minimized, whichever is greater, with a vibratory compacter with a minimum dynamic force of 20 tons operated at a slow walking pace. Also, the surface should be compacted until a density equivalent to at least 98 percent of the modified Proctor maximum dry density (ASTM D-1557) is achieved to a depth of at least 12 inches below the compacted surface.

Fill then placed above the proof rolled surface should have ASTM designations (D-2487) of GP, GW, SP, or SW, be free of debris and organics, and shall have no more than 10 percent passing the No. 200 sieve, with a maximum particle size of 3 inches. The fill should be placed in lifts not exceeding 12 inches in loose thickness when using the vibratory compaction equipment described previously. Each lift should be thoroughly compacted until densities equivalent to at least 98 percent of the modified Proctor maximum dry density are uniformly obtained.

Ground Water Control

The water table was encountered at depths varying from three to five feet below the existing ground surface and the need for dewatering may be required for utilities or other reasons. With respect to areas related to drainage structures or utilities as part of the improvements, dewatering design should be performed by a specialist knowledgeable of local conditions. We note that this was beyond our scope of services.

Pavement Design Recommendations

Provided below are general pavement recommendations for the proposed pavement areas. The project Civil Engineer should review the report information in order to provide final pavement design specifications. Pavement areas should be compacted to a minimum of 98 percent of the modified Proctor maximum dry density to a depth of at least 12 inches below the subgrade level. We recommend that stabilized subgrade having a minimum Limerock Bearing Ratio (LBR) of 40 be placed to a depth of approximately one foot below the base course. The base course will range from approximately 6 to 8 inches and should have a minimum LBR of 100.

It may be possible that the in-situ soils may meet the requirements for sub-base and possibly base material. We would require the collection of bulk samples in order to determine their LBR values and suitability. When more engineering information is available pertaining to the pavement design we should be notified.

GENERAL INFORMATION

Our client for this geotechnical evaluation was:

Mr. Michael Connor
Calvin Giordano & Associates, Inc.
1800 Eller Drive, Suite 600
Fort Lauderdale, Florida 33316

The contents of this report are for the exclusive use of the client, the client's design & construction team and governmental authorities for this specific project exclusively. Information conveyed in this report shall not be used or relied upon by other parties or for other projects without the expressed written consent of Nutting Engineers of Florida, Inc. This report discusses geotechnical considerations for this site based upon observed conditions and our understanding of proposed construction for foundation support. Environmental issues including (but not limited to), soil and/or groundwater contamination are beyond our scope of service for this project. As such, this report should not be used or relied upon for evaluation of environmental issues.

Prior to initiating compaction operations, we recommend that representative samples of the structural fill material to be used and acceptable in-place soils be collected and tested to determine their compaction and classification characteristics. The maximum dry density, optimum moisture content, gradation and plasticity characteristics should be determined. These tests are needed for compaction quality control of the structural fill and existing soils, and to determine if the fill material is acceptable.

If conditions are encountered which are not consistent with the findings presented in this report, or if proposed construction is altered or moved from the location investigated, this office shall be notified immediately so that the condition or change can be evaluated and appropriate action taken.

The vibratory compaction equipment may cause vibrations that could be felt by persons within nearby buildings and could potentially induce structural settlements. Additionally, preexisting settlements may exist within these structures that could be construed to have been caused or worsened by the proposed vibratory compaction after the fact. Pre- and post-conditions surveys of these structures along with the vibration monitoring during vibratory compaction could be performed to better evaluate this concern. The contractor should exercise due care during the performance of the vibratory compaction work with due consideration of potential impacts on existing structures.

Nutting Engineers of Florida, Inc. (NE), recommends that we be contracted to provide input to the design team and owner during the foundation and earthwork design process and that we review final foundation drawings and specifications to verify that our report recommendations and design intent have been properly implemented. NE shall also perform testing and inspections during the earthwork and foundation construction as recommended in this report.

If NE is not engaged to perform these services as detailed herein, the Client agrees that NE shall bear no liability for the interpretation, implementation of our report, its recommendations and/or inspection and testing services as described in this report if implemented by others.

The Geotechnical Engineer warrants that the findings, recommendations, specifications, or professional advice contained herein, have been presented after being prepared in accordance with general accepted professional practice in the field of foundation engineering, soil mechanics and engineering geology. No other warranties are implied or expressed.

Excavations of five feet or more in depth should be sloped or shored in accordance with OSHA and State of Florida requirements.

We appreciate the opportunity to provide these services for you. If we can be of any further assistance, or if you need additional information, please feel free to contact us.

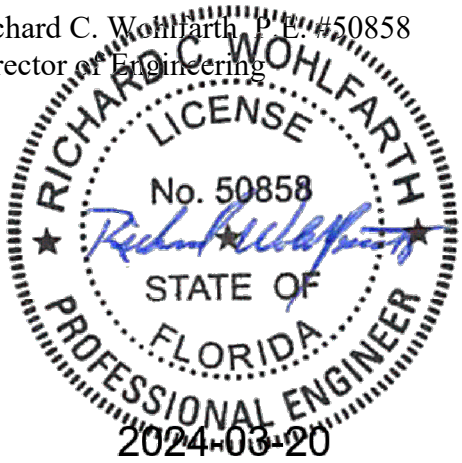
Sincerely,
NUTTING ENGINEERS OF FLORIDA, INC.

This item has been digitally signed and sealed by Richard C. Wohlfarth on the date adjacent to the seal.

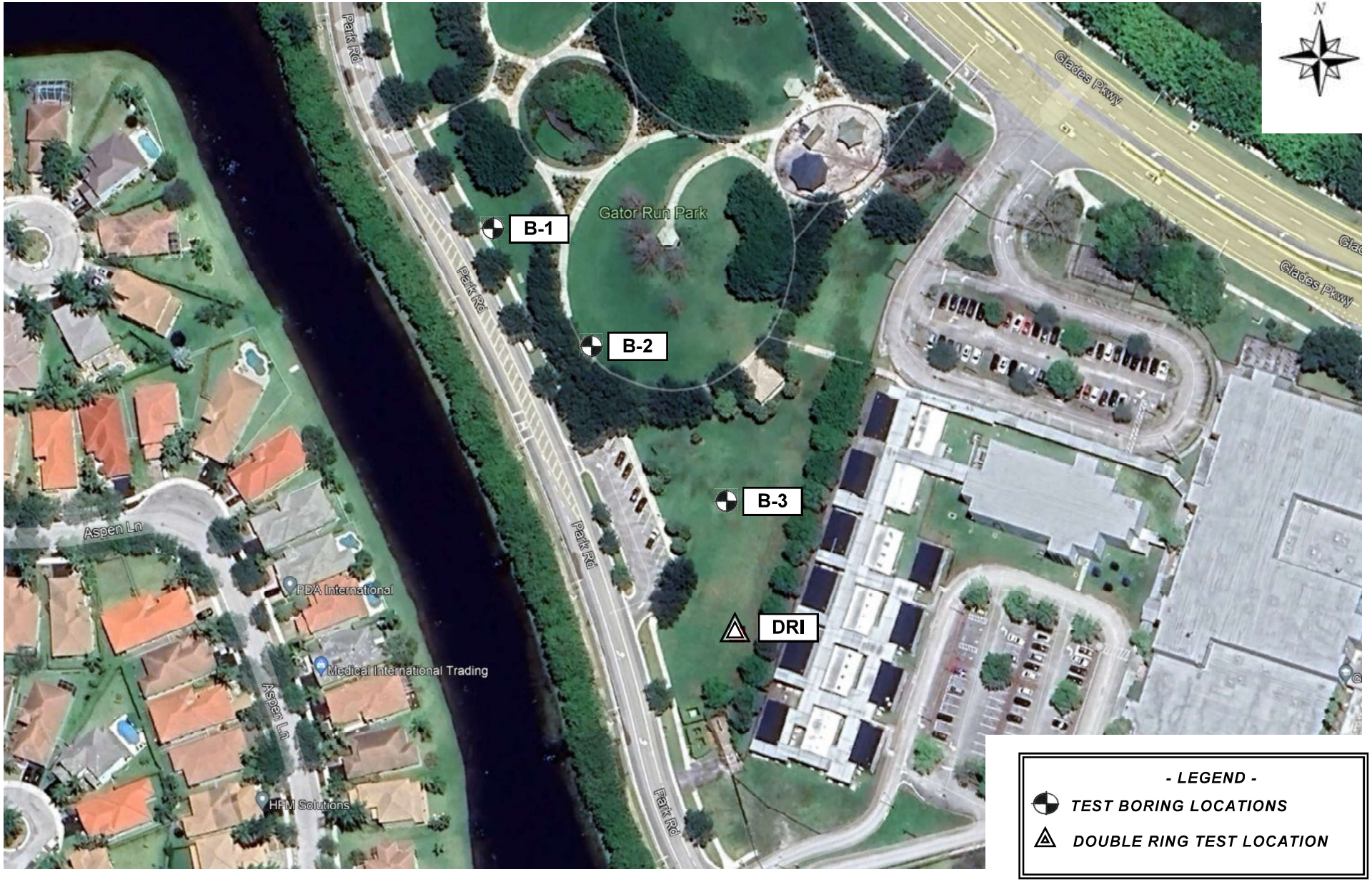
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

Colin T. Henderson, P.E. #96283
Project Engineer

Richard C. Wohlfarth, P.E. #50858
Director of Engineering



Appendix:
- Approximate Test Location Plan
- Test Boring Results
- Infiltration Test Result
- Limitations of Liability
- Soil Classification Criteria



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Calvin Giordano & Associates, Inc.
Gator Run Park Renovations
1101 Park Road
Weston, Florida 33327
PROJECT NO. 101.188

APPROXIMATE LOCATION PLAN

GEOTECHNICAL EXPLORATION

FIG. 15

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-1

PROJECT NUMBER 101.188

CLIENT Calvin Giordano & Associates, Inc.

PROJECT NAME Gator Run Park Renovations

PROJECT LOCATION 1101 Park Road, Weston, FL 33327

DATE STARTED 2/16/24 COMPLETED 2/16/24

SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring

GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson

▽ AT TIME OF DRILLING 3.8 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		TOPSOIL (3" thick)			
		Dk. brown ORGANIC SILT with LIMESTONE FRAGMENTS (FILL)	SS 1	4-4-4-3	8
		Dk. brown ORGANIC SILTY SAND, trace limestone fragments			
		Brownish to gray SILTY SAND, trace limestone fragments	SS 2	3-3-3-9	6
		Lt. brown LIMESTONE with fine SAND ▽			
5			SS 3	4-1-5-6	6
			SS 4	11-23-24-27	47
			SS 5	17-20-12-11	32
10		Bottom of hole at 10.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40

PL MC LL
20 40 60 80

☐ FINES CONTENT (%) ☐
20 40 60 80

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-2

PROJECT NUMBER 101.188

CLIENT Calvin Giordano & Associates, Inc.

PROJECT NAME Gator Run Park Renovations

PROJECT LOCATION 1101 Park Road, Weston, FL 33327

DATE STARTED 2/16/24 COMPLETED 2/16/24

SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring

GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson

▽ AT TIME OF DRILLING 5.2 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value	▲ SPT N VALUE ▲ 10 20 30 40 / PL MC LL 20 40 60 80 / ☐ FINES CONTENT (%) ☐ 20 40 60 80
0		TOPSOIL (4" thick)				
		Lt. brown and dk. brown fine SAND with LIMESTONE FRAGMENTS (FILL)	SS 1	3-3-2-2	5	▲
		Dk. brown ORGANIC SILT, some limestone fragments (FILL)				
		Lt. brown and dk. brown SILTY SAND with LIMESTONE FRAGMENTS (FILL)	SS 2	2-1-2-4	3	▲
5		Dk. brown SILTY SAND and ORGANIC SILT with LIMESTONE FRAGMENTS	SS 3	2-5-4-7	9	▲
		▽ Lt. brown LIMESTONE with fine SAND	SS 4	4-5-13-50/5"	100+	>>▲
			SS 5	11-19-18-23	37	▲
10		Bottom of hole at 10.0 feet.				

Nutting Engineers of Fl., Inc.
2051 Nw 112th Avenue
Miami, Florida 33172
Telephone: (305) 557-3083
Fax: (561) 737-9975

BORING NUMBER B-3

PROJECT NUMBER 101.188

CLIENT Calvin Giordano & Associates, Inc.

PROJECT NAME Gator Run Park Renovations

PROJECT LOCATION 1101 Park Road, Weston, FL 33327

DATE STARTED 2/16/24 COMPLETED 2/16/24

SURFACE ELEVATION REFERENCE Same as road crown

DRILLING METHOD Standard Penetration Boring

GROUND WATER LEVELS:

LOGGED BY Dancor CHECKED BY C. Henderson

▽ AT TIME OF DRILLING 3.1 ft

APPROXIMATE LOCATION OF BORING **As located on site plan**

DEPTH (ft)	GRAPHIC LOG	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	Blows	N-Value
0		TOPSOIL (16" thick)	SS 1	4-5-5-3	10
		Brownish gray and dk. brown SILTY SAND, trace to some limestone fragments, trace organics (FILL)	SS 2	3-2-2-4	4
5		Lt. brown LIMESTONE with fine SAND	SS 3	8-9-5-8	14
			SS 4	19-50/4"	100+
			SS 5	20-50/3"	100+
10		Bottom of hole at 10.0 feet.			

▲ SPT N VALUE ▲
10 20 30 40
PL MC LL
20 40 60 80
☐ FINES CONTENT (%) ☐
20 40 60 80

TEST NUTTING BOREHOLE 2-101.188 CALVIN GIORDANO & ASSOCIATES, INC. - GATOR RUN PARK RENOVATIONS.GPJ GINT US.GDT 3/5/24

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Geotechnical & Construction Materials
Engineering, Testing, & Inspection
Environmental Services

Offices throughout the state of Florida

www.nuttingengineers.com info@nuttingengineers.com

DOUBLE RING INFILTROMETER TEST - ASTM D3385

CLIENT: Calvin Giordano and Associates, Inc.
TEST : DRI-1 **TEST DATE:** 2/16/2024 **WEATHER:** Sunny 70° F
PROJECT: Gator Run Park **DRILLER:** Dancor
1101 Park Road, Weston, Florida

SOIL DESCRIPTION: 0 - 6" Dark brown fine SAND with grass

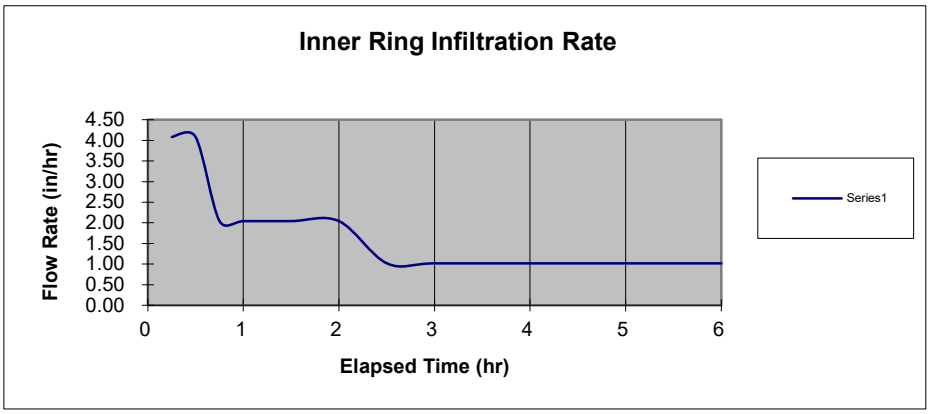
NOTE: TEST PERFORMED AT EXISTING GRADE.
GROUNDWATER DEPTH: N/A USING 12" & 24" DIAMETER RINGS

AREA: INNER RING: 113.1 IN^2 (729.7 CM^2)
ANNULAR RING: 339.3 IN^2 (2189.2 CM^2)

Testing was performed according to proceudres specified in ASTM D3385-09. Liquid used consisted of water with an approximate pH of 7.0.
As ASTM procedure recommends, data from inner ring was used to determine infiltration rate.

ELAPSED TIME (HR)	QUANTITY OF WATER INNER(in^3)	RATE INNER (IN/HR)	QUANTITY OF WATER ANNULAR(in^3)	RATE ANNULAR (IN/HR)
0.25	116	4.08	462	5.45
0.5	116	4.08	231	2.72
0.75	58	2.04	173	2.04
1	58	2.04	173	2.04
1.5	116	2.04	347	2.04
2	116	2.04	231	1.36
2.5	58	1.02	231	1.36
3	58	1.02	173	1.02
4	116	1.02	347	1.02
5	116	1.02	347	1.02
6	116	1.02	347	1.02

STEADY STATE INFILTRATION RATE = 1.02 INCH/HOUR*



* As noted in Sec. 11.1 **Precision and Bias** of ASTM D3385-09 the recorded infiltration rate should be considered only as an index value

LIMITATIONS OF LIABLILITY

WARRANTY

We warranty that the services performed by Nutting Engineers of Florida, Inc. are conducted in a manner consistent with that level of care and skill ordinarily exercised by members of the profession in our area currently practicing under similar conditions at the time our services were performed. ***No other warranties, expressed or implied, are made***. While the services of Nutting Engineers of Florida, Inc. are a valuable and integral part of the design and construction teams, we do not warrant, guarantee or insure the quality, completeness, or satisfactory performance of designs, construction plans, specifications we have not prepared, nor the ultimate performance of building site materials or assembly/construction.

SUBSURFACE EXPLORATION

Subsurface exploration is normally accomplished by test borings; test pits are sometimes employed. The method of determining the boring location and the surface elevation at the boring is noted in the report. This information is represented in the soil boring logs and/or a drawing. The location and elevation of the borings should be considered accurate only to the degree inherent with the method used and may be approximate.

The soil boring log includes sampling information, description of the materials recovered, approximate depths of boundaries between soil and rock strata as encountered and immediate depth to water data. The log represents conditions recorded specifically at the location where and when the boring was made. Site conditions may vary through time as will subsurface conditions. The boundaries between different soil strata as encountered are indicated at specific depths; however, these depths are in fact approximate and dependent upon the frequency of sampling, nature and consistency of the respective strata. Substantial variation between soil borings may commonly exist in subsurface conditions. Water level readings are made at the time and under conditions stated on the boring logs. Water levels change with time, precipitation, canal level, local well drawdown and other factors. Water level data provided on soil boring logs shall not be relied upon for groundwater based design or construction considerations.

LABORATORY AND FIELD TESTS

Tests are performed in *general* accordance with specific ASTM Standards unless otherwise indicated. All criteria included in a given ASTM Standard are not always required and performed. Each test boring report indicates the measurements and data developed at each specific test location.

ANALYSIS AND RECOMMENDATIONS

The geotechnical report is prepared primarily to aid in the design of site work and structural foundations. Although the information in the report is expected to be sufficient for these purposes, it shall not be utilized to determine the cost of construction nor to stand alone as a construction specification. Contractors shall verify subsurface conditions as may be appropriate prior to undertaking subsurface work.

Report recommendations are based primarily on data from test borings made at the locations shown on the test boring reports. Soil variations commonly exist between boring locations. Such variations may not become evident until construction. Test pits sometimes provide valuable supplemental information that derived from soil borings. If variations are then noted, the geotechnical engineer shall be contacted in writing immediately so that field conditions can be examined and recommendations revised if necessary.

The geotechnical report states our understanding as to the location, dimensions and structural features proposed for the site. ***Any significant changes of the site improvements or site conditions must be communicated in writing to the geotechnical engineer immediately*** so that the geotechnical analysis, conclusions, and recommendations can be reviewed and appropriately adjusted as necessary.

CONSTRUCTION OBSERVATION

Construction observation and testing is an important element of geotechnical services. The geotechnical engineer's field representative (G.E.F.R.) is the "owner's representative" observing the work of the contractor, performing tests and reporting data from such tests and observations. ***The geotechnical engineer's field representative does not direct the contractor's construction means, methods, operations or personnel.*** The G.E.F.R. does not interfere with the relationship between the owner and the contractor and, except as an observer, does not become a substitute owner on site. The G.E.F.R. is responsible for his/her safety, but has no responsibility for the safety of other personnel at the site. The G.E.F.R. is an important member of a team whose responsibility is to observe and test the work being done and report to the owner whether that work is being carried out in general conformance with the plans and specifications. The enclosed report may be relied upon solely by the named client.

SOIL AND ROCK CLASSIFICATION CRITERIA

SAND/SILT

N-VALUE (bpf)	RELATIVE DENSITY
0 – 4	Very Loose
5 – 10	Loose
11 – 29	Medium
30 – 49	Dense
>50	Very dense
100	Refusal

CLAY/SILTY CLAY

N-VALUE (bpf)	UNCONFINED COMP. STRENGTH (tsf)	CONSISTENCY
<2	<0.25	v. Soft
2 – 4	0.25 – 0.50	Soft
5 – 8	0.50 – 1.00	Medium
9 – 15	1.00 – 2.00	Stiff
16 – 30	2.00 – 4.00	v. Stiff
>30	>4.00	Hard

ROCK

N-VALUE (bpf)	RELATIVE HARDNESS	ROCK CHARACTERISTICS
N≥ 100	Hard to v. hard	Local rock formations vary in hardness from soft to very hard within short vertical and horizontal distances and often contain vertical solution holes of 3 to 36 inch diameter to varying depths and horizontal solution features. Rock may be brittle to split spoon impact, but more resistant to excavation.
25≤ N ≤ 100	Medium hard to hard	
5≤ N ≤ 25	Soft to medium hard	

PARTICLE SIZE

Boulder	>12 in.
Cobble	3 to 12 in.
Gravel	4.76 mm to 3 in.
Sand	0.074 mm to 4.76 mm
Silt	0.005 mm to 0.074 mm
Clay	<0.005 mm

DESCRIPTION MODIFIERS

0 – 5%	Slight trace
6 – 10%	Trace
11 – 20%	Little
21 – 35%	Some
>35%	And

Major Divisions			Group Symbols	Typical names	Laboratory classification criteria
Coarse-grained soils (More than half of material is *larger* than No. 200 sieve size)	Gravels (More than half of coarse fraction is larger than No. 4 sieve size)	Clean gravels (Little or no fines)	GW	Well-graded gavels, gravel-sand mixtures, little or no fines	Determine percentages of sand and gravel from grain-size curve. Depending on percentage of fines (fraction smaller than No. 200 sieve size), coarse-grained soils are classified as follows: Less than five percent……GW, GP, SW, SP More than 12 percent……GM, GC, SM, SC 5 to 12 percent……*Borderline* cases requiring dual systems**
			GP	Poorly graded gravels, gravel-sand mixtures, little or no fines	
		Gravels with fines (Appreciable amount of fines)	GW* d	Silty gravels, gravel-sand-silt mixtures	
			u		
			GC	Clayey gravels, gravel-sand-clay mixtures	
	Sands (More than half of coarse fraction is smaller than No. 4 sieve size)	Clean sands (Little or no fines)	SW	Well-graded sands, gravelly sands, little or no fines	
			SP	Poorly graded sands, gravelly sands, little or no fines	
		Sands with fines (Appreciable amount of fines)	SM* d	Silty sands, sand-silt mixtures	
			u		
			SC	Clayey sands, sand-clay mixtures	
Fine-grained soils (More than half of material is *smaller* than No. 200 sieve size)	Silts and clays (Liquid limit less than 50)		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity	
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy, clays, silty clays, lean clays	
			OL	Organic silts and organic silty clays of low plasticity	
	Silts and clays (Liquid limit greater than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
			CH	Inorganic clays or high plasticity, fat clays	
			OH	Organic clays of medium to high plasticity, organic silts	
	Highly organic soils		PT	Peat and other highly organic soils	

$C_u = \frac{D_{60}}{D_{10}}$ greater than 4; $C_z = \frac{(D_{30})^2}{D_{10} x D_{60}}$ *between* 1 and 3

Not meeting all gradation requirements for GW

Atterberg limits below "A" line or P.I. less than 4

Atterberg limits above "A" line with P.I. greater than 7

Above "A" line with P.I. between 4 and 7 are *borderline* cases requiring use of dual symbols.

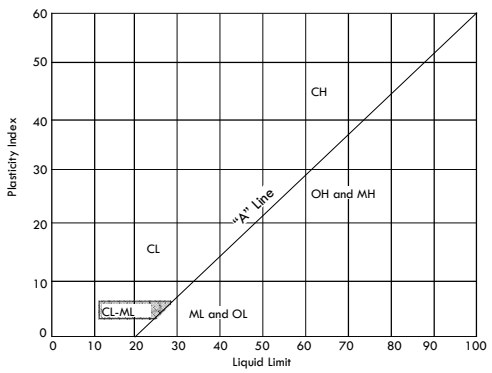
$C_u = \frac{D_{60}}{D_{10}}$ greater than 6; $C_z = \frac{(D_{30})^2}{D_{10} x D_{60}}$ *between* 1 and 3

Not meeting all gradation requirements for SW

Atterberg limits below "A" line or P.I. less than 4

Atterberg limits above "A" line with P.I. more than 7

Limits plotting in hatched zone with P.I. between 4 and 7 are *borderline* cases requiring use of dual system.



Plasticity Chart

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SECTION 16000

ELECTRICAL GENERAL REQUIREMENTS

PART 1 - GENERAL

1.01 SCOPE

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

1. Electric services, secondary feeders, branch circuits, contactors, all connections to controls, and equipment

2. Installation of underground conduits and splices

3. Complete lighting systems

4. Complete grounding system including system and equipment

1.02 RELATED DOCUMENTS

A. The general provisions of the Contract, including General Conditions and Special Conditions, apply to all the work specified herein.

1.03 LAWS, PERMITS, FEES AND NOTICES

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

1.04 DEPARTURES

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

1.05 BASIS FOR WIRING DESIGNS

A. The Contract Drawings and Specifications describe specific sizes of switches, breakers, fuses, conduits, conductors, motor starters and other items of wiring equipment. These sizes are based on specific items of power consuming equipment (heaters, lights, motors for fans, compressors, pumps, etc.). Wherever another trade provides power consuming equipment that differs from the Drawings and Specifications, the wiring for such equipment shall be changed to proper sizes to match at no additional expense to the OWNER.

1.06 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 routings of cables, conduits, pull boxes, circuit numbers, and other information required by the ENGINEER.

1.07 EXCAVATING FOR ELECTRICAL WORK

A. General – Excavation or drilling, backfill and repair of paving and grassing shall 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 OWNER and ENGINEER shall be immediately notified, and damage shall be immediately repaired.

C. Precautions – The electrical contractor must take every reasonable precaution to avoid interferences. In the vicinity of a suspected interference, excavations shall be dug by hand.

1.08 JOB SITE VISIT

A. Visit the project site before submitting a bid. Verify all dimensions shown on the Contract Drawings and determine the characteristics of existing facilities which will affect performance of the work, but which are not shown on the Drawings or described within these Specifications.

1.09 CODES AND STANDARDS

A. 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.

2. NEC – National Electrical Code (NFPA-70-2014)

3. OSHA – Standards of the Occupational Safety and Health Administration are to be complied with.

4. 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.

5. ANSI – American National Standards Institute

6. Florida Building Code

1.10 ELECTRICAL SUBMITTALS

A. The CONTRACTOR shall submit shop drawings, samples and certificates in accordance with the Special Conditions for additional instructions on substitutions. 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.

B. Shop drawings and manufacturer's data sheets are required for all electrical materials. Samples are to be supplied for any substitute as requested by the ENGINEER.

C. 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. Order no equipment or materials without approval from the ENGINEER.

1.11 OPERATION AND MAINTENANCE MANUALS

A. The CONTRACTOR shall submit Operation and Maintenance (O&M) Manuals in accordance with Division 1, General Requirements. O&M Manuals must contain, but are not limited to, the following:

1. Brief description of system and basic features
2. Manufacturer's name and model numbers of all components of the system
3. List of local factory authorized service companies
4. Operating instructions, including preparation for starting up, seasonal changes, shut down and service
5. Maintenance instruction
6. Possible breakdowns and repairs
7. Manufacturer's literature describing each piece of equipment
8. Control diagrams by the control manufacturer
9. Description of sequence by the control manufacturer
10. Parts list
11. Wiring diagrams

1.12 SPARE PARTS

A. Submit in accordance with Division 1, General Requirements, a list of Recommended Spare Parts for all major items of equipment. Include descriptions of each part, part number, and cost.

1.13 PROJECT DOCUMENTS

A. For "As Built" drawing requirements, see Division 1.

B. In addition, each "As Built" single line diagram shall be framed under glass and mounted on wall near respective contactors and controls.

PART 2 - PRODUCTS

2.01 GENERAL

A. Electrical Temporary Facilities – The CONTRACTOR shall include in his bid the cost of furnishing, installing and maintaining 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. Adequate lighting and receptacle outlets for operation of hand tools shall be provided throughout the project, including shanties, trailers, field offices, temporary toilet enclosures, and shall be extended as construction progresses.

B. All reasonable safety requirements shall be observed to protect workers and the public from shock and fire hazards.

1. Ground fault interrupters shall be employed in accordance with Codes.

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

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

2.02 ELECTRICAL PRODUCTS

A. Unless otherwise indicated in writing by the ENGINEER, the products to be furnished under this specification shall be the manufacturer's latest design. Where two or more units of the same class of equipment are required, these units shall be products of the same purpose and rating shall be interchangeable throughout the project.

B. All products shall be newly manufactured. Defective equipment or equipment damaged in the course of the installation, or a test shall be replaced or repaired in a manner meeting the approval of the ENGINEER, at no additional expense to the OWNER.

2.03 SUBSTITUTIONS

A. Comply with instruction in the Contract General Conditions and Special Conditions regarding substitutions.

2.04 ELECTRICAL IDENTIFICATION

A. Color Coding – Conductor colors shall be in accordance with NEC and NEMA requirements. Refer also to applicable sections of these specifications. Three-phase feeder and branch circuits shall be identified as follows:

120 / 240	**277 / 480**
A – Black	A – Brown
B – Red	B – Orange
C – Blue	C – Yellow
N - White	N – Gray
Green or bare for grounding conductors	
Green with Yellow trace for Special Grounding	

2.05 NAMEPLATE

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

B. 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 / 480 V, 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. 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 be 1/4 inch high, unless otherwise detailed on the drawings. Nameplates shall be securely fastened to the equipment with No. 4 Phillips, rough-head, cadmium-plated, steel self-tapping screws or nickel-plated brass bolts. Motor nameplates may be nonferrous 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 ENGINEER's approval.

C. All junction and splice boxes shall be labeled using permanent shipping tags attached to boxes, not covers.

2.06 WIRE AND CABLE IDENTIFICATION

A. All wire and cable shall be identified at each termination point and at each pull box, splice box, junction box, or manhole. Provide permanent, waterproof, non-metallic (paper unacceptable) tags indicating the circuit number in 3/16 inch letters. Circuit numbers shall be protected with clear shrinkable tubing.

PART 3 - EXECUTION

3.01 DELIVERY, STORAGE AND HANDLING

A. 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 storage. Comply with OWNER's instruction for storage locations.

3.02 ELECTRICAL COORDINATION

A. The CONTRACTOR is responsible for coordination with the OWNER, ENGINEER, the power company, and the telephone company on all matters that have a bearing on the electrical work.

B. The Drawings indicate the extent, the general location, and arrangement of equipment, conduit, and wiring. Study the Drawings, including details, so the equipment shall be properly located and readily accessible. Locate all electrical equipment to avoid interference with mechanical and / or structural features. Make necessary changes in spacings and locations of lighting fixtures, panelboards, cabinets, receptacles, and other items of equipment provided that the overall patterns of layouts are not disrupted and remain uniform.

3.03 CUTTING AND PATCHING

A. Cut and prepare all openings, chases, and trenches required for the installation of equipment and materials. Repair, remodel, and refinish in strict conformance with the quality of workmanship and materials in the surroundings. Obtain written permission from the ENGINEER for any alterations to structural members before proceeding. All penetrations through fire walls or floor / ceiling slabs shall be sealed to maintain the fire integrity of the wall or slab.

3.04 MAINTENANCE

A. Render all necessary measures to insure 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.

3.05 WATERPROOFING

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

3.06 TESTS

A. Conduct an operating test of equipment prior to the ENGINEER's approval. The equipment shall be demonstrated to operate in accordance with the requirements of these Specifications. The tests shall be performed in the presence of the ENGINEER or an authorized representative. The CONTRACTOR shall furnish all instruments, electricity and personnel required for the tests.

3.07 CLEANUP

A. Maintain 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.

END OF SECTION

SECTION 16011

CODES & STANDARDS

PART 1 - GENERAL

1.01 THIS SECTION COVERS THE CODES, SPECIFICATIONS AND STANDARDS CONSIDERED MINIMUM REQUIREMENTS FOR MATERIALS, WORKMANSHIP AND SAFETY FOR ALL DIVISIONS 16 AND RELATED ELECTRICAL WORK.

1.02 SPECIFICATIONS, CODES AND STANDARDS

A. Reference within this Specification to standards, codes or reference specifications implies that any item, product, or material so identified must comply with all minimum requirements as stated therein, except packaging and shipping, unless indicated otherwise. Only the latest revised editions are applicable.

Some of the references used in this Division are as follows:

NFPA	National Fire Protective Association
NEC	National Electrical Code
NEMA	National Electrical Manufacturers' Association
U.L.	Underwriters' Laboratories, Inc.
ANSI	American National Standards Institute
FS	Federal Specification

B. The Specifications, codes and standards indicated below and in other Sections, including the current addenda, amendments, and errata, referred to by basic designation only, form a part of this specification.

NFPA-70	National Electrical Code (Current Edition)
NFPA-90A	Air Conditioning & Ventilation (Current Edition)
NFPA-101	Code for Safety to Life (Current Edition)
F.B.C.	Florida Building Code (Current Edition)

1.03 UNDERWRITERS' LABORATORIES

A. Where materials and equipment are available under the continuing inspection and labeling service of U.L.; provide such material and equipment.

B. Listing by Underwriters' Laboratories shall be evidenced by the label or:

U.L. - Electrical Construction Materials List (Green Book)
U.L. - Electrical Appliance & Utilization Equipment List
U.L. - Building Materials List

PART 2 - PRODUCTS - NOT USED

PART 3 - EXECUTION - NOT USED

END OF SECTION

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SECTION 16050

BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 - GENERAL

1.01 SCOPE

A. Provide all material as required for a complete project as required by the Drawings and in this Specification.

1.02 SHOP DRAWING SUBMITTALS

A. Submit shop drawings for the following:

All raceways
Wiring and Splices
Contactors, Relays, Photocells
Poles and Fixtures

PART 2 - PRODUCTS

2.01 RACEWAY

A. Galvanized Rigid Conduit (ANSI C80.0) – 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.

B. PVC Conduit – Underground PVC conduit shall be Schedule 40 or Schedule 80 unless otherwise noted and shall be U.L. approved. PVC conduit shall be Schedule 80 when installed above ground.

C. Locations: – Conduit shall be used as follows:

1. All above ground grade exposed conduits shall be hot dipped galvanized rigid steel except otherwise noted on the Drawings.

2. All conduits penetrating rated fire walls or rated fire floors shall be installed with U.L. Approved devices to maintain the fire rating of the wall or floor penetrated.

2.02 WIRE AND CONNECTORS

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

1. Conductors shall be stranded.

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

3. Type of wire shall be THWN or THHN rated 75 degrees C, suitable for wet locations except where otherwise required by the drawings.

4. No wire smaller than No. 12 AWG shall be used unless specifically indicated.

5. Conductor metal shall be copper.

6. All conductors shall be meggered after installation and insulation must be in compliance with the Insulated Power Cable Engineers Association Minimum Values of Insulation Resistance.

2.03 BOXES

A. Boxes for wiring devices (switches and receptacles) installed outdoors or wet locations shall be weatherproof fiberglass with polycarbonate cover plates. Junction boxes shall be NEMA 4X construction. All boxes shall be securely mounted, plumb and level, in readily accessible locations.

B. Pull boxes in ground shall be Pencell HHPL 172012 with green lid marked "ELECTRIC".

2.04 GROUNDING

A. Grounding and Bonding – All Grounding and Bonding shall be in accordance with NFPA 70. Ground all exposed non-current-carrying metallic parts of electrical equipment, metallic raceway systems, grounding conductor in raceways, and neutral conductor of wiring systems.

B. Grounding Conductor – Provide an insulated, green-colored equipment grounding conductor in all feeder and branch circuits. This conductor shall be separate from the electrical system neutral conductor. Conduits will not be approved as grounding conductor.

C. The CONTRACTOR shall install all ground rods, ground wires, and connectors as required for the complete grounding system.

D. All metal parts and grounding conductors in each manhole or pullbox shall be grounded to a local ground rod.

E. Resistance – Readings shall not be taken within 48 hours of a rainfall.

F. The CONTRACTOR shall provide a written report for all grounding test results to the ENGINEER. The test shall include all ground connections. The report shall be signed by the OWNER of the contracting firm and shall include: test date, time, weather conditions on test date, weather conditions 3 days prior to the test date, location, and results.

G. 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 or the Cable and Conduit Schedule show ground conductors on the Drawings.

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

PART 3 - EXECUTION

3.01 CONDUIT INSTALLATION

A. General

1. Nylon pull cords shall be installed in all empty conduits. 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 8 AWG or smaller.

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

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

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

B. Handling

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 are installed before pouring of concrete. All spare conduits shall remain plugged or capped upon project completion.

C. Concrete and Masonry

1. 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 1/2" minimum clearance around the conduits, and caulking with askum and sealant, or by means of conduit entrance seals.

2. 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.

D. Panelboards and Boxes

1. Conduits entering panelboards, pull boxes, or outlet boxes shall be secured in place by galvanized locknuts and bushings, one locknut outside and one 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.

E. Bending

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

F. Mounting and Concealing

1. Conduit runs shall always be concealed in finished spaces and may be exposed in industrial spaces except where indicated on the Drawings.

2. 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.

3. Where conduits are run individually, they shall be supported by approved pipe straps, secured by means of: 1) toggle bolts or hollow masonry; 2) expansion shields and machine screws or standard preset inserts on concrete or solid masonry; 3) machine screws or bolts on metal surfaces, and wood screws on wood construction. The use of perforated straps or wires will not be permitted.

4. Concrete inserts and pipe straps installed shall be stainless steel unless otherwise noted on the Drawings. All bolts, nuts, washers, and screws shall be stainless steel. Individual hangers, trapeze hanger, and rods shall be prime-coated and painted. Conduit support clamps shall be the two-piece type.

5. Conduit support struts, clamps, bolts, nuts and washers installed outdoors and in corrosive atmosphere indoors or on floors shall be stainless steel.

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

3.02 TERMINATIONS AND SPLICES

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. Splicing of power, control, or instrumentation wiring will not be allowed except by written approval of the ENGINEER. Where splicing is allowed, splices shall be made waterproof regardless of location.

3.03 GROUNDING

A. General – Grounding shall be as indicated, and as required by NFPA 70 and ANSI-C2.

B. Grounding Connections – Grounding connections which are buried or otherwise normally inaccessible, and excepting specifically those connections for which access for periodic testing is required, shall be made by exothermic weld. Exothermic welds shall be made strictly in accordance with the weld manufacturer's written recommendations. Welds which have "puffed up" or which show convex surfaces, indicating improper cleaning, are not acceptable. No mechanical connector is required at exothermic weldments.

C. Grounding Grid System – Conductors shall be buried a minimum of 24 inches in the ground. All cable crossings shall be securely bonded, and the system connected to the ground system as well as to all equipment and structural steel work, and to all water piping.

D. Grounding Conductors – Conductors shall be insulated copper wire and sized as required by National Electrical Code.

3.04 FIELD TESTS

A. As an exception to requirements that may be stated elsewhere in the Contract, the ENGINEER shall be given five working days notice prior to each test. The CONTRACTOR shall demonstrate that all circuits and devices are in good operating conditions.

B. Test on 600 volt wiring – Verify all 600 volt wiring has no short circuits or accidental grounds. Perform insulation resistance tests on all wiring using an instrument which applies a voltage of approximately 500 volts to provide a direct reading of resistance. Minimum resistance shall be 1 megohm. The conductor loop resistance of each pair shall also be measured. The mutual capacitance between conductors of each pair shall also be measured. Provide written results for approval.

3.05 WIRE AND CABLE INSTALLATION

A. Conductors shall not be pulled into raceway until:

1. Raceway system has been inspected and approved by the ENGINEER.
2. Plastering and concrete have been completed in affected areas.
3. Raceway system has been freed of moisture and debris.

B. Conductors of No. 8 size and smaller shall be hand pulled. Larger conductors may be installed using power winches. Wire pulling lubricant, where needed, shall be U.L. approved. Wire in panels, cabinets, and gutter shall be neatly grouped, using nylon tie straps, and fanned out to terminals.

C. Building wire conductors THHN / THWN installed below grade, or in concrete slabs on grade, shall have type RHW-USE insulation, 600 volt. Building wire shall be stranded.

D. Each cable or wire in panels, pull boxes, manholes, or troughs shall have a permanent identification, with numbers and letters indicated on the conduit and cable schedule. For underground cable identification tag, see drawing.

E. Lubricants – Lubricants for assisting in the pulling of cables shall be those specifically recommended by the cable manufacturer. The lubricant shall not be deleterious to the cable sheath, jacket, or outer coverings, and shall be U.L. approved. Use Polywater J or equal.

F. Cable Pulling Tensions – Shall not exceed the maximum pulling tension

recommended by the cable manufacturer.

3.06 MOUNTING AND SUPPORTING ELECTRIC 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. All items shall be supported from the structural portion of the building and studs, except standard ceiling-mounted lighting fixtures and small devices, that may be supported from ceiling system where permitted by the ENGINEER. However, no sagging of the ceiling will be permitted. Supports and hangers shall be of types approved by Underwriter's Laboratories.

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

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

3.07 UNDERGROUND WORK

A. Excavation for Electrical Work
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 conditions, or as indicated on the Drawings.

B. Coordination
The electrical contractor must check for existing utilities before commencing any excavation or drilling. Contract Drawings and other trades are to be consulted to avoid interference with other utilities on this project. In the event of damage to existing utilities, the OWNER and ENGINEER shall be immediately notified, and the damage shall be immediately repaired at no cost to the Owner.

C. Precautions
The electrical contractor must take every reasonable precaution to avoid interferences. In the vicinity of a suspected interference, excavations shall be dug by hand.

D. Excavating, Drilling and Backfilling

1. Materials for backfill shall be as specified in Specification 02222 - Excavation and Backfill for Utility Systems, Section 2.02.

2. Locate and protect existing utilities and other underground work in a manner which will ensure that no damage or service interruption will result

from excavating and backfilling.

3. Protect property from damage which might result from excavating and backfilling.

4. Protect persons from injury at excavations, by shoring up, and using barricades, warnings and illumination.

5. Coordinate excavations with weather conditions, to minimize the possibility of washouts, settlements, and other damages and hazards.

6. Dewater excavations as necessary. Protect excavations from inflow of surface water. Pump minor inflow of ground water from excavations; protect excavations from major inflow of ground water by installing temporary sheeting and waterproofing. Provide adequate barriers which will protect other excavations and below grade property from being damaged by water, sediment, or erosion from or through the electrical work excavations.

7. No organic material is permitted in backfill. All vegetation, peat, sod or other organic matter shall be removed from the premises.

8. Except under roadways, backfill material shall be clean sand or shell rock. No debris or trash may be used as backfill.

9. Under roadways, backfill material shall be the same as comprising the road bed.

10. Backfill excavations using 8-inch high courses of backfill material, uniformly compacted to 95 percent density per ASTM Standard D1557, using power-driven, hand-operated compaction equipment. Watering the backfill for compaction is not an acceptable method.

11. Backfill to elevations matching adjacent grades. Where subsidence is measurable or observable at electrical work excavations during the warranty period, remove the surface (pavement, lawn or other finish) add backfill material, compact, and replace the surface treatment. Restore the appearance, quality, and condition of the surface or finish to match adjacent work, and eliminate evidence of restoration to the greatest extent possible.

12. Where excavation and backfill for electrical work passes through or occurs in a landscaped area, repair or replace the landscape work to match the original condition and quality of work.

13. Where excavation and backfill for electrical work passes through or occurs in an area of paving or flooring, replace and restore the construction and finish of the paving or flooring to match the original condition and quality of the work.

E. Underground

1. Underground conduits not under concrete slabs, shall be buried at least two feet below finished grade for circuits rated 600 volts or less, except under traffic areas, conduits shall be buried at least three feet below finished grade.

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

penetration.

3. Transition from PVC to RGS shall be made prior to elbow below grade. Paint RGS with bitumastic, 12 inches above and below grade.

3.08 CONCRETE MANHOLES AND PULL BOXES

A. Provide precast concrete manholes and pull boxes as indicated on the drawings. Manholes and pull boxes shall be installed on firmly compacted ground level and plumb at the elevations indicated on the drawings. Manholes and pull boxes shall be equipped with pulling-in irons opposite and below each ductway entrance. Manholes and pull boxes shall have cable supports so that each cable is supported at a minimum of 3 foot intervals within the manhole or pull box. Cable supports shall be fastened with galvanized bolts and shall be fabricated of fiberglass or galvanized steel.

Make provision for drainage and grounding. Install grounding rods at each manhole.

B. Traffic Covers – H-2-044 traffic rated covers shall be provided for manholes and pull boxes with identification as follows:

ELECTRIC" where voltages within are 600 volts and less.

"SIGNAL" for instrumentation, telephone, and control.

C. Covers and frames shall be cast iron or hot dip galvanized.

End bells shall be cast in boxes by precast manhole manufacturer for all conduit entrances indicated on the drawings.

D. Every manhole shall be equipped with 24" x 24" concrete knockouts for future conduit installation on two opposing walls.

3.09 CONDUIT INSTALLATION

A. General – 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 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.

3.10 WIRE AND CABLE INSTALLATION

A. Installation of Cables in Manholes, Handholes, and Vaults. Do not install cables utilizing the shortest route, but route along those walls providing the longest route and the maximum spare cable lengths. Form all cables to closely parallel walls, not to interfere with duct entrances, and support on brackets and cable insulators. In existing manholes, handholes and vaults where new ducts are to be terminated, or where new cables are to be installed, the existing installation of cables, cable supports, and grounding shall be modified as required for a neat and workmanlike

installation, with all cables properly arranged and supported. Support cable splices in underground structures by racks on each side of the splice. If splicing is approved, locate splices to prevent cyclic bending in the spliced sheath and out of the water. Install cables at middle and bottom of cable racks, leaving top space opening for future cables, except as otherwise indicated. Provide one spare three-insulator rack arm for each cable rack in each underground structure.

B. Cable Markers (or tags) in Manholes and Handholes – Provide cable markers or tags for each cable or wire passing through or leaving manholes or handholes and at each terminal. Tags shall be stainless steel, bronze, lead strap, or copper strip, approximately 1/16 inch thick, or hard plastic 1/8 inch thick, suitable for immersion in salt water, and of sufficient length for imprinting the legend on one line, using raised letters not less than 1/4 inch in size, and shall be permanently marked or stamped with the identification as indicated. Use of two-color laminated plastic is acceptable. Plastic markers shall be dark in color, and markings shall be light in color to provide contrast so that identification can be easily read. Fastening material shall be of a type that will not deteriorate when exposed to water with a high saline content.

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

D. Spare conduits shall be on top or accessible sides and identified uniquely at each location and active conduits shall be located on the bottom unless noted otherwise.

END OF SECTION

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SECTION 16110

RACEWAY AND BOXES

PART 1 - GENERAL

1.01 SCOPE

A. This Section includes basic materials and electrical methods for all of Division 16, Electrical and Related Work.

1.02 RELATED WORK SPECIFIED ELSEWHERE

A. Concrete - Division 3

PART 2 - PRODUCTS

2.01 RACEWAYS AND FITTINGS

A. Rigid Metal Conduit – Hot-dipped galvanized heavy wall rigid steel conduit shall be used on all electrical and instrumentation systems. Conduit shall conform to Federal Specification WW-C-581d, and fittings shall conform to Federal Specification W-F-408, Type I and III, Class 1, Style 2.

B. Liquid Tight Flexible Metal Conduit – Flexible metal conduit shall be used on all electrical and instrumentation systems. Liquid tight flexible conduit shall conform to NEC Article 351 as manufactured by Appleton, Robroy, or Anaconda. Fittings shall be as manufactured by Midwest or Robroy and conform to Federal Specification W-F-406b, Type I, Class 3.

C. Rigid Non-Metallic Conduit – Polyvinyl chloride (PVC) conduit, boxes and fittings shall conform to NEMA TC-2 and to Military Specifications MIL-C-23571 for Type II, Schedule 40 and shall be used on specified grounding and utility company systems only.

D. Wireways and Auxiliary Gutters – Wireways and auxiliary gutters shall be galvanized steel with removable covers unless indicated as hinged. Components shall be as manufactured by Square 'D', Hoffman, Keystone, or General Electric. All wireways shall be without manufactured knockouts.

2.02 BOXES AND ACCESSORIES

A. Sheet steel boxes and accessories shall conform to Federal Specification W-J-800c, as manufactured by Appleton, Steel City, or Raco.

B. Cast metal ferrous outlets shall conform to Federal Specification W-C-568a, as manufactured by Appleton, Pyle-National, or Crouse-Hinds.

C. Pull boxes and junction boxes larger than 4-11/16" shall be constructed of galvanized steel in accordance with NFPA 70, Articles #370 and #373. Boxes shall be as manufactured by Hoffman, Boss, or Keystone. All boxes shall be without manufactured knockouts.

D. Cast, malleable iron outlet boxes shall have threaded conduit entrances and gasketed covers. Aluminum-type is not permitted. Boxes shall have a minimum of two hubs on the bottom, as manufactured by Appleton or Crouse-Hinds.

E. Concrete pull boxes shall be of the open bottom type, with an iron, locking cover marked "ELECTRIC" or "SIGNAL" as applicable, and shall be U.L. Listed and meet all codes.

F. Rigid Conduit Coupling – Where rigid steel conduit is used, jointing conduit runs shall be connected by a threaded coupling or three-piece couplings. Threadless coupling will not be permitted.

G. Rigid Conduit Bushing – Where rigid steel conduit is used, all terminations in boxes, panels, etc. shall have locknuts on both sides of equipment, with a bonded, grounding bushing.

H. Field Cut Threads – Field-cut threads must be cleaned with oil and painted with a coat of aluminum, or galvanized paint. Newly cut threads that are not coated will have rust or corrosion develop and will inhibit the grounding path of the conduit run.

I. Conduit Nipples – The use of all-thread is prohibited.

2.03 EXPANSION FITTINGS

A. Any expansion fittings used shall be manufactured by O-Z Electrical Manufacturing Company, and specified as follows: Rigid metal conduit - Type AX; Electrical metallic tubing - Type TX.

B. Miscellaneous – Coatings – Tnemec 46-465

PART 3 - EXECUTION

3.01 RACEWAYS

A. Use rigid, non-metallic conduit as follows, unless noted otherwise: Grounding systems and utility systems only.

B. Paint metal conduit in floor slab or in the ground with 2 coats of Tnemec 46-465.

C. Use liquid tight, flexible metal conduit for all connections to vibrating equipment, such as motors, valves, and devices on piping or ductwork. The maximum length shall be restricted to 18" or less, any longer lengths must have approval. It shall be restricted for use within 24 inches above the floor elevation. (A green bonding conductor will be required in all runs, with other conductors.)

D. Install exposed conduit parallel with, or at right angles to the building lines. Conduit larger than 1", except as indicated, in reinforced concrete slabs shall be parallel with, or at right angles to the supports of the slab. Conduit in concrete shall be located so as not to affect the structural strength of the slabs. Conceal all conduits in walls, above ceilings, in or under slabs or in furring, except in mechanical and electrical rooms and as indicated.

E. Route feeders, home runs, and conduits where indicated, except those minor deviations as approved, will be permitted.

F. All conduits that are embedded in concrete, pass through concrete, or stub-up shall have a 30-mil coating of Tnemec 46-465 over its entire length where embedded in concrete, and 12 inches before entering and 12 inches after exiting the concrete.

3.02 BOXES AND ACCESSORIES

A. Minimum size outlet box shall be 4" square by 1-1/2" deep unless otherwise approved or indicated otherwise.

B. Use cast malleable iron boxes for outlets with gasketed covers for all exterior and for all damp locations.

3.03 MISCELLANEOUS

A. Provide approved fire stopping materials at all chases to prevent drafts.

B. Provide expansion fittings in conduit runs crossing expansion joints in the structure.

C. Provide Jet Line #232 in all empty conduits.

D. Rigid Conduit fitting shall be cast, malleable iron, with stamped, galvanized steel, stainless steel screw covers, and gasket for use inside. Outside cast malleable iron galvanized, stainless steel screw and gasket.

END OF SECTION

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SECTION 16120

CONDUCTORS

PART 1 - GENERAL

This Section includes basic materials and methods for all of Division 16, Electrical and Related Work.

1.01 RELATED WORK SPECIFIED ELSEWHERE

A. Signal Conductors

1.02 APPLICABLE REQUIREMENTS

NEC Article 310 and 400
F.S.J-C-30
F.S.W-S-6106

PART 2 - PRODUCTS

2.01 CONDUCTORS

A. Conductors shall conform to Federal Specification J-C-30 for 600 volt, Types THWN/THHN, or XHHW stranded or as shown on the drawings. Sizes are AWG unless otherwise noted.

B. Grounding conductors larger than Size 1 AWG shall be soft drawn, bare copper or insulated copper. Control conductors for 100 to 600 volt shall be size 14 AWG copper, stranded, and color coded unless indicated otherwise.

C. Control conductors for 50 volt and under shall be plastic jacketed thermostat cable, Size 18 AWG single conductor, copper, multi-conductor as required. Fixture wire shall be Type THHN for all through wiring where permitted.

2.02 PORTABLE CORDS

A. Portable cord shall be stranded copper, UL Listed, and resistant to water, acid, and alkalis.

B. Each cord shall have one green covered conductor that shall be used as a grounding conductor.

2.03 SPLICES AND TERMINATIONS

A. Connections shall comply with Federal Specification W-S-610b. Connectors for temperatures to 105NC shall be Ideal Wing Nut or 3M-Scotchloc.

B. Tape shall be Scotch 33 or slip-knot grey. Voids shall be filled with rubber tape or Scotchfill.

C. Terminal boards shall be General Electric, Type CR151, type A2. Lugs for the terminal boards shall be the locking tongue type. Control terminals and motor connections up to size 3 shall be ring tongue type as manufactured by T&B Sta-Kon.

D. Heat shrink for all splices outdoors. Insulating and sealing of all in-line, cable splices from 16 AWG through 1000 kcmil shall be done in accordance with the instructions

provided with the Shrink-Kon heat shrinkable insulators, catalog series HS as manufactured by Thomas & Betts.

E. The connector insulator must be made of thermally stabilized, homogeneous polyolefin having internally applied sealant. It must have Underwriter's Listing (UL48, 90NC, 600V) and be approved for the use. It must be usable without additional covering or adhesive, both indoors and outdoors, in overhead, direct buried, or submersed applications at rated voltage. It must not be adversely affected by moisture, ozone, oils, fuels, mild acids and alkalis, or ultraviolet light. It must be compatible with all commonly used cable jacket materials including rubber, plastic, lead, steel, aluminum, and copper. All conductors larger than #10 shall have Noalox Non-Corrosive Paste applied to wires' ends and terminals before connections are made. This will prevent or retard corrosion.

PART 3 - EXECUTION

3.01 CONDUCTORS

A. Conductors size 10 AWG and smaller shall be copper and have insulation colored for phases A, B, and N respectively as follows for single phase systems: 120/240 volts, black, red, and white.

B. All-bonding conductors shall have a green covering and shall be the same size as the circuit conductors unless otherwise indicated.

C. Installation of conductors shall be made only in completed raceway systems and all conductors in any conduit shall be pulled in together.

D. Use wire pulling compounds or lubricants as listed by Underwriters' Laboratories or talc, graphite, or soapstone.

3.02 SPLICES AND TERMINATIONS

A. Use solder-less terminal lugs on all standard conductors. Use approved solder-less connectors for all splices. Keep splices to a minimum.

B. Splice all neutrals prior to connection to wiring devices. Splices other than pre-insulated connectors shall be covered neatly with insulation type equivalent in value to the conductor insulation. Use minimum of 2 layers of tape.

3.03 PHASING AND IDENTIFICATION

A. The phase designation of all secondary conductors shall be the same and shall be indicated in or on all 3-phase outlets, transformers, panelboards, and disconnect switches, and they shall be connected with uniform phase sequence.

B. Control wiring shall have a Brady® label or equal attached, secured with a clear piece of heat shrink tubing over the numbers. The numbers shall be attached 1 inch from each end. Tag each individual conductor or wire with a label stating the terminal designation indicated on schematic diagrams, or given on manufacturer's equipment lists, and at each terminal strip, relay, etc.

3.04 NUMBER OF CONDUCTORS

A. For convenience and simplicity, wire tics are shown only on home runs other than power circuits. The Contractor shall determine the correct combination of wires to be run in all raceways including home runs, branch circuit wiring and switch legs.

B. A green ground wire must be included in all conduits. Neutral wires shall be determined by the load and proper phasing on multi-wire branch circuits.

C. All conductors shall have identification per NEC and local codes.

1. Colored tape for feeder conductors should be secured on the conductor with clear piece of heat shrink tubing.

D. Conduit fill shall be sized per National Electric Code. All 120 volt circuits shall each have individual neutrals.

3.05 TESTING

A. After wiring has been pulled in raceways and before hook-up, wires shall be subject to an insulation test. A Megohmeter of 500 volts shall be used, and a minimum of 10 megohms will be acceptable. Test shall be witnessed by the ENGINEER. A 48-hour notification must be given before test(s) commence. It is typical that wire was abused during installation, usually due to lack of lubrication. The test will reveal any damage to insulation on wiring.

END OF SECTION

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SECTION 16180

SAFETY SWITCHES, CIRCUIT BREAKERS & FUSES

PART 1 - GENERAL

1.01 RELATED WORK SPECIFIED ELSEWHERE:

Panelboards - Section 16160

Applicable Documents:

NEMA AB-1	-	Molded Case Circuit Breakers
NEMA IC-1	-	Industrial Control
F.S. W-S-865c	-	Enclosed Switches
F.S. W-C-375a	-	Circuit Breakers
U.L.-198	-	Fuses
NEMA FU-1	-	Fuses

1.02 SUBMITTALS:

Submit Shop Drawings for review including catalog cuts showing sizes, types and characteristics of all products.

PART 2 - PRODUCTS

2.01 SAFETY SWITCHES/CIRCUIT BREAKER DISCONNECTS:

A. Safety switches shall conform to Federal Specifications W-S-865c, heavy duty type HD, fusible or non-fusible, with the poles, ampere, voltage and horsepower ratings indicated and shall have solid neutrals and Class R clips. Lugs shall be U.L. listed for copper-aluminum.

B. Enclosures for safety switches shall be NEMA-1, general purpose, except that switches indicated (WP) weatherproof, shall be NEMA-3R unless marked NEMA-4. Provide hubs as required for NEMA-3R enclosures with suitable gaskets and bonding means.

C. Switches and disconnects shall be as manufactured by Square 'D', General Electric, Siemens, or Eaton.

D. Circuit breaker disconnects may be used in lieu of safety switches providing they comply with the safety switch requirements and are applied within their ratings and a schedule is submitted for approval.

2.02 CIRCUIT BREAKERS, MOLDED CASE:

A. Circuit breakers shall conform to Fed. Spec. W-C-375a and NEMA Standard AB-1 unless indicated otherwise. Circuit breakers shall be of the ampere rating, voltage rating, number of poles and class or interrupting capacity (I.C.) as indicated. Interrupting ratings are given in root mean square (RMS), symmetrical amperes based on NEMA test procedures. Lugs and terminals shall be U.L. listed for copper-aluminum. Accessories shall be 120 volt.

B. Each circuit breaker shall have a trip unit for each pole with elements providing

inverse time delay under overload conditions and instantaneous magnetic trip for short circuit protection unless indicated as non automatic. Trip elements shall operate a common trip bar to open all elements.

2.03 FUSES:

A. Provide rejection fuses for all fusible equipment regardless of which section has furnished such equipment.

B. Fuses shall be of the ratings shown on the drawings, U.L. listed and shall be Bussman Manufacturing Co., Gould-Shawmut Company, CEFCO or approved equal.

C. All fuses shall be current limiting and have an interrupting capacity of at least 200,000 amperes RMS symmetrical.

D. The time-current characteristics and ratings shall be such that positive selective coordination is assured.

E. Fuses, 600 amperes and lower, where applied to general feeder and branch circuit protection, shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP LPS-RK-SP, "Low Peak". Gould-Shawmut dual element "Amp-Trap."

F. Fuses, where required for circuit breaker protection shall conform to U.L. Class RK-1 standards and be Bussmann Type LPN-RK-SP or LPS-RK-SP "Low Peak", or Gould-Shawmut Class RK1 "Amp-Trap."

G. Coordination and current limitations or the protection of each part of the electrical system must be designed around the type and class and manufacturer selected for that type and class.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Mount grouped switches, disconnects, and controls on backboards or unistrut. Provide labels on or in all fusible equipment indicating the type and size replacement fuse required.

B. Generally, mount switches and disconnects between 4' and 5' A.F.F., readily accessible.

3.02 FUSES:

A. Install all fuses as required where indicated on the drawings and where required by the National Electrical Code, special attention shall be given to air conditioning equipment.

B. Provide 10% spares (minimum of three) of each size and type of fuses furnished. Spare fuses shall be placed in a wall mounted cabinet equal to: Bussmann SFC which shall be located in the switchgear room.

END OF SECTION

SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. Section includes equipment identification labels.

1.03 SUBMITTALS

A. Product Data – For each electrical identification product indicated.

B. Identification Schedule – An index of nomenclature of electrical equipment and system components used in identification signs and labels.

1.04 QUALITY ASSURANCE

A. Comply with ANSI A13.1.

B. Comply with NFPA 70.

C. Comply with 29 CFR 1910.144 and 29 CFR 1910.145.

D. Adhesive-attached labeling materials, including label stocks, laminating adhesives, and inks used by label printers, shall comply with UL 969.

1.05 COORDINATION

A. Coordinate identification names, abbreviations, colors, and other features with requirements in other Sections requiring identification applications, Drawings, Shop Drawings, manufacturer's wiring diagrams, and the Operation and Maintenance Manual; and with those required by codes, standards, and 29 CFR 1910.145. Use consistent designations throughout Project.

B. Coordinate installation of identifying devices with completion of covering and painting of surfaces where devices are to be applied.

C. Coordinate installation of identifying devices with location of access panels and doors.

PART 2 - PRODUCTS

2.01 UNDERGROUND-LINE WARNING TAPE

A. Tape

1. Recommended by manufacturer for the method of installation and suitable to identify and locate underground electrical, controls and I&C raceways.

2. Printing on tape shall be permanent and shall not be damaged by burial operations.

3. Tape material and ink shall be chemically inert, and not subject to degrading when exposed to acids, alkalis, and other destructive substances commonly found in soils.

B. Color and Printing

1. Comply with ANSI Z535.1 through ANSI Z 535.5.

2. Inscriptions for Red-Colored Tapes: ELECTRIC LINE, LOW VOLTAGE.

3. Inscriptions for Orange-Colored Tapes: I&C CABLE, OPTICAL FIBER CABLE.

2.02 EQUIPMENT IDENTIFICATION LABELS

A. Self-Adhesive, Engraved, Laminated Acrylic or Melamine Label – Adhesive backed, with white letters on a dark-gray background. Minimum letter height shall be 3/8 inch.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Verify identification of each item before installing identification products.

B. Location – Install identification materials and devices at locations for most convenient viewing without interference with operation and maintenance of equipment.

C. Apply identification devices to services that require finish after completing finish work.

D. Self-Adhesive Identification Products – Clean surfaces before application, using materials and methods recommended by manufacturer of identification device.

E. Underground-Line Warning Tape – During backfilling of trenches install continuous underground-line warning tape directly above line at 6 to 8 inches (150 to 200 mm) below finished grade. Use multiple tapes where width of multiple lines installed in a common trench exceeds 16 inches overall.

3.02 IDENTIFICATION SCHEDULE

A. Locations of Underground Lines – Identify with underground-line warning tape for electrical, controls and I&C wiring and optical fiber cable.

B. Equipment Identification Labels – On each unit of equipment, install unique designation label that is consistent with wiring diagrams, schedules, and the Operation and Maintenance Manual. Apply labels to disconnect switches and protection equipment, central or master units, control panels, control stations, terminal cabinets, and racks of each system. Systems requiring labels include power, lighting, control, and I&C unless equipment is provided with its own identification.

1. Labeling Instructions

a. Indoor Equipment – Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high. Utilize white

lettering on black background.

b. Outdoor Equipment: Self-adhesive, engraved, laminated acrylic or melamine label. Unless otherwise indicated, provide a single line of text with 1/2 inch high letters on 1-1/2 inch high label; where two lines of text are required, use labels 2 inches high. Utilize white lettering on black background.

2. Equipment to be Labeled.

a. Enclosures and electrical cabinets

b. Motor Control Centers

c. Enclosed switches

d. Variable Frequency Drives

e. Monitoring and control equipment

END OF SECTION

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SECTION 16450

GROUNDING

PART 1 - GENERAL

1.01 SCOPE

This Section includes basic materials and methods for all Division 16 and related electrical work.

1.02 APPLICABLE REQUIREMENTS

NEC Article 250

PART 2 - PRODUCTS

2.01 GROUND RODS

Ground rods shall be a minimum of 5/8" diameter by 10' length & copper-clad, unless otherwise specified. Grounding accessories shall be as manufactured by Burndy, Erico or Thompson.

PART 3 - EXECUTION

3.01 INSTALLATION

A. End to end fixtures shall be continuously bonded. Grounding contact of receptacles shall be connected to a solidly grounded conduit system or to a system grounding conductor (not the system neutral) by a stranded copper wire not smaller than 12 AWG or shall be grounded in some other approved manner.

B. Bond all metal parts. Make equipment and bus connections with suitable lugs or clamps. Cadweld all wire-to-ground rod joints. Cadweld all wire-to-wire joints size 1/0 AWG and over.

C. Bond all conduits stubbing under switchboards, transformers and similar locations using bonding bushings. Bond each conduit separately.

D. Provide a bonding wire from grounding bushings on all conduit terminated at panels, boxes, wireways, panels, etc.

E. Provide a bond wire in all flexible metal conduits and connect to the boxes at each end in an approved manner.

F. Use PVC for sleeving grounding conductors, except that where sleeves are subject to extreme injury use rigid metal conduit bonded at both ends.

G. Ground all separately derived sources such as transformers to adjacent cold water pipe or building steel in accordance with NEC.

H. Grounding of all equipment should be accomplished with lugs equal to T & B "Locktite" one bolt hole tongue #31003 or equal.

I. All conduit to Service entrance equipment and Transfer Switch along with Load Center shall have Grounding Bushing on all conduit and ground to box, cabinet, etc.

This will give an added protection in grounding all the electrical systems.

END OF SECTION