TECHNICAL PROVISIONS
FOR

BARBER PARK
PLAYGROUND IMPROVEMENTS

ORANGE COUNTY,
FLORIDA

ORANGE COUNTY
CAPITAL PROJECTS DIVISION
400 E. SOUTH STREET
ORLANDO, FL 32801

PREPARED BY:

CPWG
CRIBB PHILBECK WEAVER GROUP

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BID DOCUMENTS
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SECTION 01001 - PROJECT DIRECTORY

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Electrical/Mechanical	Architectural Design Collaborative, Inc. 945 North Pennsylvania Avenue Winter Park FL 32789 (407) 629-1188 KANDERSON@adcinternational.net

END SECTION - 01001

SECTON 01005-ADMINISTRATIVE PROVISIONS

PART I GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS

A. Work of this Contract comprises site work, remove existing playground, construct new playground, utilities, grading, paving, drainage, demolition and related construction work to produce a complete and functional BARBER PARK PLAYGROUND IMPROVES including but not limited to a complete new playground area and addition parking for the BARBER PARK PLAYGROUND IMPROVEMENT project.

1.02 CONTRACT METHOD

A. Construct the work under a single lump sum contract (or as otherwise defined in bid documents).

1.03 COORDINATION

A. Coordinate work of the various Sections of Specifications to assure efficient and orderly sequence of installation of construction elements, with provisions for accommodating items installed later.

B. Verify characteristics of elements of interrelated operating equipment are compatible; coordinate work of various Sections having interdependent responsibilities for installing, connecting to and placing in service such equipment. Differences shall be brought to the Owner’s attention during bid process or remain the responsibility of the Contractor.

C. Coordinate space requirements and installation of items, such as but not limited to, mechanical, plumbing, systems and electrical work which are indicated diagrammatically or otherwise on drawings. Follow routing shown for pipes, ducts and conduits, as closely as practicable; make runs parallel with lines of building. Utilize spaces efficiently to maximize accessibility for other installations, for facility maintenance and for future repairs.

D. In finished areas (except as otherwise shown), conceal pipes, ducts, and wiring in the construction. Coordinate locations of fixtures and outlets with finish elements.

E. Execute cutting and patching to integrate elements of work, uncover ill timed, defective and nonconforming work, provide openings for penetrations of existing surfaces and provide samples as specified in individual sections for testing. Seal penetrations through floors, walls and ceilings, and fire safe where necessary as part of the lump sum price.

1.04 FIELD ENGINEERING SURVEYING

A. Provide field engineering surveying services; establish grades, lines and levels, by use of engineering survey practices recognized as standard by the survey industry. Said work shall be required to be provided by a Professional Land Surveyor, registered as such in the State of Florida.

1.05 REFERENCE STANDARDS

A. For products specified by association or trade standards, comply with requirements of the standard, except when more rigid requirements are specified or are required by applicable codes.

B. The date of the standard is that in effect when a specified date is specified and if no date is specified, use the latest edition.

C. Obtain copies of referenced standards listed in individual specification sections. Maintain copy at job site during progress of the specific work.

END OF SECTION 01005

SECTION 01010-SUMMARY OF WORK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 PROJECT DESCRIPTION

Performance of all tasks specified in the contract documents shall be the responsibility of the contractor unless specified otherwise. The description of the project is as follows: replace an existing playground area with a new playground, stormwater drainage, new parking lot, sidewalks, excavation, sodding, and miscellaneous site work.

The project has one additive bid as discussed below.

Additive 1 – North Parking and Walkway
The additive will include

1. Prepare the area
2. Construct 26 parking spaces and associated work

1.03 WORK UNDER OTHER CONTRACTS

A. Separate contracts may be issued to perform certain construction operations at the site.

1.04 BUILDING/SITE SECURITY

A. The site shall be secured by the General Contractor from unwarranted entry at the end of each day.

B. The construction site shall be secured by means of a construction fence, located around the entire perimeter of the construction site. This construction fence shall be required to be secure from unwarranted entry at the end of each day.

1.05 CONTRACTOR USE OF PREMISES

A. General: During the construction period the Contractor shall have full use of the premises for construction operations, including use of the site. The Contractors use of the premises is limited only by the Owners right to perform construction operations with the own forces or to employ separate contractors on portions of the project.

B. General: Limit use of the premises to construction activities in areas indicated within the limit of the premises the Contractor may use any portion of the site for storage or work areas or any legal purpose.

1. Confine operations to areas within Contract limits indicated on the Drawings. Portions of the site beyond areas in which construction operations are indicated are not to be disturbed.

2. Keep driveways and entrances serving the premises clear and available to the Owner and the Owners employees at all times. Do not use these areas for parking or storage of materials.

3. Burial of Waste Materials: Do not dispose of construction debris, vegetation and hazardous material on site, either by burial or by burning.

1.06 DISTRIBUTION OF RELATED DOCUMENTS

A. The Contractor is solely responsible for the distribution of ALL related documents/drawings/specifications to ALL appropriate vendors/ subcontractors to insure proper coordination of all aspects of the project and its related parts during bidding and construction.

1.07 CONTRACT DOCUMENT FILE

A. Copies of the Contract Documents, Plans, Specifications, Addenda, Change Orders, Architects Supplemental Instructions, approved Shop Drawings, Substitution Approvals, etc. shall be placed and maintained in the Contractors field office at the project site by the Contractor throughout the entire contract period. Said these documents shall be filed in a manner that allows for ease of retrieval. Documents shall be made available to the Architect/Engineer and the County’s representatives throughout this same period.

PART 2 PRODUCTS

2.01 ASBESTOS FREE MATERIAL

A. Contractor shall provide a written and notarized statement on company letterhead(s) to certify and warrant that ONLY ASBESTOS FREE MATERIALS AND PRODUCTS were provided as required in this section. Such statement shall be submitted with the final payment request. Final payment shall not be made until such statement is submitted. Contractor agrees that if materials containing asbestos are subsequently discovered at any future time to have been included in the construction, the contractor shall be liable for all costs related to the redesign or modification on the construction of the project so that materials containing asbestos are removed from the facility. If construction has begun or has been completed pursuant to a design that includes asbestos containing materials, the Contractor shall also be liable for all costs related to the abatement of such asbestos.

PART 3 EXECUTION (Not applicable).

END OF SECTION 01010

SECTION 01027-APPLICATION FOR PAYMENT

PART I GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractor's Applications for Payment.

B. The Contractor's Construction Schedule and Submittal Schedule are included in Section 01300 – SUBMITTALS □

1.03 SCHEDULE OF VALUES

A. Coordinate preparation of the Schedule of Values with preparation of Contractor's Construction Schedule.

1. Submit the Schedule of Values to the Owner at the earliest feasible date, but in no case later than Preconstruction Meeting. Refer to Section 01200 – Project Meetings.

2. Sub-Schedules: Where the Work is separated into phases that require separately phased payments, provide sub-schedules showing values correlated with each phase of payment.

B. Format and Content: Use the Project Manual Table of Contents as a guide to establish the format for the Schedule of Values.

1. Identification: Include the following project identification on the Schedule of Values:

a. Project name and location.
b. Name of the Architect
c. Project Number
d. Contractor's name and address
e. Date of submittal

2. Arrange the Schedule of Values in a tabular form with separate columns to indicate the following for each item listed:

    a. Generic name
    b. Related Specification Section
    c. Change Orders (numbers) that have affected value
    d. Dollar Value
    e. Percentage of Contract Sum to the nearest one-hundredth percent, adjusted to total 100 percent

3. Provide a breakdown of the Contract Sum in sufficient detail to facilitate continued evaluation of Applications for Payment and progress reports. Break principal subcontract amounts down into several line items:

    a. A value will be given for at least every major specification section (subsections can logically be grouped together).
    b. A single material subcontractor (i.e. sod, window blinds) will not be required to be broken down into labor and material unless it is anticipated the materials will be stored and invoiced prior to installation.
    c. All multiple item subcontracts or work items (i.e. concrete, roofing, painting, mechanical, electrical items, etc.) will be shown broken down at least in labor and material (all taxes, burden and overhead and profit included).
    d. Mobilization (move-on, bond, insurance, temporary office and sanitary service installation) shall not exceed 2.5% of contract price.
    e. For multi-story work all items broken down per floor.
    f. Concrete broken down at least into foundation slab on grade, columns, beams and suspended slabs.
    g. Masonry divided into C.M.U. brick, stem walls, exterior walls, interior walls and elevator shaft.
    h. Plumbing broken down at least into underslab rough-in, vents and stacks supply piping, equipment items (each listed separately), fixtures and trim.
    I. HVAC: Typically shown per specification section, labor and material, per floor.
    j. Electrical: same as HVAC.
    k. Fire protection broken down at least into underground, rough-in and trim. All per building and labor and material.
    l. Logical grouping of specification subsections is permitted.
    m. Include line item for closeout documents.

4. Round amounts off the nearest whole dollar, the total shall equal the Contract Sum.

5. For each part of the Work where an Application for Payment may include materials or equipment, purchased or fabricated and stored, but not yet installed, provide separate line items on the Schedule of Values for initial cost of the materials, for each subsequent stage of completion, and for total installed value of that part of the Work.
6. Margins of Cost: Show line items for indirect costs, and margins on actual costs, only to the extent that such items will be listed individually in Applications for Payment. Each item in the Schedule of Values and Applications for Payment shall be complete including its total cost and proportionate share of general overhead and profit margin.

    a. At the Contractors' option, temporary facilities and other major cost items that are not direct cost of actual work-in-place may be shown as separate line items in the Schedule of Values or distributed as general overhead expense.

7. Schedule Updating:

1.04 APPLICATIONS FOR PAYMENT

A. Each Application for Payment shall be consistent with previous applications and payments as reviewed by the Owner representative and paid for by the Owner.

    1. The initial Application for Payment, the Application for Payment at time of Substantial Completion, and the Final Application for Payment involve additional requirements. See items G, I, J and K of this section.

B. Payment Application Times: The period of construction work covered by each Application of Payment is the period indicated in the Agreement.

C. Payment Application Forms: Use the County's most updated form as the form for Application for Payment. Form is given at the Preconstruction Conference.

D. Application Preparation: Complete every entry on the form, including notarization and execution by person authorized to sign legal documents on behalf of the Owner. Incomplete applications will be returned without action.

    1. Entries shall match data on the Schedule of Values and Contractors' Construction Schedule. Use updated schedules if revisions have been made.

    2. Include amounts of Change Orders and Construction Change Directives issued prior to the last day of the construction period covered by the application.

E. Transmittal: Submit five (5) original executed copies of each Application for Payment to the Project Manager by means ensuring receipt within 24 hours; one copy shall be complete, including waivers of lien and similar attachments, when

required.

1. Transmit each copy with a transmittal form listing attachments, and recording appropriate information related to the application in a manner acceptable to the Project Manager.

F. Payment will be processed once a month. Payment for item will be based on percentage completed as determined and approved by the County Project Manager or invoice for stored materials. Retainage (10%) will be held for all applications.

G. Application for Payment at Substantial Completion: Following issuance of the Certificate of Substantial Completion, submit an Application for Payment; this application shall reflect any Certificates of Partial Substantial Completion issued previously for Owner occupancy of designated portions of the Work. Application shall also include all items listed in Part H. above.

H. Final Payment Application: Administrative actions and submittals, which must precede or coincide with submittal of the final payment. Application for Payment includes the following:

1. Completion of Project Close-Out requirements
2. Completion of items specified for completion after Substantial Completion (Punch List)
3. Contractor's release of lien (on Owner's form)
4. Subcontractor and material supplier release of lien
5. Consent of Surety
6. Power of attorney
7. Asbestos-free letter
8. Project requiring badging, provide sworn notarized statement and signed submittal (by owner) that badges have been returned
9. Current Insurance Certificate
10. If Davis Bacon, final Certified Payroll

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01027

SECTION 01035-MODIFICATION PROCEDURES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this section.

1.02 SUMMARY

A. This section specifies administrative and procedural requirements for handling and processing Contract modifications.

1.03 MINOR CHANGES IN THE WORK

A. Supplemental instructions authorizing minor changes in the work, not involving an adjustment to the Contract Sum or Contract Time, will be issued by the Project Manager.

1.04 CHANGE ORDER PROPOSAL REQUESTS

A. Owner-Initiated Proposal Requests: Proposed changes in the work that will require adjustment to the Contract Sum or Contract Time will be issued by the Project Manager, with a detailed description of the proposed change and supplemental or revised Drawings and Specifications, if necessary.

1. Proposal requests issued by the Project Manager are for information only. Do not consider them instruction either to stop work in progress, or to execute the proposed change.

2. Unless otherwise indicated in the proposal request, within 7 days of receipt of the proposal request, submit to the Project Manager from the Owner's review, an estimate of cost necessary to execute the proposed change.

    a. Include a list of quantities of products to be purchased and unit costs, along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.
    b. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.
    c. Include a statement indicating the effect the proposed change in the work will have on the Contract Time.
    d. Contractor and subcontractors will provide a complete detailed

labor and material breakdown to justify change order request amount.

e. Pricing not received within 15 days shall be considered a zero cost item.

B. Contractor-Initiated Change Order Proposal Requests: When latent or other unforeseen conditions in mutual accord with the Owner Representative's findings require modifications to the Contract, the Contractor may propose changes by submitting a request for a change to the Architect.

1. Include a statement outlining the reasons for the change and the effect of the change on the Work. Provide a complete description of the proposed change. Indicate the effect of the proposed change on the Contract Sum and Contract Time.

2. Include a list of quantities of products to be purchased and unit costs along with the total amount of purchases to be made. Where requested, furnish survey data to substantiate quantities.

3. Indicate applicable taxes, delivery charges, equipment rental, and amounts of trade discounts.

4. Comply with requirements in Section 01631 Product Substitutions- if the proposed change in the work requires that substitution of one product or system for a product or system not specified.

5. Contractor and subcontractors will provide a complete detailed labor and material breakdown to justify change order request amounts.
6. Contractor shall submit pricing within 15 calendar days of the condition causing the change. If the change is the result of an RFI this pricing shall be submitted within 15 calendar days of the response date. Failure to do so will result in a zero cost change order.
7. If the change is a result of an ASI (Architects Supplemental Instruction) pricing shall be submitted by the contractor within 15 calendar days of the issued date of the ASI. Failure to do so will result in a zero cost change order.

1.05 CONSTRUCTION CHANGE DIRECTIVE

A. Construction Change Directive: When the Owner and Contractor are not in total agreement on the terms of a Change Order Proposal Request, the Project Manager may issue a Construction Change Directive instructing the Contractor to proceed with a change in the Work, for subsequent inclusion in a Change Order.

1. The Construction Change Directive will contain a complete description of the change in the Work and designate the method to be followed to determine change in the Contract Sum or Contract Time.

B. Documentation: Maintain detailed records on a time and material basis of work required by the Construction Change Directive.

1. After completion of the change, submit an itemized account and supporting data necessary to substantiate cost and time adjustments to the Contract.

1.07 CHANGE ORDER PROCEDURES

A. Upon the Owner's approval of a Change Order Proposal Request, the Project Manager will issue a Change Order for signatures of the Owner and Contractor on County's Change Order form, as provided in the Conditions of the Contract.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01035

SECTION 01040-PROJECT COORDINATION

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and supervisory requirements necessary for project coordination including, but not necessarily limited to:

1. Coordination
2. Administrative and supervisory personnel
3. General installation provisions
4. Cleaning and protection

B. Preconstruction meetings, Progress meetings, Coordination meetings and Pre-installation conferences are included in Section 01200 ‘Project Meetings’.

C. Requirements for the Contractor’ Construction Schedule are included in Section 01300 ‘Submittals’.

1.03 COORDINATION

A. Coordination: Coordinate construction activities included under various Sections of these Specifications to ensure efficient and orderly installation of each part of the Work. Coordinate construction operations included under different Sections of the Specification that are dependent upon each other for proper installation, connection, and operation.

1. Where installation of one part of the Work is dependent on installation of other components, either before or after its own installation, schedule construction activities in the sequence required to obtain the best results.

2. Where availability of space is limited, coordinate installation of different components to assure maximum accessibility for required maintenance, service and repair.

3. Make adequate provisions to accommodate items scheduled for later installation.

B. Where necessary, prepare memoranda for distribution to each party involved outlining special procedures required for coordination. Include such items as required: notices, reports, and attendance at meetings.

1. Prepare similar memoranda for the Owner and separate Contractors where coordination of their Work is required.

C. Administrative Procedures: Coordinate scheduling and timing of required administrative procedures with other construction activities to avoid conflicts and ensure orderly progress of the Work. Such administrative activities include, but are not limited to, the following:

1. Preparation of Schedules
2. Installation and removal of temporary facilities
3. Delivery and processing of submittals
4. Progress meetings
5. Project close-out activities

D. Conservation: Coordinate construction activities to ensure that operations are carried out with consideration given to conservation of energy, water, and materials.

1. Salvage materials and equipment (if any) involved in performance of, but not actually incorporated in, the Work.

E. Lack of coordination as specified in this and other sections of the contract documents are in grounds for assessment of back charges and/or termination in order to remediate the situation.

1.04 SUBMITTALS

A. Coordination Drawings: Prepare and submit coordination Drawings where close and careful coordination is required for installation of products and materials fabricated off-site by separate entities, and where limited space availability necessitates maximum utilization of space for efficient installation of different components.

1. Show the interrelationship of components shown on separate Shop Drawings.

2. Indicate required installation sequences.

3. Comply with requirements contained in Section Submittals.

4. Refer to Appropriate Mechanical and Electrical Specifications for specific

coordination drawing requirements for mechanical and electrical installations.

B. Staff Names: At the Preconstruction Conference submit a list of the Contractor's principal staff assignments, including the Superintendent and other personnel in attendance at the site; identify individuals, their duties and responsibilities; list their addresses and telephone numbers.

1. Post copies of the list in the project meeting room, the temporary field office, and each temporary telephone.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 PROCUREMENT

A. Contractor shall have all subcontractors under contract within 60 days of execution of contract with owner

3.02 GENERAL INSTALLATION PROVISIONS

A. Inspection of Conditions: Require the Installer of each major component to inspect both the substrate and conditions under which work is to be performed. Do not proceed until unsatisfactory conditions have been corrected in an acceptable manner.

B. Manufacturer's Instructions: Comply with manufacturer's installation instructions and recommendations, to the extent that those instructions and recommendations are more explicit or stringent than requirements contained in Contract Documents.

C. Inspect materials or equipment immediately upon delivery and again prior to installation. Reject damaged and defective items.

D. Provide attachment and connection devices and methods necessary for securing work. Secure work true to line and level. Allow for expansion and building movement.

E. Visual Effects: Provide uniform joint widths in exposed work. Arrange joints in exposed work to obtain the best visual effect. Refer questionable choices to Project Manager for final decision.

F. Recheck measurements and dimensions, before starting each installation.

G. Install each component during weather conditions and Project status that will ensure the best possible results. Isolate each part of the completed construction

from incompatible material as necessary to prevent deterioration.

H. Coordinate temporary enclosures with required inspections and tests, to minimize the necessity of uncovering completed construction for that purpose.

I. Mounting Heights: Where mounting heights are not indicated, put request in writing and refer to the Architect/Project Manager for final decision.

3.03 CLEANING AND PROTECTION

A. During handling and installation, clean and protect construction in progress and adjoining materials in place. Apply protective covering where required to ensure protection from damage or deterioration at Substantial Completion.

B. Clean and maintain completed construction as directed by the Project Manager and as frequently as necessary to ensure its integrity and safety through the remainder of the construction period. Adjust and lubricate operable components to ensure operability without damaging effects.

C. Limiting Exposures: Supervise construction activities to ensure that no part of the construction, completed or in progress, is subject to harmful, dangerous, damaging, or otherwise deleterious exposure during the construction period. Where the applicable, such exposures include, but are not limited to, the following:

1. Excessive static or dynamic loading
2. Excessively high or low temperatures
3. Excessively high or low humidity
4. Air contamination or pollution
5. Water
6. Solvents
7. Chemicals
8. Soiling, staining and corrosion
9. Rodent and insect infestation
10. Combustion
11. Destructive testing
12. Misalignment
13. Excessive weathering
14. Unprotected storage
15. Improper shipping or handling
16. Theft
17. Vandalism

END OF SECTION 01040

SECTION 01045 - CUTTING AND PATCHING

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for cutting and patching.

B. Refer to other Sections for specific requirements and limitations applicable to cutting and patching individual parts of the Work.

1. Requirements of this Section apply to mechanical and electrical installations. Refer to the appropriate Mechanical and Electrical -16 Sections for other requirements and limitations applicable to cutting and patching mechanical and electrical installations.

1.03 SUBMITTALS

A. Cutting and Patching Proposal: Where approval of procedures for cutting and patching is required before proceeding, submit a proposal describing procedures well in advance of the time cutting and patching will be performed and request approval to proceed. Include the following information, as applicable, in the proposal:

1. Describe the extent of cutting and patching required and how it is to be performed; indicate why it cannot be avoided.

2. Describe anticipated results in terms of changes to existing construction; include changes to structural elements and operating components as well as changes in the building’s appearance and other significant visual elements.

3. List products to be used and firms or entities that will perform Work.

4. Indicate dates when cutting and patching is to be performed.

5. List utilities that will be disturbed or affected, including those that will be relocated and those that will be temporarily out-of-service. Indicate how long service will be disrupted.

6. Where cutting and patching involves addition of reinforcement to structural elements, submit details and engineering calculations to show

how reinforcement is integrated with the original structure.

7. Approval by the Owner to proceed with cutting and patching does not waive the Owner's right to later require complete removal and replacement of a part of the Work found to be unsatisfactory.

1.04 QUALITY ASSURANCE

A. Requirements for Structural Work: Do not cut and patch structural elements in a manner that would reduce their load carrying capacity or load-deflection ratio.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following structural elements.

a. Foundation construction
b. Bearing and retaining walls
c. Structural concrete
d. Structural steel
e. Lintels
f. Timber and primary wood framing
g. Structural decking
h. Miscellaneous structural metals
I. Stair systems
j. Exterior curtain wall construction
k. Equipment supports
l. Piping, ductwork, vessels and equipment
m. Structural systems of special construction as noted in Specifications.

B. Operational and Safety Limitations: Do not cut and patch operating elements or safety related components in a manner that would result in reducing their capacity to perform as intended, or result in increased maintenance, or decreased operational life or safety. Refer to Mechanical and Electrical Divisions regarding Fire Rated Penetrations.

1. Obtain approval of the cutting and patching proposal before cutting and patching the following operating elements or safety related systems.

a. Shoring, bracing and sheeting
b. Primary operational systems and equipment
c. Air or smoke barriers
d. Water, moisture, or vapor barriers
e. Membranes and flashings
f. Fire protection systems
g. Noise and vibration control elements and systems
h. Control systems
I. Communication systems
j. Conveying systems

k. Electrical wiring systems
l. Special construction as noted in specifications
m. Elevators and elevator equipment

C. Visual Requirements: Do not cut and patch construction exposed on the exterior or in occupied spaces, in a manner that would, in the Designer's and or Owner's opinion, reduce the building's aesthetic qualities, or result in visual evidence of cutting and patching. Remove and replace work cut and patched in a visually unsatisfactory manner.

1. If possible retain the original installer or fabricator to cut and patch the following categories of exposed work, or if it is not possible to engage the original installer or fabricator, engage another recognized experienced and specialized firm:

a. Processed concrete finishes
b. Preformed metal panels
c. Window wall system
d. Stucco and ornamental plaster
e. Acoustical ceilings
f. Carpeting
g. Wall covering
h. HVAC enclosures, cabinets or covers
I. Roofing systems

PART 2 PRODUCTS

2.01 MATERIALS

A. Use materials that are identical to existing materials. If identical materials are not available or cannot be used where exposed surfaces are involved, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect unless otherwise indicated by Architect/Owner. Use materials whose installed performance will equal or surpass that of existing materials.

PART 3 EXECUTION

3.01 INSPECTION

A. Before cutting existing surfaces, examine surfaces to be cut and patched and conditions under which cutting and patching is to be performed. Take corrective action before proceeding, if unsafe or unsatisfactory conditions are encountered.

1. Before proceeding, meet at the site with all parties involved in cutting and patching, including mechanical and electrical trades. Review areas of potential interference and conflict. Coordinate procedures and resolve potential conflicts before proceeding.

2. In an occupied Building, any items which may result in a flammable

combustible reaction shall have a designated firewatch.

3.

3.02 PREPARATION

A. Temporary Support: Provide temporary support of work to be cut.

B. Protection: Protect existing construction during cutting and patching to prevent damage. Provide protection from adverse weather conditions for portions of the Project that might be exposed during cutting and patching operations.

C. Avoid interference with use of adjoining areas and interruption of free passage to adjoining areas.

D. Take all precautions necessary to avoid cutting existing pipe, conduit or ductwork serving the building, but scheduled to be removed or relocated until provisions have been made to bypass them.

3.03 PERFORMANCE

A. General: Employ skilled workmen to perform cutting and patching. Proceed with cutting and patching at the earliest feasible time and complete without delay.

1. Cut existing construction to provide for installation of other components or performance of other construction activities and the subsequent fitting and patching required to restore surfaces to their original condition.

B. Cutting: Cut existing construction using methods least likely to damage elements to be retained or adjoining construction. Where possible review proposed procedures with the original installer; comply with the original installer’s recommendations.

1. In general, where cutting is required use hand or small power tools designed for sawing or grinding, not hammering and chopping. Cut holes and slots neatly to size required with minimum disturbance of adjacent surfaces. Temporarily cover openings when not in use.

2. To avoid marring existing finished surfaces, cut or drill from the exposed or finished side into concealed surfaces.

3. Cut through concrete and masonry using a cutting machine such as a Carborundum saw or diamond core drill. Use wet cutting methods unless not possible.

4. Comply with requirements of applicable Specification Sections where cutting and patching required excavating and backfilling.

5. By-pass utility services such as pipe or conduit, before cutting, where services are shown or required to be removed. Cap, valve or plug and seal

the remaining portion of pipe or conduit to prevent entrance of moisture or other foreign matter after by-passing and cutting.

C. Patching: Patch with durable seams that are as invisible as possible. Comply with specified tolerances.

1. Where feasible, inspect and test patched areas to demonstrate integrity of the installation.

2. Restore exposed finishes of patched areas and extend finish restoration into retained adjoining construction in a manner that will eliminate evidence of patching and refinishing.

3. Where removal of walls or partitions extends one finished area into another, patch and repair floor and wall surfaces in the new space to provide an even surface of uniform color and appearance. Remove existing floor and wall coverings and replace with new materials if necessary to achieve uniform color and appearance.

a. Where patching occurs in a smooth painted surfaces, extend final coat over entire unbroken surfaces containing the patch, after the patched area has received primer and second coat.

3.04 CLEANING

A. Thoroughly clean areas and spaces where cutting and patching is performed or used as access. Remove completely paint, mortar, oils, putty and items of similar nature. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied. Restore damaged materials to their original condition.

END OF SECTION 01045

SECTION -01070 ABBREVIATIONS

PART 1 GENERAL

A. General:

A	Area Square Feet; Ampere
AAMA	Architectural Minimum Manufacturer's Association
ABS	Acrylonitrile Butadiene Styrene
A.C.	Alternating Current; Air conditioning; Plywood Grade A & C
A.B.	Anchor Belt
A.C.I.	American Concrete Institute
Acous.	Acoustical
AD	Plywood, Grade A & D
A.D.	Area Drain
Adh.	Adhesive
Addit	Additional
Adj.	Adjustable
af	Audio-frequency
Aff	Above Finished Floor
Afg	Above Finished Grade
A.G.A.	American Gas Association
Agg.	Aggregate
A.H.	Ampere Hours
A hr.	Ampere-hour
A.H.U.	Air Handing Unit
A.I.A.	American Institute of Architects
A.I.C.	Alternating Interrupting Capacity
AIC	Ampere Interrupting Capacity
AISC	American Institute of Steel Construction
Allow.	Allowance
ALT.	Alternate
Alt.	Altitude
Alum.	Aluminum
a.m.	Ante Meridiem
Amp.	Ampere
Anc.	Anchor
Anod.	Anodized
ANSCI	American National Standards Institute
A.P.	Access Panel
Appd.	Approved
Approx.	Approximately
Apt.	Apartment
Arch.	Architectural

Asb.	Asbestos
A.S.B.C.	American Standard Building Code
A.S.H.R.A.E.	American Society of Heating, Refrig. & AC Engineers
A.S.M.E.	American Society of Mechanical Engineers
A.S.T.M.	American Society for Testing and Materials
Attchmt.	Attachment
Auto.	Automatic
Avg.	Average
A.W.G.	American Wire Gauge
AWI	American Wood Institute
AWS	American Welding Society
Bbl.	Barrel
B.C.	Bare Copper
B.& B.	Grade B. and Better;Balled and Burlapped
B.& S.	Bell and Spigot
B.& W.	Black and White
b.c.c.	Body-centered Cubic
Bd	Board
BE	Bevel End
B.F.	Board Feet
BF.	Bottom Face
Bg. Cem	Bag of Cement
BHP	Boiler Horsepower, Brake Horsepower
B.I.	Black Iron
Bit. ;Bitum	Bituminous
Bk.	Backed
Bkrs.	Breakers
Bldg.	Building
Blk.	Block
Blkg.	Blocking
Bm.	Beam
B.M.	Benchmark
B.O.C.	Bottom of Curb
BOT.	Bottom
Boil.	Boilermaker
B.P.M.	Blows Per Minute
BR	Bedroom
Brg.	Bearing
Brhe.	Bricklayer Helper
Bric.	Bricklayer
Brk.	Brick
Brkt.	Bracket
Brng.	Bearing
Brs.	Brass
Brz.	Bronze
Bsmt.	Basement
Bsn.	Basin

Btr.	Better
BTU	British Thermal Unit
BTUH	BTU per hour
Btwn.	Between
B.U.R.	Built up Roofing
BX	Interlocked Armored Cable
c	Conductivity
C	Hundred; Centigrade
C.	Course
C/C	Center to Center
Cab.	Cabinet
Cair.	Air Tool Laborer
Calc.	Calculated
Cap.	Capacity
Carp.	Carpenter
C.B.	Circuit Breaker
C.BD.	Chalk Board
C.C.A.	Chromate Copper Arsenate
C.C.F.	Hundred Cubic Feet
cd	Candela
cd/sf	Candela per Square Feet
CD	Grade of Plywood Face & Back
CDX	Plywood, grade C & D, exterior glue
Cefi.	Cement Finisher
Cem.	Cement
Cer.	Ceramic
CF	Hundred Feet
C.F.	Cubic Feet
CFM	Cubic Feet per Minute
c.g.	Center of Gravity
CG	Corner Guard
CHW	Chilled Water
C.I.	Cast Iron
C.I.P.	Cast in Place
Circ.	Circuit
C.J.	Control Unit
C.L.	Carload Lot
Clab.	Common Laborer
Clec.	Clock Equipment Cabinet
C.L.F.	Hundred Linear Feet
CLF	Current Limiting Fuse
Clg.	Ceiling
Clkg.	Caulking
Clo.	Closed
CLP	Cross Linked Polyethylene
Clr.	Clear
cm	Centimeter
CMP	Corr. Metal Pipe

C.M.U.	Concrete Masonry Unit
Cntr.	Counter
C.O.	Cleanout
Col.	Column
Conn.	Connection
Cont.	Continuous
Cont.	Contractor
C.Opng.	Cased Opening
CO2	Carbon Dioxide
Comb.	Combination
Compr.	Compressor
Conc.	Continuous; Continued
Cond.	Conductor
Corr.	Corrugated
Cos	Cosine
Cot	Cotangent
Cov.	Cover
CPA	Control Point Adjustment
Cplg.	Coupling
C.P.M.	Critical Path Method
CPVC	Chlorinated Polyvinyl Chloride
C.Pr.	Hundred Pair
CRC	Cold Rolled Channel
Creos.	Creosote
Crpt.	Carpet & Linoleum Layer
CRT	Cathode Ray Tube
CS	Carbon Steel
Csc	Cosecant
C.S.F.	Hundred Square Feet
CSI	Construction Specifications Institute
C.T.	Current Transformer
CTS	Copper Tube Size
Cu	Cubic
Cu. Ft.	Cubic Foot
cw	Continuous Wave
C.W.	Cool White; Cold Water
C. Wall	Curtain Wall
Cwt.	100 Pounds
C.W.X.	Cool White Deluxe
C.Y.	Cubic Yard (27 cubic feet)
C.Y./Hr.	Cubic Yard per Hour
Cyl.	Cylinder
d	Penny (nail size)
D	Deep; Depth; Discharge
Dis; Disch	Discharge
Db.	Decibel
Dbl.	Double
DC	Direct Current

Demob.	Demobilization
d.f.u.	Drainage Fixture Units
D.H.	Double Hang
DHU	Domestic Hot Water
Diag.	Diagonal
Diam.	Diameter
Distrib.	Distribution
Dk.	Deck
D.L.	Deck Load
Do.	Ditto
Dp.	Depth
D.P.S.T.	Double Pole, Single Throw
Dr.	Driver
Drink.	Drinking
D.S.	Double Strength
D.S.A.	Double Strength A Grade
D.S.B.	Double Strength B Grade
Dty.	Duty
DWV	Drain Waste Vent
DX	Deluxe White, Direct Expansion
dyn	Dynbe
e	Eccentricity
E	Equipment only; East
Ea	Each
E.B.	Encased Burial
Econ.	Economy
EDP	Electronic Data Processing
E.D.R.	Equiv. Direct Radiation
Eq.	Equation
Elec.	Electrician; Electrical
Elev.	Elevator; Elevating
EMT	Electrical Metallic Conduit; Thin Wall Conduit
Eng.	Engine
EPDM	Ethylene Propylene Diene Monomer
Eqhv.	Equip. Oper., heavy
Eqlt.	Equip. Oper., light
Eqmd.	Equip. Oper., medium
Eqmm.	Equip. Oper., Master Mechanic
Equol.	Equip. Oper., Oilers
ERW	Electric Resistance Welded
Est.	Estimated
esu	Electrostatic Units
E.W.	Each Way
EWT	Entering Water Temperature
Excav.	Excavation
Exp.	Expansion, Exposure
Ext.	Exterior
Extru.	Extrusion

f.	Fiber Stress
F	Fahrenheit; Female; Fill
Fab.	Fabricated
F.B.C.	Florida Building Code
FBGS	Fiberglass
F.C.	Foot candles
f.c.c.	Face Centered Cubic
f'c	Compressive Stress in Concrete; Extreme Compressive Stress
F.E.	Front End
FRP	Fluorinated Ethylene Propylene (Teflon)
F.G.	Flat Grain
F.H.A.	Federal Housing Administration
Fig.	Figure
Fin	Finished
Fixt.	Fixture
Fl. Oz.	Fluid Ounces
Flr.	Floor
F.M.	Frequency Modulation; Factory Mutual
Fmg.	Framing
Fndtn.	Foundation
Fori.	Foreman; Inside
Fount.	Fountain
FPM	Feet Per Minute
Fr.	Frame
F.R.	Fire Rating
FRK	Foil Reinforced Kraft
FRP	Fiberglass Reinforced Plastic
FS	Forged Steel
FSC	Cast Body; Cast Switch Box
Ft.	Foot; Feet
Ftng.	Fitting
Ftg.	Footing
Ft.Lb.	Foot Pound
Furn.	Furniture
FVNR	Full Voltage Non-Reversing
FXM	Female by Male
Fy.	Minimum Yield Stress of Steel
g	Gram
G	Gauss
Ga.	Gauge
Gal.	Gallon
Gal./Min.	Gallon Per Minute
Galv.	Galvanized
Gen.	General
G.F.I.	Ground Fault Interrupter
Glaz.	Glazier
GPD	Gallons per Day

GPH	Gallons per Hour
GPM	Gallons per Minute
GR	Grade
Gran.	Granular
Grnd.	Ground
H	High; High Strength Bar Joist; Henry
H.C.	High Capacity
H.D.	Heavy Duty; High Density
H.D.O.	High Density Overlaid
Hdr.	Header
Hdwe.	Hardware
Help.	Helper Average
HEPA	High Efficiency Particular Air Filter
Hg.	Mercury
HIC	High Interrupting Capacity
H.O.	High Output
Horiz.	Horizontal
H.P.	Horsepower; High Pressure
H.P.F.	High Power Factor
Hr.	Hour
Hrs./Day	Hours per Day
HSC	High Short Circuit
Ht.	Height
Htg.	Heating
Htrs.	Heaters
HVAC	Heating, Ventilating & Air Conditioning
Hvy.	Heavy
HW	Hot Water
Hyd.;Hydr.	Hydraulic
Hz.	Hertz (cycles)
I.	Moment of Inertia
I.C.	Interrupting Capacity
ID	Inside Diameter
I.D.	Inside Dimension; Identification
I.F.	Inside Frosted
I.M.C.	Intermediate Metal Conduit
In.	Inch
Incan.	Incandescent
Incl.	Included; Including
Int.	Interior
Inst.	Installation
Insul.	Insulation
I.P.	Iron Pipe
I.P.S.	Iron Pipe Size
I.P.T.	Iron Pipe Threaded
I.W.	Indirect Waste
J	Joule
J.I.C.	Joint Industrial Council

K	Thousand; Thousand Pounds; Heavy Wall Copper Tubing
K.A.H.	Thousand Amp. Hours
KCMIL	Thousand Circular Mils
KD	Knock Down
K.D.A.T.	Kiln Dried After Treatment
Kg	Kilogram
kG	Kilogauss
kgf	Kilogram force
kHz	Kilohertz
Kip	1000 Pounds
KJ	Kiljoule
K.L.	Effective Length Factor
Km	Kilometer
K.L.F.	Kips per Linear Foot
K.S.F.	Kips per Square Feet
K.S.I.	Kips per Square Inch
K.V.	Kilovolt
K.V.A	Kilovolt Ampere
K.V.A.R.	Kilovolt (Reactance)
KW	Kilowatt
KWh	Kilowatt-hour
L	Labor only; Length; Long; Medium Wall Copper Tubing
La.	Labor
lat	Latitude
Lath.	Lather
Lav.	Lavatory
lb,;#	Pound
L.B.	Load Bearing; L Conduit Body
L. & E.	Labor & Equipment
lb./hr.	Pounds per Hour
lb./L.F.	Pounds Per Linear Foot
L.C.L.	Less than Carload Lot
Ld.	Load
LE	Lead Equivalent
L.F.	Linear Foot
Lg.	Long; Length; Large
L. & H.	Light and Heat
L.H.	Long Span high Strength Bar Joist
L.J.	Long Span Standard Strength Bar Joist
L.L.	Live Load
L.L.D.	Lamp Lumen Depreciation
lm	Lumen
lm/sf	Lumen per Square Feet
lm/W	Lumen per Wall
L.O.A.	Length Over All
log	Logarithm

L.P.	Liquified Petroleum; Low Pressure
L.P.F.	Low Power Factor
L.R.	Long Radius
L.S.	Lump Sum
Lt.	Light
Lt.Ga	Light Gauge
L.T.L.	Less than Truckload Lot
Lt. Wt.	Lightweight
L.V.	Low Voltage
M	Thousand; Material; Male; Light Wall Copper Tubing
m/hr; M.H.	Man Hour
mA	Milliampere
Mach	Machine
Mag. Str.	Magnetic Starter
Maint.	Maintenance
Marb.	Marble Setter
Mat. Mat'l	Material
Max	Maximum
MBF	Thousand Board Feet
MBH	Thousand BTU's per hr.
MC	Metal Clad Cable
M.C.F.	Thousand Cubic Feet
M.C.F.M.	Thousand Cubic Feet per Minute
M.C.M.	Thousand Circular Mils
M.C.P.	Motor Circuit Protector
MD	Medium Duty
M.D.O.	Medium Density Overlaid
Med.	Medium
MF	Thousand Feet
M.F.B.M.	Thousand Feet Board Measure
Mfg.	Manufacturing
Mfrs.	Manufacturers
mg	Milligram
MGD	Million Gallons per Day
MGPH	Thousand Gallons per Hour
MH:M.H.	Manhole; Metal Halide; Man-Hour
MHz	Megahertz
Mi.	Mile
Ml	Malleable Iron; Mineral Insulated
mm	Millimeter
Mill.	Millwright
Min.;min.	Minimum; minute
Misc.	Miscellaneous
mi	Millimeter
M.L.F.	Thousand Linear Feet
Mo.	Month
Mobil.	Mobilization

Mog.	Mogul Base
MPH	Miles Per Hour
MPT	Male Pipe Thread
MRT	Mile Round Trip
ms	Millisecond
M.S.F.	Thousand Square Feet
Mstz.	Mosaic & Terrazzo Worker
M.S.Y.	Thousand Square Yards
Mtd.	Mounted
Mthe.	Mosaic & Terrazzo Helper
Mult.	Multi; Multiply
M.V.A.	Million Volt Amperes
M.V.A.R.	Million Volt Amperes Reactance
MV	Megavolt
MW	Megawatt
MXM	Male by Male
MYD	Thousand Yards
N	Natural; North
nA	Nanoampere
NA	Not Available; Not applicable
N.B.C.	National Building Code
NC	Normally Closed
N.F.M.A.	National Electrical Manufacturers Association
NEHB	Bolted Circuit Breaker to 600V
N.L.B.	Non-Load-Bearing
NM	Non-Metallic Cable
nm	Nanometer
No.	Number
N.O.C.	Not Otherwise Classified
Nose.	Nosing
N.P.T.	National Pipe Thread
NQOB	Bolted Circuit Breaker to 240V
N.R.C.	Noise Reduction Coefficient
N.R.S.	Non Rising Stem
ns	Nanosecond
nW	Nanowatt
OB	Opposing Blade
OC	On Center
OD	Outside Diameter
O.D.	Outside Dimension
ODS	Overhead Distribution System
O & P	Overhead and Profits
Oper.	Operator
Opng.	Opening
Orna.	Ornamental
O.S. & Y.	Outside Screw and Yoke
Ovhd.	Overhead

OWG	Oil, Water or Gas
Oz.	Ounce
P.	Pole; Applied Load; Projection
p.	Page
Pape.	Paperhanger
P.A.P.R.	Powered Air Purifying Respirator
PAR	Weatherproof Reflector
Pc.	Piece
P.C.	Portland Cement; Power Connector
P.C.M.	Phase Contract Microscopy
P.C.F.	Pounds Per Cubic Feet
P.E.	Professional Engineer; Porcelain Enamel; Polyethylene; Plain End
Perf.	Perforated
Ph.	Phase
P.I.	Pressure Injected
Pile.	Pile Driver
pkg.	Package
Pl.	Plate
Plah.	Plaster Helper
Plas.	Plasterer
Pluh.	Plumbers Helper
Plum.	Plumber
Ply.	Plywood
p.m.	Post Meridiem
Pord.	Painter Ordinary
pp	Pages
PP;PPL	Polypropylene
P.P.M.	Parts per Million
Pr.	Pair
Prefab.	Prefabricated
Prefin.	Prefinished
Prop.	Propelled
PSF;psf	Pounds per Square Foot
PSI;psi	Pounds per Square Inch
PSIG	Pounds per Square Inch Gauge
PSP	Plastic Sever Pipe
Pspr.	Painter, Spray
Psst.	Painter, Structural Steel
P.T.	Potential Transformer
P. & T.	Pressure & Temperature
Ptd.	Painted
Ptns.	Partitions
Pu	Ultimate Load
PVC	Polyvinyl Chloride
Pvmt.	Pavement
Pwr.	Power
Q	Quantity Heat Flow

Quan.; Qty	Quantity	
Q.C.	Quick Coupling	
r	Radius of Gyration	
R	Resistance	
R.C.P.	Reinforced Concrete Pipe	
Rect.	Rectangle	
Reinf.	Reinforced	
Req'd	Required	
Res.	Resistant	
Resi	Residential	
Rgh.	Rough	
R.H.W.	Rubber, Heat & Water Resistant;	Residential Hot Water
rms	Root Mean Square	
Rnd.	Round	
Rodm.	Rodman	
Rofc.	Roofer, Composition	
Rofp.	Roofer, Prcast	
Rohe.	Roofer Helpers (Composition)	
Rots.	Roofer, Tile & Sale	
R.O.W.	Right of Way	
RPM	Revolutions per Minute	
R.R.	Direct Burial Feeder Conduit	
R.S.	Rapid Start	
R.T.	Round Trip	
S.	Suction; Single Entrance; South	
Scaf.	Scaffold	
Sch.;Sched.	Schedule	
S.C.R.	Modular Brick	
S.D.	Sound Deadening	
S.D.R.	Standard Dimension Ratio	
S.E.	Surfaced Edge	
Sel.	Select	
S.E.R.;S.E.U.	Service Entrance Cable	
SF.	Square Foot	
S.F.C.A.	Square Foot Contact Area	
S.F.F.C.M.U.	Split Face Fluted Concrete Masonry Unit.	
S.F.G.	Square Foot of Ground	
S.F. Hor.	Square Foot Horizontal	
S.R.F.	Square Foot of Radiation	
S.F.Shlf.	Square Foot of Shelf	
S4S	Surface 4 Sides	
Shee.	Sheet Metal Worker	
Sin.	Sine	
Skwk.	Skilled Worker	
S.L.	Saran Lined	
S.L.	Slimline	
Sldr.	Solder	

S.N.	Solid Neutral
S.P.	Static Pressure; Single Pole; Self Propelled
Spri.	Sprinkler Installer
Sq.	Square; 100 Square Feet
S.P.D.T.	Single Pole, Double Throw
S.P.S.T.	Single Pole, Single Throw
SPT	Standard Pipe Thread
Sq.Hd.	Square Head
Sq.In.	Square Inch
S.S.	Single Strength; Stainless Steel
S.S.B.	Single Strength B Grade
Sswk.	Structural Steel Worker
Sswl.	Structural Steel Welder
St.;Stl.	Steel
S.T.C.	Sound Transmission Coefficient
Std.	Standard
STP	Standard Temperature & Pressure
Stpi.	Steamfitter, Pipefitter
Str.	Strength; Starter; Straight
Strd.	Stranded
Struct.	Structural
Sty.	Story
Subj.	Subject
Subs.	Subcontractors
Surf.	Surface
Sw.	Switch
Swbd.	Switchboard
S.Y.	Square Yard
Syn.	Synthetic
Sys.	System
t.	Thickness
T	Temperature; Ton
Tan	Tangent
T.C.	Terra Cotta
T & C	Threaded and Coupled
T.D.	Temperature Difference
T.E.M.	Transmission Electron Microscopy
TFE	Tetrafluoroethylene (teflon)
T.& G.	Tongue & Groove; Tar & Gravel
Th.;Thk.	Thick
Thn.	Thin
Thrded.	Threaded
Tilf.	Tile Layer Floor
Tilh.	Tile Layer Helper
THW	Insulated Strand Wire
THWN;THHN	Nylon Jacketed Wire
T.L.	Truckload
Tot.	Total

T.S.	Trigger Start
Tr.	Trade
Transf.	Transformer
Trhv.	Truck Driver, Heavy
Trir.	Trailer
Trit.	Truck Driver, Light
TV	Television
T.W.	Thermoplastic Water Resistant Wire
UCI	Uniform Construction Index
UF	Underground Feeder
U.H.F.	Ultra High Frequency
U.L.	Underwriters Laboratory
Unfin.	Unfinished
URD	Underground Residential Distribution
V	Volt
V.A.	Volt Amperes
V.C.T.	Vinyl Composition Tile
VAV	Variable Air Volume
VC	Veneer Core
Vent.	Ventilating
Vert.	Vertical
V.F.	Vinyl Faced
V.G.	Vertical Grain
V.H.F.	Very High Frequency
VHO	Very High Output
Vib.	Vibrating
V.L.F.	Vertical Linear Foot
Vol.	Volume
W	Wire; Watt; Wide; West
w/	With
W.C.	Water Column; Water Closet
W.F.	Wide Flange
W.G.	Water Gauge
Wldg.	Welding
W. Mile	Wire Mile
W.R.	Water Resistant
Wrck.	Wrecker
W.S.P.	Water Steam, Petroleum
WT, Wt.	Weight
WWF	Welded Wire Fabric
XRMR	Transformer
XHD	Extra Heavy Duty
XHHW;XLPE	Cross Linked Polyethylene Wire Insulation
Y	Wye
yd	Yard
yr	Year
Δ	Delta
%	Percent

Φ	Phase
@	At
<	Less Than
>	Greater Than

PART 2- PRODUCTS:

Not used.

PART 3- EXECUTION:

Not used.

END SECTION 01070

SECTION 01095-REFERENCE STANDARDS AND DEFINITIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 DEFINITIONS

A. General: Basic Contract definitions are included in the Conditions of the Contract.

B. Indicated: The term Indicated refers to graphic representations, notes or schedules on the Drawings, or other Paragraphs or Schedules in the Specifications, and similar requirements in the Contract Documents. Where terms such as shown, noted, scheduled and specified are used, it is to help the reader locate the reference; no limitation on location is intended.

C. Directed: Terms such as directed, requested, authorized, selected, approved, required, and permitted mean directed by the Project Manager, requested by the Architect/Project Manager and similar phrases.

D. Accepted: This term; Accepted, where used in conjunction with the Architects action on the Contractors submittals, applications, and requests, is limited to the Architects duties and responsibilities as stated in the Conditions of the Contract.

E. Regulations: The term Regulations includes laws, ordinances, statutes, and lawful orders issued by authorities having jurisdiction, as well as rules, conventions, and agreements within the construction industry that control performance of the Work.

F. Furnish: The term furnish is used to mean supply and deliver to the Project site, ready for unloading, unpacking, assembly, installation, and similar operations.

G. Install: The term install is used to describe operations at project site including the actual unloading, unpacking, assembly, erection, placing, anchoring, applying, working to dimension, finishing, curing, protecting, cleaning, and similar operations.

H. Provide: The term provide means to furnish and install, complete and ready for the intended use.

I. Installer: An Installer is the Contractor or an entity engaged by the Contractor, either as an employee, subcontractor, or contractor of lower tier for performance of a particular construction activity, including installation, erection, application, and similar operations. Installers are required to be experienced in the operations they are engaged to perform.

1. The term experienced, when used with the term Installer, means having a minimum of five previous projects similar in size and scope to this Project, being familiar with the special requirements indicated, and having complied with requirements of the authority having jurisdiction.

2. Trades: Use of titles such as carpentry is not intended to imply that certain construction activities must be performed by accredited or unionized individuals of a corresponding generic name, such as carpenter. It also does not imply that requirements specified apply exclusively to trades persons of the corresponding generic name.

J. Project Site is the space available to the Contractor for performance of construction activities, either exclusively or in conjunction with others performing other work as part of the Project. The extent of the Project Site is shown on the Drawings and may or may not be identical with the description of the land on which the Project is to be built.

K. Testing Laboratories: testing laboratory is an independent entity engaged to perform specific inspections or tests, either at the Project site or elsewhere, and to report on and, if required, to interpret results of those inspections or tests.

1.03 SPECIFICATION FORMAT AND CONTENT EXPLANATION

A. Specification Format: These Specifications are organized into Divisions and Sections based on the Construction Specifications Institutes 16 Division format and MASTER FORMAT numbering system.

B. Specification Content: This Specification uses certain conventions in the use of language and the intended meaning of certain terms, words, and phrases when used in particular situations or circumstances. These conventions are explained as follows:

1. Abbreviated Language: Language used in Specifications and other Contract Documents is the abbreviated type. Words and meaning shall be interpreted as appropriate. Words that are

implied, but not stated shall be interpolated as the sense required. Singular words will be interpreted as plural and plural words interpreted as singular where applicable and the context of the Contract Documents so indicates.

2. Imperative and streamlined language is used generally in the Specifications. Requirements expressed in the imperative mood are to be performed by the Contractor. At certain locations in the text, for clarity, subjective language is used to describe responsibilities that must be fulfilled indirectly by the Contractor, or by others when so noted.

   a. The words, shall be shall be included by inference wherever a colon (:) is used within a sentence or phrase.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01095

SECTION 01200-PROJECT MEETINGS

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for project meetings including but not limited to:

1. Pre-Construction Conference
2. Pre-Installation Conference
3. Coordination Meetings
4. Progress Meetings

B. Construction schedules are specified in Section 01300 Submittals.

1.03 PRE-CONSTRUCTION CONFERENCE

A. Schedule a pre-construction conference and organizational meeting at the project site or other convenient location no later than 20 days after execution of the agreement and prior to commencement of construction activities. Conduct the meeting to review responsibilities and personnel assignments.

B. Attends: The OWNERS, Representative, the Contractor and its superintendent, major subcontractors, manufacturers, suppliers and other concerned parties shall each be represented at the conference by persons familiar with and authorized to conclude matters relating to the work.

C. Agenda: Discuss items of significance that could affect progress including such topics as:

1. Tentative construction schedule
2. Critical Work sequencing and/coordinating
3. Designation of responsible personnel
4. Procedures for processing field decisions and Change Orders
5. Procedures for processing Applications for Payment
6. Distribution of Contract Documents
7. Submittal of Shop Drawings, Product Data and Samples
8. Preparation of record documents
9. Use of the Premises
10. Office, Work and storage areas
11. Equipment deliveries and priorities

12. Safety procedures
13. First aid
14. Security
15. Housekeeping
16. Working hours

D. Contractor must submit at the time of the meeting at least the following items:

1. Schedule of Values
2. Listing of key personnel including project superintendent and subcontractors with their addresses, telephone numbers, and emergency telephone numbers.
3. Preliminary Construction Schedule
4. Submittal Schedule

1.04 PRE-INSTALLATION CONFERENCE

A. Conduct a Pre-installation conference at the site before each construction activity that requires coordination with other construction. The Installer and representatives of manufacturers and fabricators involved in or affected by the installation, and its coordination or integration with other materials and installations that have preceded or will follow, shall attend the meeting. Advise at least 48 hours in advance the Project Manager of scheduled meeting dates.

1. Review the progress of other construction activities and preparations for the particular activity under consideration at each pre-installation conference, including requirements for:

a. Contract Documents
b. Options
c. Related Change Orders
d. Purchases
e. Deliveries
f. Shop Drawings, Product Data and Quality Control Samples
g. Possible conflicts
h. Compatibility problems
I. Time schedules
j. Weather limitations
k. Manufacturer's recommendations
l. Comparability of materials
m. Acceptability of substrates
n. Temporary facilities
o. Space and access limitations
p. Governing regulations
q. Safety
r. Inspection and testing requirements
s. Required performance results

t. Recording requirements
u. Protection

2. Record significant discussions and agreements and disagreements of each conference along with and approved schedule. Distribute the record of the meeting to everyone concerned promptly including the Owner and Architect.

3. Do not proceed if the conference cannot be successfully concluded. Initiate whatever actions are necessary to resolve impediments to performance of Work and reconvene the conference at the earliest feasible date.

1.05 COORDINATION MEETINGS

A. Conduct project coordination meeting at weekly intervals on day and time as established by the Project Manager or more frequently, if necessary convenient for all parties involved. Project coordination meetings are in addition to specific meetings held for other purposes, such as regular progress meetings and special pre-installation meetings.

B. Request representation at each meeting by every party currently involved in coordination or planning for the construction activities involved, to include subcontractors and representatives.

C. Contractor shall record meeting results and distribute copies to everyone in attendance and to others affected by decisions or actions resulting from each meeting.

1.06 PROGRESS MEETINGS

A. Conduct progress meetings at the Project site at bimonthly intervals or more frequently if necessary as directed by the Project Manager. Notify the Owner at least 48 hours in advance of scheduled meeting time and dates. Coordinate dates of meetings with preparation of the payment request. Contractor shall be responsible for the taking of notes and issuance of meeting minutes, and sign-in sheets.

B. Attendees: In addition to representatives of the Owner and Architect, each subcontractor, supplier or other entity concerned with current progress of involved in planning, coordination or performance of future activities with the project and authorized to conclude matters relating to progress.

C. Agenda: Review and correct or approve minutes of the previous progress meeting. Review other items of significance that could affect progress. Include topics for discussion as appropriate to the current status of the Project.

1. Contractor’s Construction Schedule: Review progress since the last meeting. Determine where each activity is in relation to the Contractor’s

Construction Schedule, whether on time, ahead, or behind schedule. Determine how construction behind schedule will be expedited; secure commitments from parties involved to do so. Discuss whether schedule revisions are required to ensure that current and subsequent activities will be completed within the Contract Time.

2. Review the present and future needs of each entity present, including such items as:

   a. Interface requirements
   b. Time
   c. Sequences
   d. Deliveries
   e. Off-site fabrication problems
   f. Access
   g. Site utilization
   h. Temporary facilities and services
   I. Hours of work
   j. Hazards and risks
   k. Housekeeping
   l. Quality and work standards
   m. Change Orders
   n. Documentation of information for payment requests.

D. Reporting: No later than 3 days after each progress meeting date, distribute copies of minutes of the meeting to each party present and to other parties who should have been present. Include a brief summary, in narrative form, or progress since the previous meeting and report.

PART 2 PRODUCTS

(Not Applicable)

PART 3 EXECUTION

(Not Applicable)

END OF SECTION 01200

SECTION 01300-SUBMITTALS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for submittals required for performance of the Work, including:

1. Contractor's Construction Schedule
2. Submittal Schedule
3. Daily Construction Reports
4. Shop Drawings
5. Product Data
6. Samples

B. Administrative Submittals: Refer to other Division-1 Sections and other Contract Documents for requirements for administrative submittals. Such submittals include, but are not limited to:

1. Permits
2. Applications for Payment
3. Performance and Payment Bonds
4. Insurance Certificates
5. List of Subcontractors with start and finish dates (update as necessary)
6. Schedule of Values
7. Construction Schedule

C. The Schedule of Values submittal is included in Section 01027 Applications for Payment.

D. Inspection and test reports are included in Section 01400 Quality Control Services.

1.03 SUBMITTAL PROCEDURES

A. Coordination: Coordinate preparation and processing of submittals with performance of construction activities. Transmit each submittal sufficiently in advance of performance of related construction activities to avoid delay.

1. Coordinate each submittal with fabrication, purchasing, testing, delivery, other submittals and related activities that require sequential activity.

2. Coordinate transmittal of different types of submittals for related elements of the Work so processing will not be delayed by the need to review submittals concurrently for coordination.

    a. The Project Manager reserves the right to withhold action on a submittal requiring coordination with other submittals until related submittals are received.

3. Processing: Allow sufficient review time so that installation will not be delayed as a result of the time required to process submittals, including time for resubmittals.

    a. Allow two weeks for initial review. Allow additional time if processing must be delayed to permit coordination with subsequent submittals. The Project Manager will promptly advise the Contractor when a submittal being processed must be delayed for coordination.
    b. If an intermediate submittal is necessary, process the same as the initial submittal.
    c. Allow two weeks for reprocessing each submittal.
    d. No extension of Contract Time will be authorized because of failure to transmit submittals to the Architect sufficiently in advance of the Work to permit processing.

B. Submittal Preparation: Place a permanent label or title block on each submittal for identification. Indicate the name of the entity that prepared each submittal on the label or title block.

1. Provide a space approximately 4" x 5" on the label or beside the title block on Shop Drawings to record the Contractor's review and approval markings and the action taken.

2. Include the following information on the label for processing and recording action taken.
    a. Project name
    b. Date
    c. Name and address of Architect
    d. Name and address of Contractor
    e. Name and address of subcontractor
    f. Name and address of supplier
    g. Name of manufacturer
    h. Number and title of appropriate Specification Section
    I. Drawing number and detail references, as appropriate.

C. Submittal Transmittal: Package each submittal appropriately for transmittal and handling. Transmit each submittal from Contractor to Project Manager using transmittal form as provided by the Project Manager. Submittals received from sources other than the Contractor will be returned without action.

1. On the transmittal record relevant information and requests for data. On the form, or separate sheet, record deviations from Contract Document requirements, including minor variations and limitation. Include Contractor's certification that information complies with Contract Document requirements.

2. Transmittal Form: As provide by the Project Manager

D. Contractor shall be responsible for cost of re-review of rejected submittals, shop drawing, etc. Costs for re-review shall be reimbursed to the County by deducting the cost from the Contractors monthly progress payments. Costs to be determined by applying the consultants standard billing rates, plus 10% handling by the County.

E. Substitution request to specified products will be made within 30 days of Notice to Proceed. After the 30 day period, no requests for substitutions from the Contractor will be considered. Refer to 01631 Product Substitutions.

1. Substitution submitted within the first 30 days will have product data from specified and requested substitute submitted together and demonstrate better quality, cost savings if of equal quality, or show benefit to the County for accepting the substitute.

F. Once submittals are approved or approved as noted, they will be scanned and converted to PDF documents with OCR (optical character recognition) and given to the owner.

1.04 CONTRACTOR'S CONSTRUCTION SCHEDULE

A. Critical Path Method (CPM) Schedule: Prepare a fully developed, horizontal bar-chart type Contractor's construction schedule. Submit in accordance with Section 01200 Project Meetings.

1. Provide a separate time bar for each significant construction activity. Provide a continuous vertical line to identify the first working day of each week. Use the same breakdown of units of the work as indicated in the Schedule of Values.

2. Within each time bar, indicate estimated completion percentage in 10 percent increments. As work progresses, place a contrasting mark in each bar to indicate Actual Completion.

3. Prepare the schedule on a sheet, series of sheets, stable transparency, or other reproducible media, of sufficient width to show data for the entire construction period.

4. Secure time commitments for performing critical elements of the work from parties involved. Coordinate each element on the schedule with other construction activities; include minor elements involved in the sequence of the work. Show each activity in proper sequence. Indicate graphically sequences necessary for completion of related portions of the work.

5. Coordinate the Contractor's construction schedule with the schedule of values, list of subcontracts, submittal schedule, progress reports, payment request and other schedules.

6. Indicate completion in advance of the date established for Substantial Completion. Indicate Substantial Completion on the schedule to allow time for the Architect's procedures necessary for certification of Substantial Completion.

B. Phasing: Provide notations on the schedule to show how the sequence of the work is affected by requirements for phased completion to permit work by separate Contractors and partial occupancy by the Owner prior to Substantial Completion.

C. Work Stages: Indicate important stages of construction for each major portion of the work, including testing and installation.

D. Area Separations: Provide a separate time bar to identify each major construction area for each major portion of the work. Indicate where each element in an area must be sequenced or integrated with other activities.

E. Cost Correlation: At the head of the schedule, provide a two item cost correlation line, indicating precalculated and actual costs. On the line show dollar-volume of work performed as the dates used for preparation of payment requests.

1. Refer to Section Applications for Payment for cost reporting and payment procedures.

F. Distribution: Following response to the initial submittal, print and distribute copies to the Architect, Owner, subcontractors, and other parties required to comply with scheduled dates. Post copies in the project meeting room and temporary field office.

1. When revision are made distribute to the same parties and post in the same

locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

G. Schedule Updating: Revise the schedule monthly or activity, where revisions have been recognized or made. Issue the updated schedule concurrently monthly pay request.

1.05 SUBMITTAL LOG

A. After development and acceptance of the Contractor's construction schedule, prepare a complete log of submittals.

1. Coordinate submittals log with the list of subcontracts, schedule of values and the list of products as well as the Contractor's construction schedule.

2. Prepare the log in chronological order; include all submittals required. Provide the following information:

a. Scheduled date for the first submittal
b. Related Section number
c. Submittal category
d. Name of subcontractor
e. Description of the part of the work covered
f. Scheduled date for resubmittal
g. Scheduled date the Architect's final release or approval.

3. All submittals must be received within the first 25% of contract time.

B. Distribution: Following response to initial submittal, print and distribute copies to the Project Manager, subcontractors, and other parties required to comply with submittal dates indicated. Post copies in the project meeting room and field office.

1. When revision are made, distribute to the same parties and post in the same locations. Delete parties from distribution when they have completed their assigned portion of the Work and are no longer involved in construction activities.

C. Log Updating: Revise the log after each meeting or activity, where revisions have been recognized or made. Issue the updated schedule concurrently with report of each meeting.

1.06 DAILY CONSTRUCTION REPORTS

A. Prepare a daily construction report, recording the following information concerning events at the site; and submit duplicate copies to the Project Manager at weekly intervals:

1. List of subcontractors at the site
2. Approximate count of personnel at the site
3. High and low temperatures, general weather conditions
4. Accidents and unusual events
5. Meetings and significant decisions
6. Stoppages, delays, shortages, losses
7. Meter readings and similar recordings
8. Emergency procedures
9. Orders and requests of governing authorities
10. Change Orders received, implemented
11. Services connected, disconnected
12. Equipment or system tests and start-ups
13. Partial completions, occupancies
14. Substantial Completions authorized

1.07 SHOP DRAWINGS

A. Submit newly prepared information, drawn to accurate scale. Highlight, encircle, or otherwise indicate deviations from the Contract Documents. Do not reproduce Contract Documents or copy standard information as the basis of Shop Drawings. Standard information prepared without specific reference to the Project is not considered a Shop Drawings and will be rejected.

B. Shop Drawings include fabrication and installation drawings, setting diagrams, schedules, patterns, templates and similar drawings. Include the following information:

1. All required dimensions
2. Identification of products and materials included
3. Compliance with specified standards
4. Notation of coordination requirements
5. Notation of dimensions established by field measurement
6. Sheet Size: Except for templates, patterns and similar full-size Drawings on sheets at least 8 ½” x 11" but no larger than 24" x 36".
7. Initial Submittal: Submit one correctable translucent reproducible print and one blue-or black-line print for the Project Manager’s review; the reproducible print will be returned.
8. Initial Submittal: Submit 2 blue-or black-line prints for the Architect's review; one will be returned.
9. Final Submittal: Submit 5 blue-or black-line prints; submit 7 prints where required for maintenance manuals. 3 prints will be retained; the remainder will be returned.
10. Final Submittal: Submit 3 blue-or black-line prints; submit 5 prints where

required for maintenance manuals. 2 prints will be retained; the remainder will be returned.

a. One of the prints returned shall be marked-up and maintained as a Record Documents.

11. Do not use Shop Drawings without an appropriate final stamp indicating action taken in connections with construction.

C. Coordination drawings are a special type of Shop Drawing that show the relationship and integration of different construction elements that require careful coordination during fabrication or installation to fit in the space provided or function as intended.

1. Preparation of coordination Drawings is specified in section Project Coordination and may include components previously shown in detail on Shop Drawings or Product Data.

2. Submit coordination Drawings for integration of different construction elements. Show sequence and relationships of separate components to avoid any conflict including conflicts in use of space.

3. Contractor is not entitled to additional payments due to lack of compliance with this Section.

1.08 PRODUCT DATA

A. Collect Product Data into a single submittal for each element of construction or system. Product Data includes printed information such as manufacturer □s installation instructions, catalog cuts, standard color charts, roughing-in diagrams and templates, standard wiring diagrams and performance curves. Where Product Data must be specially prepared because standard printed data is not suitable for use, submit as Shop Drawing.

1. Mark each copy to show applicable choices and options. Where printed Product Data includes information on several products, some of which are not required, mark copies to indicate the applicable information. Include the following information:

a. Manufacturer's printed recommendations
b. Compliance with recognized trade association standards
c. Compliance with recognized testing agency standards
d. Application of testing agency labels and seals
e. Notation of dimensions verified by field measurement
f. Notation of coordination requirements
g. Manufacturers local representative and phone number.

2. Do not submit Product Data until compliance with requirements of the Contract Documents has been confirmed.

3. Preliminary Submittal: Submit a preliminary single-copy of Product Data where selection of options is required.

4. Submittals: Submit six (6) copies of each required submittal. The Project Manager will return two (2) sets to the Contractor marked with action taken and corrections or modifications required.

    a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.

5. Distribution: Furnish copies of final submittal to installers, subcontractors, suppliers, manufacturers, fabricators, and others required for performance of construction activities. Show distribution on transmittal forms.

    a. Do not proceed with installation until an applicable copy of Product Data applicable is in the Installer’s possession.
    b. Do not permit use of unmarked copies of Product Data in connection with construction.

1.09 SAMPLES

A. Submit full-size, fully fabricated Samples cured and finished as specified and physically identical with the material or product proposed. Samples include partial sections of materials, color range sets, and swatches showing color, texture and pattern.

1. Mount, display, or package Samples in the manner specified to facilitate review of qualities indicated. Prepare Samples to match the Architect's/Owner's Sample. Include the following:

    a. Generic description of the Sample
    b Sample source
    c. Product name or name of manufacturer
    d. Compliance with recognized standards
    e. Availability and delivery time

2. Submit Samples for review of kind, color, pattern, and texture, for a final check of these characteristics with other elements, and for a comparison of these characteristics between the final submittal and the actual component as delivered and installed.

    a. Where variation in color, pattern, texture or other characteristics are inherent in the material or product represented, submit multiple units (not less than 3), that show approximate limits of the variations.

b. Refer to other Specification Sections for requirements for Samples that illustrate workmanship, fabrication techniques, details of assembly, connections, operation and similar construction characteristics.

3. Preliminary submittals: Where Samples are for selection of color, pattern, texture or similar characteristics from a range of standard choices, submit a full set of choices for the material or product.

a. Preliminary submittals will be reviewed and returned with the Architect's/Owner's mark indicating selection and other action.

4. Submittals: Except for Samples illustrating assembly details, workmanship, fabrication techniques, connections, operation and similar characteristics, submit 3 sets; one will be returned marked with the action taken.

5. Maintain sets of Samples, as returned, at the project site, for quality comparisons throughout the course of construction.

a. Unless noncompliance with Contract Document provisions is observed, the submittal may serve as the final submittal.
b. Sample sets may be used to obtain final acceptance of the construction associated with each set.

B. Distribution of Samples: Prepare and distribute additional sets to subcontractors, manufacturers, fabricators, suppliers, installers, and others as required for performance of the Work. Show distribution on transmittal forms.

1. Field Samples specified in individual sections are special types of Samples. Field Samples are full-size examples erected on site to illustrate finishes, coatings, or finish materials and to establish the standard by which the work will be judged.

a. Comply with submittal requirements. Process transmittal forms to provide a record of activity.

1.10 ARCHITECT'S ACTION

A. Except for submittals for record, information or similar purposes, where action and return is required or requested, the Architect/Project Manager will review each submittal, mark to indicate action taken, and return promptly.

1. Compliance with specified characteristics is the Contractor's responsibility.

B. Action Stamp: The Architect/Project Manager will stamp each submittal with a uniform, self-explanatory action stamp. The stamp will be appropriately marked, similarly as follows, to indicate the action taken:

1. Final Unrestricted Release: Where submittals are marked"No Exceptions Taken", that part of the work covered by the submittal may proceed provided it complies with requirements of the Contract Documents; final acceptance will depend upon that compliance.

2. Final-But-Restricted Release: When submittals are marked Made Corrections Noted that part of the Work covered by the submittal may proceed provided it complies with notations or corrections on the submittal and requirements of the Contract Documents; final acceptance will depend on that compliance.

3. Returned for Resubmittal: When submittal is marked Revise and Resubmit, do not proceed with that part of the Work covered by the submittal, including purchasing, fabrication, delivery, or other activity. Revise or prepare a new submittal in accordance with the notations; resubmit without delay. Repeat if necessary to obtain a different action mark.

   a. Do not permit submittals marked "Revise and Resubmit" to be used at the Project site, or elsewhere where work is in progress.

4. Rejected: Submittal does not comply with requirements of the Contract Documents. Submittal must be discarded and entirely new submittal shall be forward to the Project Manager without delay.

PART 2 PRODUCTS

(Not Applicable)

PART 3 Execution

(Not Applicable)

END SECTION 01300

SECTION 01380
CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including Contractual Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. General: This Section specifies administrative and procedural requirements for construction photographs.

1.03 SUBMITTALS

A. General: Refer to Division 1 Section Submittals for general requirements for submitting photographs.

B. Prints: Submit 3 prints of each view directly to the Project Manager within 5 days of taking photographs. The Project Manager will distribute prints as follows:

1. One print to the Contractor shall be retained in the field office at the project site and available at all times for reference.

2. One print to the Owner as the Owner's permanent record.

3. One print shall be retained in the Architect's files.

C. Extra Prints: When requested by the Architect, the photographer shall submit extra prints of photographs, with distribution directly to designated parties who will pay the costs for the extra prints directly to the photographer.

D. Negatives: Retain the photographic negatives 3 years after date of Substantial Completion. During this period, the photographer shall fill orders by the Architect for extra prints. Extra prints shall be priced at prevailing local commercial prices.

1.04 QUALITY ASSURANCE

A. Engage a qualified commercial photographer to take photographs during construction.

B. Photographer's Qualifications: Photographer shall be a firm or an individual of established reputation who has been regularly engaged as a professional photographer for not less than 3 years.

C. Associated Services: Cooperate with the photographer's work. Provide reasonable auxiliary services as requested, including access and use of temporary facilities including temporary lighting.

PART 2 PRODUCTS

2.01 PHOTOGRAPHIC COPIES

A. Provide 8" x 10" smooth surface gloss color prints on single-weight commercial-grade stock, mounted on muslin. Allow a 1" wide margin punched for standard 3-ring binder. Place margin on the left edge for vertical shots and at the top for horizontal shots.

B. Identification: Label each photograph on the front in the bottom margin with project name and date the photograph was taken. On the back of each print provide an applied label or rubber stamped impression with the following information:

1. Name of the Project
2. Name and address of the photographer
3. Name of the Architect
4. Name of the Contractor
5. Date the photograph was taken
6. Architect's Project No.

C. Description of vantage point, in terms of location, direction (by compass point), and evaluation of story on construction.

PART 3 EXECUTION

3.01 PHOTOGRAPHIC REQUIREMENTS

A. Take three (3) color project photographs at monthly intervals, coinciding with the cutoff date associated with each Application for Payment. The photographer shall select the vantage points for each shot each month to best show the status of construction and progress since the last photographs were taken.

B. Additional Photographs: From time to time the Architect may issue requests for

additional photographs, in addition to periodic photographs specified. Additional photographs will be paid for by Change Order, and are not included in the Contract Sum or an Allowance.

1. The Architect will give the photographer 3 days notice, where feasible.

2. In emergency situations, the photographer shall take additional photographs within 24 hours of the Architect's request.

C. Circumstances that could require additional photographs include, but are not limited to:

1. Substantial Completion of a major phase or component of Work.

2. Owner's request for special publicity photographs.

3. Special events planned at project site.

D. Immediate follow-up when on-site events result in construction damage or losses. Photographs to be taken at fabrication locations away from project site; these are not subject to unit prices or unit-cost allowances. Extra record photographs at time of final acceptance.

E. Construction projects over $1,000,000 shall include at least one of the photographs listed in 3.01.A be aerial.

F. Aerial Photos shall be required from the date of the Notice to Proceed to the date of Final Completion.

END OF SECTION 01380

SECTION 01410-TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 SECTION INCLUDES

A. Selection and payment

B. Contractor submittals

C. Laboratory responsibilities

D. Laboratory reports

E. Limits on testing laboratory authority

F. Contractor responsibilities

G. Schedule of inspections and tests

1.02 RELATED SECTIONS

A. Information Available to Bidders: Soil Investigation Data.

B. General Conditions: Inspections, testing, and approvals required by public authorities.

C. Individual Specification Sections: Inspections and tests required, and standards for testing.

1.03 REFERENCES

A. ANSI/ASTM D3740 or as required in Specifications Divisions 2-16 - Practice for Evaluation of Agencies Engages in testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction.

B. ANSI/ASTM E329 or as required in Specifications Divisions 2-16 - Recommended Practice for Inspection and Testing Agencies for Concrete, Steel, and Bituminous Materials as Used in Construction.

1.04 SELECTION AND PAYMENT

A. Owner will employ and pay for services of an independent testing laboratory to perform specified inspection and testing.

B. Employment of testing laboratory shall in no way relieve Contractor of obligation

to perform work in accordance with requirements of Contract Documents.

1.05 QUALITY ASSURANCE

A. Comply with requirements of ANSI/ASTM E329 and ANSI/ASTM D3740

B. Laboratory: Authorized to operate in state in which Project is located.

C. Laboratory Staff: Maintain a full time registered Engineer on staff to review services.

D. Testing Equipment: Calibrated at reasonable intervals with devices of an accuracy traceable to either National Bureau of Standards (NBS) Standards or accepted values of natural physical constants.

1.06 CONTRACTOR SUBMITTALS

NOT USED

1.07 LABORATORY RESPONSIBILITIES

A. Test samples of mixes.

B. Provide qualified personnel at site when required. Cooperate with Orange County and Contractor in performance of services.

C. Perform specified inspection, sampling, and testing of Products in accordance with specified standards.

D. Ascertain compliance of materials and mixes with requirements of Contract Documents.

E. Promptly notify Orange County and Contractor of observed irregularities or non-conformance of Work or Products.

F. Perform additional inspections and test required by Orange County.

G. Attend preconstruction conferences and progress meetings.

1.08 LABORATORY REPORTS

A. After each inspection and test, promptly submit four copies of laboratory report to Orange County, and to Contractor.

B. Include:

1. Date issued
2. Project title and number
3. Name of inspector
4. Data and time of sampling or inspection
5. Identification of product and specifications section
6. Location in the Project
7. Type of inspection or test
8. Date of test
9. Results of tests
10. Conformance with Contract Documents

C. When requested by Orange County, provide interpretation of test results.

1.09 LIMITS ON TESTING LABORATORY AUTHORITY

A. Laboratory may not release, revoke, alter, or enlarge on requirements of Contract Documents.

B. Laboratory may not approve or accept any portion of the Work.

C. Laboratory may not assume any duties of Contractor

D. Laboratory has no authority to stop the Work.

1.10 CONTRACTOR RESPONSIBILITIES

A. Cooperate with laboratory personnel, and provide access to the Work.

B. Provide incidental labor and facilities to provide access to work to be tested, to obtain and handle samples at the site or at source of products to be tested, to facilitate tests and inspections, storage and curing of test samples.

C. Notify Orange County and laboratory 48 hours prior to expected time for operations requiring inspection and testing services.

D. Arrange with laboratory and pay for additional samples and tests required by Contractor beyond specified requirements.

1.11 SCHEDULE OF INSPECTIONS AND TESTS

A. Backfilling: Requirements for sampling and testing backfilled materials.

B. Testing required:

1. Modified proctor maximum density determination tests for each soil type.

2. Field in-place density tests at intervals not to exceed 300 ft. on sub-base and

base material.

3. Thickness test for asphaltic concrete surfacing and concrete parking. Cores shall be taken at a maximum of 250 ft. The minimum thickness allowed shall be 1/4" less than the required average thickness.

4. Extraction stability and gradation of combine aggregate - one test per 200 tons or part with minimum of one per day. Bitumen content, stability and gradation of aggregate to conform to intent of job mix formula.

5. Provide concrete mix designs as required under Specifications Sections 02520 and 03300.

6. Strength test for each 50 cubic yard of concrete placed per day.

7. Visual inspection of all bar joist bearing ends for compliance with specifications.

8. Visual inspection of all metal roof deck structural welds.

END OF SECTION 01410

SECTION 01500-TEMPORARY FACILITIES

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies requirements for temporary services and facilities, including utilities, construction and support facilities, security and protection.

B. Temporary utilities required include but are not limited to:

1. Water service and distribution
2. Temporary electric power and light
3. Telephone service
4. Sanitary facilities

C. Temporary construction and support facilities required include but are not limited to:

1. Temporary heat and ventilation as required to facilitate construction process and personnel.
2. Field office and storage sheds.
3. Sanitary facilities, including drinking water.
4. Temporary enclosures.
5. Hoists and temporary elevator use.
6. Temporary project identification signs and bulletin boards
7. Waste disposal services.
8. Rodent and pest control
9. Construction aids and miscellaneous services and facilities.

D. Security and protection facilities required include but are not limited to:

1. Temporary fire protections
2. Barricades, warning signs, lights
3. Sidewalk bridge or enclosure fence for the site.
4. Environmental protection
5. Fencing
6. Barriers

a. Contractor shall be responsible for providing a temporary 6' high chain link construction fence around the entire perimeter of the construction site. Fence shall be removed upon completion of the job. Limits of construction fence indicate on the site plan drawings.

b. Contractor shall be responsible for providing security measures as required to prevent public entry to construction areas and adjacent properties from damage from construction operations.

c. Contractor shall be responsible for providing a protective barrier around trees and plants designated to remain as indicated in plans. Project against vehicular traffic, stored materials, dumping, chemically injurious materials and puddling or continuous running water.

7. Enclosures
   a. Provide temporary weather-tight closures of openings in exterior surfaces to provide acceptable working conditions and protection for materials, in allow for temporary heating, and to prevent entry of unauthorized persons. Provide temporary doors with self-closing hardware and locks.
8. Protection of Installed Work
   a. Provide temporary protection for installed products. Control work and traffic in immediate area to avoid damage.
   b. Provide protective coverings at walls, projections, jambs, sills and soffits of openings. Provide barriers or coverings to protect roof and finished floors and stairs from work and traffic, movement of heavy objects and storage.
   c. Prohibit work, traffic and storage on waterproofed and roofed surfaces, and on lawn and landscaped areas that is not a part of the work for those surfaces and areas.
9. Security and Maintenance
   a. Vehicular and pedestrian gates, when indicated or required, shall be securely locked at all times when no work is in progress and when not required for construction activities. During all work hours, gates which must be open shall becontinuously monitored by the contractor to prevent unauthorized personnel or vehicles from entering the construction site.
   b. Fencing shall be as specified in 1.02 D above and shall prevent pedestrian travel through the site for any reason.
   c. Temporary fencing shall be removed only for construction reasons. If temporary fencing removal is required for non-construction reasons, fencing shall be immediately replaced and secured as soon as the activity for which its removal

was required is completed, or if the activity cannot be completely by the end of the work day, temporary security measures shall be taken by the Contractor to ensure that there is no breach of security even during off-work periods.

d. 'No Trespassing' and similar signs shall be posted at gates and along fencing adjacent to public areas to inform non-construction personnel of the reason for the fence and potential hazards of entering the construction site. Said signs shall be of a size and spacing to be legible from any point along the entire perimeter of the construction site.

1.03 SUBMITTALS

A. Temporary Utilities: Submit reports of tests, inspections, meter readings and similar procedures performed on temporary utilities.

1.04 QUALITY ASSURANCE

A. Regulations: Comply with industry standards and applicable laws and regulations if authorities having jurisdiction, including but to limited to:

1. Building Code requirements
2. Health and safety regulations
3. Utility company regulations
4. Police, Fire Department and Rescue Squad rules
5. Environmental Protection regulations

B. Standards: Comply with NFPA Code 241, 'Building Construction and Demolition Operations', ANSI-A10 Series standards for 'Safety Requirements for Construction and Demolition', and NECA Electrical Design Library 'Temporary Electrical Facilities'.

1. Refer to 'Guidelines for Bid Conditions for Temporary Job Utilities and Services', prepared jointly by AGC and ASC, for industry recommendations.

2. Electrical Services: Comply with NEMA, NECA and UL standards and regulations for temporary electric service. Install service in compliance with National Electric Code (NFPA 70).

C. Inspections: Arrange for authorities having jurisdiction to inspect and test each temporary utility before use. Obtain required certifications and permits.

1.05 PROJECT CONDITIONS

A. Temporary Utilities: Prepare a schedule indicating dates for implementation and termination of each temporary utility. At the earliest feasible time, when acceptable to the Owner, change over from use of temporary service to use for the permanent service.

B. Conditions of Use: Keep temporary services and facilities clean and neat in appearance. Operate in a safe and efficient manner. Take necessary fire prevention measures. Do not overload facilities, nor permit them to interfere with progress. Do not allow hazardous dangerous, unsanitary conditions, nor public nuisances to develop or persist on the site.

C. Water Control: Grade site to drain. Maintain excavations free of water. Provide and operate pumping equipment if necessary. Provide silt barriers required by the Florida Department of Transportation St. Johns and any other authority having jurisdiction over the Project.

D. Cleaning During Construction: Control accumulation of waste materials and rubbish so as to maintain a neat, clean and orderly and safe project; periodically dispose of off-site as needed.

Clean interior areas prior to start of finish work, maintain areas free of dust and other contaminants during finishing operations.

E. Project Identification: Provide a sign as outlined in SECTION 01580 PROJECT SIGN. Locate to provide an unobstructed view from adjoining roadway. Remove project sign upon final completion acceptance.

F. Field Office and Sheds: Office: Weather-tight with lighting, electrical outlets, heating, cooling, and ventilating equipment, and equipped with furniture.

Storage Sheds for Tools, Materials, and Equipment: Weather-tight with adequate space for organized storage and access, and lighting for inspection of stored materials.

Contractor provide 10 x 8 minimum size office with plan table, telephone, heat, a/c for projects exceeding 10,000 sq. ft. building area.

G. Protection of Adjacent Properties: Locate on site construction operations that will generate noise and/or dust as far as practical from occupied structures on adjacent properties so as to minimize disturbances to the occupants of these structures or properties.

Prevent dust or other contaminants caused by construction operations for this Project from being carried to adjacent properties by installation of

protective barriers and/or suspension of construction operations during high winds.

Dispose of all construction debris which may be carried to adjacent properties by winds. Remove debris daily and/or more often as required to prevent contamination of adjacent properties.

H. Removal: Remove temporary materials, equipment and construction facilities prior to Substantial Completion inspection.

Remove temporary utility services prior to Final Completion Inspection.

Clean and repair damage caused by installation or use of temporary facilities. Remove underground installations; grade and complete all work on site as indicated.

I. Conversion to Public Utilities: General Contractor is to coordinate and arrange with the appropriate utility service providing agencies and make arrangements for the installation and connection to final utilities prior to Final Completion inspection.

General Contractor shall provide any and all coordination, scheduling and layouts as may be required by the service utilities.

PART 2 PRODUCTS

2.01 MATERIALS

A. General: Provide new materials; of acceptable to the Project Manager, undamaged previously used materials in serviceable condition maybe used. Provide materials suitable for the use intended.

B. Lumber and Plywood: Comply with requirements in Division 6 Section ‘Rough Carpentry’.

1. For job-built temporary offices, shops and sheds within the construction area, provide UL labeled, fire treated lumber and plywood for framing, sheathing and siding.

2. For signs and directory boards, provide exterior type, Grade B-B High Density Concrete Form Overlay Plywood conforming to PS-1 of sizes and thickness indicated.

3. For fences and vision barriers, provide exterior type, minimum 3/8" thick plywood.

4. For safety barriers, sidewalk bridges and similar uses, provide minimum 5/8" thick exterior plywood.

C. Paint: Comply with requirements of Division 9 Section 'Finish Painting'.

1. For job-built temporary offices, shops, sheds, fences and other exposed lumber and plywood, provide exterior grade acrylic-latex emulsion over exterior primer.

2. For sign panels and applying graphics, provide exterior grade alkyd gloss enamel over exterior primer.

3. For interior walls of temporary offices, provide two coats interior latex flat wall paint.

D. Tarpaulins: Provide waterproof, fire-resistant, UL labeled tarpaulins with flame-spread rating of 15 or less. For temporary enclosure provide translucent nylon reinforced laminated polyethylene or polyvinyl chloride fire retardant tarpaulins.

E. Water: Provide portable water approved by local health authorities.

F. Open-Mesh Fencing: Provide 11-gage, galvanized 2-inch, chain link fabric fencing 6-feet high with galvanized barbed wire top strand and galvanized steel pipe post, one (1) " I.D. for line posts and two (2) I.D. for corner posts.

2.02 EQUIPMENT

A. General: Provide new equipment: if acceptable to the Project Manager, undamaged, previously used equipment in serviceable condition may be used. Provide equipment suitable for use intended.

B. Water Hoses: Provide 3/4" heavy-duty, abrasion-resistant, flexible rubber hoses 100 ft. Long, with pressure rating greater than the maximum pressure of the water distribution system. Provide adjustable shut-off nozzles at hose discharge.

C. Electrical Outlets: Provide properly configured NEMA polarized outlets to prevent insertion of 110-120 volt plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset bottom and pilot light, for connection of power tools and equipment.

D. Electrical Power Cords: Provide grounded extension cords; use hard-service cords where exposed to abrasion and traffic. Provide water proof

connectors to connect separate lengths of electric cords, if single lengths will not reach areas where construction activities are in progress.

E. Lamps and Light Fixtures: Provide general service incandescent lamps of wattage required for adequate illumination. Provide guard cages or tempered glass enclosures, where exposed to breakage. Provide exterior fixtures where exposed to moisture.

F. Heating Units: Provide temporary heating units that have been tested and labeled by UL, FM or another recognized trade association related to the type of fuel being consumed.

G. Temporary Offices: Provide prefabricated or mobile units or similar job-built construction with lockage entrances, operable windows and serviceable finished. Provide heated and air-conditioned units on foundations adequate for normal loading.

H. Temporary Toilet Units: Provide self-contained single-occupant toilet units of the chemical, aerated recirculation, or combustion type, properly vented and fully enclosed with a glass fiber reinforced polyester shell or similar nonabsorbent material.

I. First Aid Supplies: Comply with governing OSHA and any other regulations.

J. Fire Extinguishers: Provide hand-carried, portable UL-rated, class "A" fire extinguishers for temporary offices and similar spaces. In other locations provide hand-carried, portable UL-rated, class 'ABC' dry chemical extinguishers, or a combination of extinguishers of NEPA recommended classes for the exposures.

1. Comply with NFPA 10 and 241 for classification, extinguishing agent and size required by location and class of fire exposure.

PART 3 EXECUTION

3.01 INSTALLATION

A. Use qualified personnel for installation of temporary facilities. Locate facilities where they will serve the project adequately and result in minimum interference with performance of the work. Relocate and modify facilities as required.

B. Provide each facility ready for use when needed to avoid delay. Maintain and modify as required. Do not remove until facilities are no longer

needed, or are replaced by authorized use of completed permanent facilities.

3.02 TEMPORARY UTILITY INSTALLATION

A. General: Engage the appropriate local utility company to install temporary service or connect to existing service. Where the company provides only part of the service, provide the remainder with matching, compatible materials and equipment; comply with the company's recommendations.

1. Arrange with the company and existing users for a time when service can be interrupted, where necessary, to make connections for temporary services.

2. Provide adequate capacity at each stage of construction. Prior to temporary utility availability, provide trucked-in services.

3. Obtain easements to bring temporary utilities to the site, where the Owner's easements cannot be used for that purpose.

4. Use Charges: Cost of use charges for temporary facilities are not chargeable to the Owner or Architect, and will not be acceptable as a basis of claims for a Change Order.

B. Water Service: Install water service and distribution piping of sized and pressures adequate for construction until permanent water service is in use.

C. Temporary Electric Power Service: Provide weatherproof, grounded electric power service and distribution system of sufficient size, capacity, and power characteristics during construction period. Include meters, transformers, overload protected disconnects, automatic ground-fault interrupters and main distribution switch gear.

D. Temporary Lighting: Whenever overhead floor or roof deck has been installed, provide temporary lighting with local switching.

1. Install and operate temporary lighting that will fulfill security and protection requirements, without operating the entire system, and will provide adequate illumination for construction operations and traffic conditions.

E. Temporary Telephones: Provide temporary telephone service for all personnel engaged in construction activities, throughout the construction period. Install telephone on a separate line for each temporary office and

first aid station. Where an office has more than two occupants, install a telephone for each additional occupant or pair of occupants.

1. At each telephone, post a list of important telephone numbers.

F. Sewers and Drainage: If sewers are available, provide temporary connections to remove effluent that can be discharged lawfully. If sewers are not available or cannot be used, provide drainage ditches, dry wells, stabilization ponds and similar facilities. If neither sewers nor drainage facilities can be lawfully used for discharge or effluent, provide containers to remove and dispose of effluent off the site in a lawful manner.

1. Filter out excessive amounts of soil, construction debris, chemicals, oils and similar contaminants that might clog sewers or pollute waterways before discharge.

G. Provide earthen embankments and similar barriers in and around excavations and subgrade construction, sufficient to prevent flooding by run-off of storm water from heavy rains.

3.03 TEMPORARY CONSTRUCTION AND SUPPORT FACILITIES INSTALLATION

A. Locate field offices, storage sheds, sanitary facilities land other temporary construction and support facilities for easy access.

1. Maintain temporary construction and support facilities until Substantial Completion. Personnel remaining after Substantial Completion will be permitted to use permanent facilities, under conditions acceptable to the Owner.

B. Provide incombustible construction for offices, shops and sheds located within the construction area or within 30 feet of building lines. Comply with requirements of NFPA 241.

C Temporary Heat: Provide temporary heat required by construction activities, for curing or drying of completed installations or protection of installed construction from adverse effects of low temperatures or high humidity. Select safe equipment that will not have a harmful effect on completed installations or elements being installed. Coordinate ventilation requirements to produce the ambient condition required and minimize consumption of energy.

D. Heating Facilities: Except where use of the permanent system is authorized, provide electric vented self-contained LP gas or fuel oil heaters with individual thermostatic control.

1. Use of gasoline-burning space heaters, open flame, or salamander type heating units is prohibited.

E. Storage and Fabrication Sheds: Install storage and fabrication sheds, sized, furnished and equipped to accommodate materials and equipment involved, including temporary utility service. Sheds maybe open shelters or fully enclosed spaces with the building or elsewhere on the site.

F. Temporary Paving: Construct and maintain temporary roads and paving to support the indicated loading and to withstand exposure to traffic during the construction period. Locate temporary paving the roads, storage areas and parking where the same permanent facilities will be located. Review proposed modifications to permanent paving with the Architect.

1. Paving: Comply with Division 2 Section 'Asphalt Concrete Paving' or construction and maintenance of temporary paving.

2. Coordinate temporary paving development with subgrade grading, compaction, installation, and stabilization of sub-base, and installation of base and finish courses of permanent pavings.

3. Install temporary paving to minimize the need to rework the installations and to result in permanent reads and paved areas that are without damage or deterioration when occupied by the Owner.

4. Delay installation of the final course of permanent asphalt concrete paving until immediately before Substantial Completion. Coordinate with either conditions to avoid unsatisfactory results.

5. Extend temporary paving in and around the construction area as necessary to accommodate delivery and storage of materials, equipment usage, administration and supervision.

G. Sanitary facilities include temporary toilets, wash facilities and drinking water fixtures. Comply with regulations and health codes for the type, number, location, operation and maintenance of fixtures and facilities. Install where facilities will best serve the Project's needs.

1. Provide toilet tissue, paper towels, paper cups and similar disposable materials for each facility. Provide covered waste containers for used material.

H. Toilets: Install self-contained toilet units. Shield toilets to ensure privacy. Use of pit-type privies will not be permitted. Provide one toilet for each 15 workers on site and have serviced weekly as a minimum.

I. Wash Facilities: Install wash facilities supplied with portable water at convenient locations for personnel involved in handling materials that require wash-up for a healthy and sanitary condition. Dispose of drainage properly. Supply cleaning compounds appropriate for each condition.

1. Provide safety showers, eye-wash fountains and similar facilities for convenience, safety and sanitation of personnel.

J. Drinking Water Fixtures: Provide drinking water fountains including paper cups supply.

1. Where power is accessible, provide electric water coolers to maintain dispensed water temperature at 45 to 55 degree F (7 to 13 degree C).

K. Dewatering Facilities and Drains: For temporary drainage and dewatering facilities and operations not directly associated with construction activities included under individual Sections, comply with dewatering requirements of applicable Division 2 Sections. Where feasible, utilize the same facilities. Maintain the site, excavations and construction free of water.

L. Temporary Enclosures: Provide temporary enclosure for protection of construction in progress and completed, from exposure, foul weather, other construction operations and similar activities.

1. Where heat is needed and the permanent building enclosure is not complete, provide temporary enclosures where there is no other provision for containment of heat. Coordinate enclosure with ventilating and material drying or curing requirements to avoid dangerous conditions and effects.

2. Install tarpaulins securely, with incombustible wood framing and other materials. Close openings of 25 square feet or less with plywood or similar materials.

3. Close openings through floor or roof decks and horizontal surfaces with load-bearing wood-framed construction.

4. Where temporary wood or plywood enclosure exceeds 100 square feet in area, use UL-labeled fire-retardant treated material for framing and main sheathing.

M. Temporary Lifts and Hoist: Provide facilities for hoisting materials and employees. Truck cranes and similar devices used for hoisting material are considered 'tools and equipment' and not temporary facilities.

N. Temporary Elevator Use: Refer to Division 14 'Elevator' Sections.

I. Project Identification and Temporary Signs: Prepare project identification and other signs of the size indicated. Install signs where indicated to inform the public and persons seeking entrance to the Project. Support on posts or framing of preservative treated wood or steel. Do not permit installation of unauthorized signs.

1. Project Identification Signs: Engage an experienced sign painter to apply graphics. Comply with details indicated.

2. Temporary Signs: Prepare signs to provide directional information to construction personnel and visitors.

P. Temporary Exterior Lighting: Maintain exterior yard and sign lights so that signs are visible when work is being performed.

Q. Collection and Disposal of Waste: Collect waste from construction areas and elsewhere daily. Comply with requirements of NFPA 241 for removal of combustible waste material and debris. Enforce requirements strictly. Do not hold materials more than 7 days during normal weather or 3 days when the temperature is expected to raise above 80 degree F (27 degree). Handle hazardous, dangerous, or unsanitary waste materials separately from other waste by containerizing properly. Dispose of materials in a lawful manner.

R. Rodent and Pest Control: Before foundation work has been completed, retain a local exterminator or pest control company to recommend practices to minimize attraction and harboring of rodents, roaches and other pests. Employ this service to perform extermination and control procedures at regular intervals so the project will be relatively free of pests and their residues at Substantial Completion. Perform control operations in a lawful manner using environmentally safe materials.

3.04 SECURITY AND PROTECTIONS FACILITIES INSTALLATION

A. Except for use of permanent fire protection as soon as available do not change over from use of temporary security and protection facilities to permanent facilities until Substantial Completion, or longer as requested by the Project Manager.

B. Temporary Fire Protection: Until fire protection needs are supplied by permanent facilities of the types needed to protect against reasonably predictable and controllable fire losses. Comply with NFPA 10 Standard for Portable Fire Extinguishers, and NFPA 141 Standard for Safeguarding Construction, Alternations and Demolition Operations.

1. Locate fire extinguishers where convenient and effective for their intended purpose, but not less than one extinguisher on each floor at or near each usable stairwell.

2. Store combustible materials in containers in fire-safe locations.

3. Maintain unobstructed access in fire extinguishers, fire hydrants, temporary file protection facilities, stairways and other access routes for fighting fires. Prohibit smoking in hazardous fire exposure areas.

4. Provide supervision of welding operations, combustion type temporary heating units, and similar sources of fire ignition.

C. Permanent Fire Protection: At the earliest feasible date in each area of the Project, complete installation of the permanent fire protection facility, including connected services, and place into operation and use. Instruct key personnel on use of facilities.

D. Barricades, Warning Signs and Lights: Comply with standards and code requirements for erection of structurally adequate barricades. Paint with appropriate colors, graphics and warning signs to inform personnel and the public of the hazard being protected against. Where appropriate and needed, provide lighting including flashing red or amber lights.

E. Enclosure Fence: When excavation begins, install an enclosure fence with lockable entrance gates. Locate where indicated, or enclose the entire site or the portion determined sufficient to accommodate construction operations. Install in a manner that will prevent people, dogs and other animals from easily entering the site, except by the entrance gates.

1. Provide open-mesh, chain-link fencing with posts set in a compacted mixture of gravel and earth.

F. Security Enclosure and Lockup: Install substantial temporary enclosure of partially completed areas of construction. Provide locking entrances to prevent unauthorized entrance, vandalism, theft and similar violations of security.

1. Storage: Where materials and equipment must be stored, and are of value or attractive for theft, provide a secure lockup. Enforce discipline in connection with the installation and release of materials to minimize the opportunity for theft and vandalism.

G. Environmental Protection: Provide protection, operate temporary facilities and conduct construction in ways and by methods that comply with environmental regulations, and minimize the possible that air, waterways and sub-soil might be contaminated or polluted, or that other undesirable effects might result. Avoid use of tools and equipment which product harmful poise. Restrict use of noise making tools and equipment to hours that will minimize complaints from persons or firms near the site.

3.05 OPERATION, TERMINATION AND REMOVAL

A. Supervision: Enforce strict discipline in use of temporary facilities. Limit availability of temporary facilities to essential and intended uses to minimize waste and abuse.

B. Maintenance: Maintain facilities in good operating condition until removal. Protect from damage by freezing temperatures and similar elements.

1. Maintain operation of temporary enclosures, heating, cooling, humidity control, ventilation and similar facilities on a 24 hour day basis where required to achieve indicated results and to avoid possibility of damage.

2. Protection: Prevent water filled piping from freezing. Maintain makers for underground lines. Protect from damage during excavation operations.

C. Termination and Removal: Unless the Architect requests that it be maintained longer, remove each temporary facility when the need has ended, or when replaced by authorized use of a permanent facility, or no later than substantial completion. Complete or, if necessary, restore permanent construction that may have been delayed because of interference with the temporary facility. Repair damaged work, clean exposed surfaces and replace construction that cannot be satisfactorily repaired.

1. Materials and facilities that constitute temporary facilities are property of the Contractor. The Owner reserves the right to take possession of Project identification signs.

2. Remove temporary paving that is not intended for or acceptable for integration into permanent paving. Where the area is intended for landscape development, remove soil and aggregate fill that does not comply with requirements for fill or subsoil in the area. Remove materials contaminated with road oil, asphalt and other petrochemical compounds, and other substances which might impair growth of plant materials or lawns. Repair or replace street pavings, curbs and sidewalks at the temporary entrances, as required by the governing authority.

3. At Substantial Completion, clean and renovate permanent facilities that have been used during the construction period, including but not limited to:
   a. Replace air filters and clean inside of ductwork and housings.
   b. Replace significantly worn parts and parts that have been subject to unusual operating conditions.
   c. Replace lamps that are burned out or noticeably dimmed by substantial hours of use as noted by the Owner's representative.

END OF SECTION 01500

SECTION 01580
PROJECT SIGN

PART 1 GENERAL

1.01 DESCRIPTION

A. Furnish, install and maintain one project identification sign, 48 inches x 96 inches in size. Contractor shall verify maximum allowable job site sign size specifications prior to fabrication of sign. Contractor shall be required to obtain and pay for any and/or all permits and approvals for the erection of said project identification sign. Unless local authorities have different maximum size requirements that would not allow for such size.

B. Content required on sign:

1. Title of project/address of project

2. Name of Owner/name of Orange County chairman and commissioner(s). All names shall be those in office on the date the construction contract is awarded.

3. Tile and names of:

a. Engineer of Record
b. General Contractor

C. No other signs or advertising will be permitted on the project site, without approval of County, except signs for safety purposes.

1.02 CODES

A. Where required by Local Code, comply with minimum structural and foundation requirements.

1.03 SUBMITTALS

A. Shop Drawings, showing:

1. Layout, showing sizes and styles of letters

2. Type of paint.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

A. Southern Pine No. 2 pressure treated, AWPB LP-2. Surfaced four sides.

B. Plywood: A-C EXT MDO APA PSI, with medium density overlay, 3/4" thick.

C. Nails: Hot-dip galvanized

D. Paint: Manufactured by Sherwin-Williams or equal

1. Primer: A-100 Ext. Wood Primer Y24W20

2. Second, and third coats: Industrial Enamel B54(S-W)

E. Sign Colors: Refer to project sign drawing attached herein.

2.02 LETTERING

A. All Lettering shall be Times Roman Bold Style

PART 3 EXECUTION

3.01 INSTALLATION

A. Install members plumb, in true alignment, and in concrete foundations by Local Code.

B. Securely attach framing members to each other and to foundations.

3.02 PAINT

A. Paint all exposed surfaces of sign and support construction.

3.03 REMOVAL

A. Remove sign, framing and foundations no later than date of Final Completion.

3.04 SIGN DETAILS

A. Construct sign in accordance with the attached drawing.

END OF SECTION 01580

SECTION 01600-MATERIALS AND EQUIPMENT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements governing the Contractors selection of products for use in the Project.

1. Multiple Prime Contracts: Provisions of this Section apply to the construction activities of each prime Contractor.

B. The Contractors Construction Schedule and the Schedule of Submittals are included under Section 01300 Submittals.

C. Standards: Refer to Section Definitions and Standards for applicability of industry standards to products specified.

D. Administrative procedures for handling requests for substitutions made after award of the Contract are included under Section 01631 Product Substitution.

1.03 DEFINITIONS

A. Definitions used in this Article are not intended to change the meaning of other terms used in the Contract Documents such as specialties, systems, structure, finishes, accessories, and similar terms. Such terms are self-explanatory and have well recognized meanings in the construction industry.

1. Products are items purchased for incorporation in the Work, whether purchased for the Project or taken from previously purchased stock. The term product includes the term material, equipment, system and terms of similar intent.

a. Named Products are items identified by manufacturers' product name, including make or model designation, indicated in the manufacturers published product literature that is current as of the date of the Contract Documents.

b. Foreign Products, as distinguished from domestic products, are

items substantially manufactured (50 percent or more of value) outside of the United States and its possessions; or produced or supplied by entities substantially owned (more than 50 percent) by persons who are not citizens or nor living within the United States and its possessions.

2. Materials are products that are substantially shaped; cut, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form a part of the Work.

3. Equipment is a product with operational parts, whether motorized or manually operated, that requires service connections such as wiring or piping.

1.04 SUBMITTALS

A. Product List Schedule: Prepare a schedule showing products specified in a tabular form acceptable to the Project Manager. Include generic names of products required. Include the manufacturers name and proprietary product names for each item listed.

1. Coordinate the product list schedule with the Contractors Construction Schedule and the Schedule of Submittals.
   a. Related Specification Section Number
   b. Generic name used in Contract Documents
   c. Proprietary name, model number and similar designations.
   d. Manufacturers name and address
   e. Suppliers name and address
   f. Installers name and address
   g. Projected delivery date, or time span of delivery period.

2. Initial Submittal: Within 30 days after date of commencement of the Work, submit 3 copies of an initial product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

   a. At the Contractors option, the initial submittal may be limited to product selections and designations that must be established early in the Contract period.

3. Complete Scheduled: Within 45 days after date of commencement of the Work, submit 3 copies of the completed product list schedule. Provide a written explanation for omissions of data, and for known variations from Contract requirements.

4. Architects Action: The Architect will respond in writing to the

Contractor within 2 weeks of receipt of the completed product list schedule. No response within this time period constitutes no objection to listed manufacturers or products, but does not constitute a waiver of the requirement that products comply with Contract Documents. The Architects response will include the following:

a. A list of unacceptable product selections, containing a brief explanation of reasons for this action.

1.05 QUALITY ASSURANCE

A. Source Limitations: To the fullest extent possible, provide products of the same kind, from a single source.

B. Compatibility of Options: When the Contractor is given the option of selecting between two or more products for use on the Project; the product selected shall be compatible with products previously selected, even if previously selected products were also options.

C. Nameplates: Except for required labels and operating data, do not attach or imprint manufacturers or producers nameplates or trademarks on exposed surfaces of products which will be exposed to view in occupied spaces or on the exterior.

1. Labels: Locate required product labels and stamps on a concealed surface or, where required for observation after installation, on an accessible surface that is not conspicuous.

2. Equipment Nameplates: Provide a permanent nameplate on each item of service-connected or power-operated equipment. Locate on an easily accessible surface which is inconspicuous in occupied spaces. The nameplate shall contain the following information and other essential operating data.

a. Name of product and manufacturer
b. Model and serial number
c. Capacity
d. Speed
e. Ratings
f. Additional pertinent information

1.06 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Deliver, store and handle products in accordance with the manufacturers' recommendations, using means and methods that will prevent damage, deteriorating and loss, including theft.

1. Schedule delivery to minimize long-term storage at the site and to prevent overcrowding of construction spaces.

2. Coordinate delivery with installation time to ensure minimum holding time for items that are flammable, hazardous, easily damaged, or sensitive to deterioration, theft and other losses.

3. Deliver products to the site in the manufacturers original sealed container of other packaging system, complete with labels and instructions for handling, storing, unpacking, protecting and installing.

4. Inspect products upon delivery to ensure compliance with the Contract Documents and to ensure that products are undamaged and properly protected.

5. Store products at the site in a manner that will facilitate inspection and measurement of quantity or counting of units.

6. Store heavy materials away from the Project structure in a manner that will not endanger the supporting construction.

7. Store products subject to damage by the elements above ground, under cover in a weather tight enclosure, with ventilation adequate in prevent condensation. Maintain temperature and humidity within range required by manufacturers instructions.

PART 2 PRODUCTS

2.01 PRODUCT SELECTION

A. General Product Requirements: Provide products that comply with the Contract Documents, that are undamaged and, unless otherwise indicated, unused at the time of installation.

1. Provide products complete with all accessories, trim, finish, safety guards and other devices and details needed for a complete installation and for the intended use and effect.

2. Standard Products: Where available, provide standard products of types that have been produced and used successfully in similar situation on other projects.

B. Product Selection Procedures: Product selection is governed by the Contract Documents and governing regulations, not by previous Project experience. Procedures governing product selection include the following:

1. Proprietary Specification Requirements: Where only a single product or manufacturer is named, provide the product indicated. No substitutions will be permitted.

    a. Where products or manufacturers are specified by name, accompanied by the term or equal or approved equal comply with the Contractor Document provisions concerning substitutions to obtain approval for use of an unnamed product.

2. Non-Proprietary Specifications: When the Specifications list products or manufacturers that are available and may be incorporated in the Work, but do not restrict the Contractor to use of those products only, the Contractor may propose any available product that complies with Contract requirements. Comply with Contract Document provisions concerning substitutions to obtain approval for use of an unnamed product.

3. Descriptive Specification Requirements: Where Specifications describe a product or assembly, listing exact characteristics required, with or without use of a brand or trade name, provide a product or assembly that provides the characteristics and otherwise complies with Contract requirements.

4. Performance Specification Requirements: Where Specifications require compliance with performance requirements, provide products that comply with these requirements, and are recommended by the manufacturer for the application indicated.

    a. Manufacturers recommendations may be contained in published product literature, or by the manufacturers' certification of performance.

5. Compliance with Standards, Codes and Regulations: Where the Specifications only requires compliance with an imposed code, standard or regulation, select a product that complies with the standards, codes or regulations specified.

6. Visual Matching: Where Specifications require matching an established Sample, the Architects decision will be final on whether a proposed product matches satisfactorily.

    a. Where no product available within the specified category matches satisfactorily and also complies with other specified requirements, comply with provisions of the Contract Documents concerning substitutions for selection of a matching product in another product category, or for noncompliance with specified requirements.

7. Visual Selection: Where specified product requirements include the phrase ... as selected from manufacturers standard colors, pattern, textures... or a similar phrase, select a product and manufacturer that complies with other specified requirements. The Architect will select the color, pattern and texture from the product line selected.

8. Asbestos free materials: No products containing asbestos shall be used for any part of the work for this product. Provide verification.

END OF SECTION 01600

SECTION 01631-PRODUCTS SUBSTITUTIONS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary conditions and other Division-1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for handling request for substitutions made after award of the Contract.

B. The Contractor's Installation Schedule and the Schedule of Submittals are included under Section Submittals.

C. Standards: Refer to Section Definitions and Standards for applicability of industry standards to products specified.

D. Procedural requirements governing the Contractor's selection of products and product options are included under Section Materials and Equipment.

E. Contractor shall use the attached Request for Substitution form.

1.03 DEFINITIONS

A. Definitions used in this Article are not intended to change or modify the meaning of other terms used in the Contract Documents.

B. Substitutions: Requests for changes in products, materials, equipment, and methods of installation required by Contract Documents proposed by the Contractor after award of the Contract are considered requests for substitutions. The following are not considered substitutions:

1. Revisions to Contract Documents requested by the Owner or Architect.

2. Specified options of products and installation methods included in Contract Documents.

3. The Contractor's determination of and compliance with governing regulations and orders issued by governing authorities.

1.04 SUBMITTALS

A. Substitution Request Submittal: Request for substitution will be considered if received within thirty five (30) days after commencement of the Work. As long as this time allowance will not impact the construction schedule.

1. Submit three (3) copies of each request for substitution for consideration. Submit requests in the form and in accordance with procedures required for Change Order proposals.

2. Identify the product, or the fabrication or installation method to be replaced in each request. Include related Specification Section and Drawing numbers. Provide complete documentation showing compliance with the requirements for substitution, and the following information, as appropriate:
   a. Product Data, including Drawings, and descriptions of products, fabrication and installation procedures.
   b. Samples, where applicable or requested.
   c. A detailed comparison of significant qualities of the proposed substitution with those of the Work specified. Significant qualities may include elements such as size, weight, durability, performance and visual effect.
   d. Coordination information, including a list of changes or modifications needed to other parts of the Work and to construction performed by the Owner and separate Contractors that will become necessary to accommodate the proposed substitution.
   e. A statement indicating the substitution's effect on the Contractor's construction schedule compared to the schedule without approval of the substitution. Indicate the effect of the proposed substitution on overall Contract Time.
   f. Cost information, including a proposal of the net change, if any in the Contract Sum.

   g. Certification by the Contractor that the Substitution proposed is equal-to or better in every significant respect to that required by the Contract Documents, and that it will perform adequately in the application indicated. Include the contractor's waiver of rights to additional payment or time, that may subsequently become necessary because of the failure of the substitution to perform adequately.

3. Architect's Action: Within two weeks of receipt of the request for substitution, the Architect will request additional information or documentation necessary for

evaluation of the request if needed. Within two (2) weeks of receipt of the request, or one week of receipt of the additional information or documentation, which ever is later, the Architect will notify the Contractor of acceptance or rejection of the proposed substitution. If a decision on use of a proposed substitute cannot be made or obtained within the time allocated, use the project specified by name. Decision on the use of a product substitution or its rejection by the Architect is considered final. Acceptance will be in the form of a Change Order.

PART 2 PRODUCTS

2.01 SUBSTITUTIONS

A. Conditions: The Contractor □s substitution requ considered by the Architect when one or more of the following conditions are satisfied, as determined by the Architect; otherwise request will be returned without action except to record noncompliance with these requirements.

1. Extensive revisions to Contract Documents are not required.

2. Proposed changes are in keeping with the general intent of Contract Documents.

3. The request is timely, fully documented and properly submitted.

4. The specified product or method of construction cannot be provided within the Contract Time. The request will not be considered if the product or method cannot be provided as a result of failure to pursue the work promptly or coordinate activities properly.

5. The specified product or method of construction cannot receive necessary approval by a governing authority, and the requested substitution can be approved.

6. A substantial advantage is offered to the Owner, in terms of cost, time, energy conservation or other considerations of merit, after deducting offsetting responsibilities the Owner may be required to bear. Additional responsibilities for the Owner may include additional compensation to the Architect for redesign and evaluation services, increased cost of other construction by the Owner or separate Contractors, and similar consideration.

7. The specified product or method of construction cannot be provided in a manner that is compatible with other materials, and where the Contractor certifies that the substitution will overcome the incompatibility.

8. The specified product or method of construction cannot be coordinated with other materials, and where the Contractor certifies that the proposed substitution can be coordinated.

9. The specified product or method of construction cannot provide a warranty required by the Contract Documents and where the Contractor certifies that the proposed substitution provide the required warranty.

B. The Contractor's submittal and Project Manager's acceptance of Shop Drawings, Product Data or Samples that relate to construction activities not complying with the Contract Documents does not constitute an acceptable or valid request for substitution, nor does it constitute approval.

C. Substitution request constitutes a representation that the Contractor:

1. Has investigated proposed product and determined that it meets or exceeds, in all respects, specified product.

2. Will provide the same warranty for substitution as for specified product.

3. Will coordinate installation and make other changes which may be required for work to be complete in all respects.

4. Waives claims for additional costs which may subsequently become apparent. All costs associated with the substitution will be paid by the Contractor regardless of approvals given, and regardless of subsequent difficulties experienced as a result of substitutions.

END OF SECTION 01631

SECTION 01700-PROJECT CLOSE-OUT

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies administrative and procedural requirements for project close-out, including but not limited to:

1. Inspection procedures
2. Project record document submittal. (Substantial Completion)
3. Operating and maintenance manual submittal (Substantial Completion Requirements).
4. Submittal of warranties (Substantial Completion Requirement).
5. Final cleaning

B. Close-out requirements for specific construction activities are included in the appropriate Sections in Divisions 2 through 16.

C. Final payment to be made when the County has received all required close-out documents.

1.03 SUBSTANTIAL COMPLETION

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

1. In the Application for Payment that coincides with, or first follows, the date Substantial Completion in claimed, show 100 percent completion for the portion of the Work claimed as substantially complete. Include supporting documentation for completion as indicated in these Contract Documents and a statement showing an accounting of changes to the Contract Sum.

    a. 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. Complete final clean up requirements, including touch-up painting. Touch-up and otherwise repair and restore marred exposed finishes.

B. Inspection Procedures: On receipt of a request for inspection, the Project Manager will either proceed with inspection or advise the Contractor of unfilled requirements. The Project Manager will prepare the Certificate of Substantial Completion following inspection, or advise the Contractor of construction that must be completed or corrected before the certificate will be issued.

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

2. Should the project fail to meet the standards required for Substantial Completion as defined in the documents the Contractor will pay the expense of a second inspection by the Project Manager/Consultants and the Owner. Cost will be deducted from the Contractors retainage.

1.04 FINAL ACCEPTANCE

A. Preliminary Procedures: Before requesting final inspection for certification of final acceptance and final payment, complete the following List exceptions in the request:

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 and updated final statement, accounting for final additional changes to the Contract Sum.

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

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 the responsibility for corresponding elements of the Work.

5. Submit consent of surety to final payment.

6. Submit a final liquidated damages settlement statement

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

B. Reinspection Procedure: The Project Manager will reinspect 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 Project Manager.

1. Upon completion of reinspection, the Project Manager will prepare a certification 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.

1.05 RECORD DOCUMENT SUBMITTALS

A. General: Do not use record documents for construction purposes; protect from deterioration and loss in a secure, fire-resistive location; provide access to record documents for the Project Managers reference during normal working hours.

B. Record Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Contractor Drawings and Shop Drawings. Mark the set to show the actual installation where the installation varies substantially from the Work as originally shown. 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 Contract Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Provide for project photographs if deemed necessary by Owners representative.

1. Mark record sets with red erasable pencil; use other colors to distinguish between variations in separate categories of the Work.

2. Mark new information that is important to the Owner, but was not

shown on Contract Drawings or Shop Drawings.

3. Note related Change Order numbers where applicable.

4. Organize record drawing sheets, an print. suitable titles, dates and other identification on the cover of each set.

5. Provide three (3) additional sets of black line drawing sets of As-Builts 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. Mark these documents to show substantial variations in actual Work performed in comparison with the text of the Specifications and modifications. 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. Note related record drawing information and Project Data.

1. Upon completion of the Work, submit record Specifications to the Project Manager for the Owners records.

D. Record Project Data: Maintain one copy of each Product Data submittal. Mark these documents to show significant variation in actual Work performed in comparison with information submitted. Include variations in products delivered to the site, and from the manufacturers installation instructions and recommendations. Give particular attention to concealed products and portions of the Work which cannot otherwise be readily discerned later by direct observation. Note related Change Orders and mark-up of record drawings and Specifications.

1. Upon completion of mark-up, submit complete set of record Product Data in the three ring binder (indexed) to the Project Manager for the Owners records.

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

date or dates of Substantial Completion, complete miscellaneous record and place in good order, properly identified and bound or filed, ready for continued use and reference. Submit to the Project Manager for the Owners records.

G. Maintenance Manuals: Organize operating and maintenance data into five (5) suitable sets of manageable size. Bind properly indexed data in individual heavy-duty 2-inc, 3-ring vinyl covered binders, with pocket folders for folded sheet information. Mark appropriate identification on front and spine of each binder. Include the following types of information:

1. Emergency instructions
2. Spare parts list
3. Copies of warranties
4. Wiring diagrams
5. Recommended turn around cycles
6. Inspection procedures
7. Shop Drawings and Product Data
8. Fixture lamping schedule

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION

3.01 CLOSE-OUT PROCEDURES

A. Operating and Maintenance Instructions: Arrange for each installer of equipment that requires regular maintenance. If installers are not experienced in procedures, provide instruction by manufacturers representatives. All items to be provided or completed prior to certificate of Substantial Completion being issued by the Owner. Include a detailed review of the following items:

1. Maintenance manuals
2. Record documents
3. Spare parts and materials
4. Tools
5. Lubricants
6. Fuels
7. Identification systems
8. Control sequences
9. Hazards
10. Cleaning
11. Warranties and bonds
12. Maintenance agreements and similar continuing commitments

13. On site instructions to County maintenance personnel on major systems operations such as HVAC as per technical specifications.

B. As part of instruction for operating equipment, demonstrate the following procedures, prior to the Owner issuing Certificate of Substantial Completion:

1. Start-up
2. Shutdown
3. Emergency operations
4. Noise and vibration adjustments
5. Safety procedures
6. Economy and efficiency adjustments

3.02 PROJECT CLOSE-OUT MANUALS AT SUBSTANTIAL COMPLETION

A. Submit Project Close-out Manuals prior to issuance of final application for payment. Provide three (3) copies.

B. Bind in commercial quality 8 ½" x 11" three ring binder, indexed with hardback, cleanable, plastic covers.

C. Label cover of each binder with typed title PROJECT CLOSE-OUT MANUAL, with title of project; name, address, and telephone number of Contractor and name of responsible Principal.

D. Provide table of contents: Neatly typed, in the following sequence:

1. Final Certificate of Occupancy
2. Warranty Service Subcontractors Identification List
3. Final Lien Waivers and Releases
4. Warranties and Guarantees
5. Systems Operations and Maintenance Instruction
6. Manufacturers Certificates and Certifications
7. Maintenance Service Contracts
8. Spare Parts Inventory List
9. Special Systems Operating Permits or Approvals
10. Asbestos free materials notarized statement

E. Provide all documents for each section listed. List individual documents in each section in the table of contents, in the sequence of the Table of Contents of the Project Manual.

F. Identify each document listed in the Table of Contents with the number and title of the specification section in which specified, and the name of the Product or Work item.

G. Separate each section with index to sheets that are keyed to the Table of Contents listing.

H. Warranty Service Subcontractors List shall identify subcontractor supplier, and manufacturer for each warranty with name, address and emergency telephone number.

3.03 FINAL CLEANING

A. General: General cleaning during construction is required by the General Conditions and included in Section Temporary Facilities.

B. Cleaning: Employ experienced workers or professional cleaners for final cleaning. Clean each surface or unit to the condition expected in a normal, commercial building cleaning and maintenance program. Comply with manufacturers instructions.

1. Complete the following cleaning operations before requesting inspection for Certification of Substantial Completion.

a. Remove labels that are not permanent labels.
b. Clean transparent materials, including mirrors and glass in doors and windows. Remove glazing compound and other substances that are noticeable vision-obscuring materials. Replace chipped or broken glass and other damaged transparent materials.
c. Clean exposed exterior and interior hard-surfaced finished to a dust-free condition, free of stains, films and similar foreign substances. Restore reflective surfaces to their original reflective condition. Leave concrete floors broom clean. Vacuum carpeted surfaces. Apply floor wax to vinyl floors.
d. Wipe surfaces of mechanical and electrical equipment. Remove excess lubrication and other substances. Clean plumbing fixtures to a sanitary condition. Clean light fixtures and lamps.
e. Clean the site, including landscape development areas, of rubbish, litter and other foreign substances. Sweep paved areas broom clean; remove stains, spills and other foreign deposits. Rake grounds that are neither paved nor planted, to a smooth even-textured surface. Remove waste and surplus materials from the site in an appropriate manner.

C. Pest Control: Engage an experienced exterminator to make a final inspection, and rid the Project of rodents, insects and other pests.

D. Removal of Protection: Remove temporary protection and facilities installed for protection of the Work during construction.

E. Compliance: 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 Owners 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.

1. Where extra materials of value remaining after completion of associated Work have become the Owners property, arrange for disposition of these materials as direct.

END OF SECTION 01700

SECTION 01740-WARRANTIES AND BONDS

PART 1 GENERAL

1.01 RELATED DOCUMENTS

A. Drawings and general provisions of Contract, including General and Supplementary Conditions and other Division 1 Specification Sections, apply to this Section.

1.02 SUMMARY

A. This Section specifies general administrative and procedural requirements for warranties and bonds required by the Contract Documents, including manufacturers standard warranties on products and special warranties.

1. Refer to the General Conditions for terms of the Contractors special warranty of workmanship and materials.

2. General close-out requirements are included in Section Project Close-Out.

3. Specific requirements for warranties for the Work and products and installations that are specified to be warranted, are included in the individual Sections of Division 2 through 16.

4. Certifications and other commitments and agreements for continuing services to Owner are specified elsewhere in the Contract Documents.

B. Disclaimers and Limitations: Manufacturers disclaimers and limitations on product warranties to not relieve the Contractor of the warranty on the Work that incorporates the products, nor does it relieve suppliers, manufacturers, and subcontractors required do countersign special warranties with the Contractor.

1.03 WARRANTY REQUIREMENTS

A. Related Damages and Losses: When correcting warranted Work that has failed, remove and replace other Work that has been damaged as a result of such failure or that must be removed and replaced to provide access for correction of warranted Work.

B. Reinstatement of Warranty. When Work covered by a warranty has failed and been corrected by replacement or rebuilding, reinstate the warranty by written endorsement. The reinstated warranty shall be equal to the original warranty with an equitable adjustment for depreciation.

C. Replacement Cost: Upon determination that Work covered by a warranty has failed, replace or rebuild the Work to an acceptable condition complying with

requirements of Contract Documents.

D. Owners Recourse: Written warranties made to the Owner are in addition to implied warranties, and shall not limit the duties, obligation, rights and remedies otherwise available under the law, nor shall warranty periods be interpreted as limitations on time in which the Owner can enforce such other duties, obligations, rights, or remedies.

1. Rejection of Warranties: The Owner reserves the right to reject warranties and to limit selections to products with warranties not in conflict with requirements of the Contract Documents.

E. The Owner reserves the right to refuse to accept Work for the Project where a special warranty, certification, or similar commitment is required on such Work or part of the Work, until evidence is presented that entities required to countersign such commitments are willing to do so.

1.04 WARRANTY PERIOD

A. The Contractor shall participate with the County and the Architects representative, at the beginning of the tenth month of the warranty period, in conducting an on site review and evaluation of all items of equipment, materials and workmanship covered by the warranties and guarantees. Contractor shall act promptly and without cost to the County to correct all defects, problems, or deficiencies determined as such by the Architect/Owner during on the site review.

B. All warranties and guarantees shall commence on the date of Substantial Completion except for items which are determined by the County to be incomplete or a non-comply status at the time of Substantial Completion. The coverage commencement date for warranties and guarantees of such work shall be the date of the County’s acceptance of that work.

C. Warranty period shall be manufacturers standard for product specified except where specific warranty periods are specified in individual sections. But in no case less than one year.

1.05 SUBMITTALS

A. Submit written warranties to the Owner prior to the date certified for Substantial Completion. If the Architects Certificate of Substantial Completion designates a commencement date for warranties other than the date of Substantial Completion for the Work, or a designated portion of the Work, submit written warranties upon request of the Project Manager.

1. When a designated portion of the Work is completed and occupied or used by the Owner, by separate agreement with the Contractor during the construction period, submit properly executed warranties to the Project

Manager within fifteen (15) days of completion of that designated portion of the Work.

B. When a special warranty is required to be executed by the Contractor, or the Contractor and a subcontractor, supplier or manufacturer, prepared a written document that contains appropriate terms and identification, ready for execution by the required parties. Submit a draft to the Owner through the Architect for approval prior to final execution.

1. Refer to individual Sections of Division 2 through 16 for specific content requirements, and particular requirements for submittal of special warranties.

C. Form of Submittal: At Final Completion compile two (2) copies of each required warranty and bond properly executed by the Contractor, or by the subcontractor, supplier or manufacturer. Organize the warranty documents into an orderly sequence based on the table of contents of the Project Manual.

D. Bind (3) three sets of warranties and bonds in heavy-duty, commercial quality, durable 3-ring vinyl covered loose-leaf binders, thickness as necessary to accommodate contents, and sized to receive 8" by 11" paper.

1. Provide heavy paper dividers with Celluloid covered tabs for each separate warranty. Mark the tab to identify the product or installation. Provide a typed description of the product or installation, including the name of the product, and the name, address and telephone number of the installer.

2. Identify each binder on the front and the spine with the typed or printed title WARRANTIES AND BONDS, the Project title or name, and the name of the Contractor.

3. When operating and maintenance manuals are required for warranted construction, provide additional copies of each required warranty, as necessary, for inclusion in each required manual.

PART 2 PRODUCTS (Not Applicable)

PART 3 EXECUTION (Not Applicable)

END OF SECTION 01740

SECTION 02010 – SOIL REPORT AND RECOMMENDATIONS

PART 1 - GENERAL

See Attached Report

Geotechnical Engineering Report

Barber Park Expansion
Gatlin Avenue and Dixie Belle Drive
Orlando, Florida

September 24, 2015
Terracon Project No. H1155140

Prepared for:
Orange County Capital Projects Division
Orlando, Florida

Prepared by:
Terracon Consultants, Inc.
Winter Park, Florida

September 24, 2015

Terracon
Consultants, Inc.

Orange County Capital Projects Division
400 E. South Street
Orlando, Florida 32801

Attn: Mr. Roan Waterbury, LEED AP
P: [407] 836-0034
E: Roan.Waterbury@ocfl.net

Re: Geotechnical Engineering Report
Barber Park Expansion
Gatlin Avenue and Dixie Belle Drive
Orlando, Orange County, Florida
Terracon Project Number: H1155140

Dear Mr. Waterbury:

Terracon Consultants, Inc. (Terracon) has completed the geotechnical engineering services for the above referenced project. This study was performed in general accordance with our proposal number PH1150541 dated July 23, 2015.

This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork, the design and construction of playfields, pavements, and stormwater management design parameters for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report, or if we may be of further service, please contact us.

Sincerely,
Terracon Consultants, Inc.
Certificate of Authorization Number 8830

Shenna McMaster, P.E.
Senior Geotechnical Engineer
Florida PE #57537

Jay W. Casper, P.E.
Senior Associate

Enclosures

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Geotechnical exploration has been performed for the proposed expansion to the existing Barber Park located on Gatlin Avenue, west of Dixie Belle Drive in Orlando, Orange County, Florida. Eight (8) manual auger borings, designated as B-1 through B-8, have been performed to depths of 7 and 7.5 feet below the existing ground surface across the proposed expansion area.

Based on the information obtained from our geotechnical exploration, it appears that the site can be developed for the proposed project. The following geotechnical considerations were identified:

- Soil conditions observed consisted of fine sand (SP) and fine sand with silt (SP-SM). Soils with trace organics, indicative of topsoil, were observed at the surface of many borings. The soil conditions are generally suitable for the proposed improvements.
- Groundwater was observed in the borings at depths of 0.8 to 1.5 feet below existing grade. Seasonal high groundwater levels are expected to be near observed levels.
- Careful attention to relatively high groundwater levels is recommended in pavement and site grading.
- Shallow swales, possibly constructed in fill and/or constructed with bottom underdrains, will be required to make dry stormwater systems feasible at this site.

This summary should be used in conjunction with the entire report for design purposes. It should be recognized that details were not included or fully developed in this section, and the report must be read in its entirety for a comprehensive understanding of the items contained herein. The section titled **GENERAL COMMENTS** should be read for an understanding of the report limitations.

GEOTECHNICAL ENGINEERING REPORT
BARBER PARK EXPANSION
GATLIN AVENUE AND DIXIE BELLE DRIVE
ORLANDO, FLORIDA

Terracon Project No. H1155140
September 24, 2015

1.0 INTRODUCTION

This geotechnical engineering report has been prepared for the proposed expansion to the existing Barber Park located on Gatlin Avenue, west of Dixie Belle Drive in Orlando, Orange County, Florida as shown on the Topographic Vicinity Map included as Exhibit A-1 in Appendix A. Eight (8) manual auger soil borings, designated B-1 through B-8, were performed to depths of 7 to 7.5 feet below the existing ground surface across the proposed expansion area. Logs of the borings along with a Boring Location Plan (Exhibit A-4) are included in Appendix A of this report. Laboratory testing procedures are included in Exhibit B-1 in Appendix B.

The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- subsurface soil conditions
- groundwater conditions
- earthwork
- pavement design
- stormwater pond design

2.0 PROJECT INFORMATION

2.1 Project Description

Item	Description
Site layout	Based on the conceptual site plan provided, three (3) soccer fields, a paved parking area, and stormwater pond areas are planned.
Design traffic	Standard duty: 30,000 E_{18}SALs (assumed[1]) Heavy duty: 50,000 E_{18}SALs (assumed[1])
Stormwater Management	A stormwater pond is anticipated in the southern portion of the project site.

1. Pavement design to be based on the indicated total number of 18-kip equivalent single axle load repetitions (E_{18}SALs) over a 20-year design life.

2.2 Site Location and Description

Item	Description
Location	The project site is located at the existing Barber Park on Gatlin Avenue, west of Dixie Belle Drive in Orlando, Florida
Existing Site Conditions	The expansion is planned to the northeast of the existing park facility. The current ground cover is grass lawn.
Existing topography	The site currently appears nearly level. The USGS topographic quadrangle maps "Orlando East, Florida" and "Pine Castle, Florida" depict the ground surface elevations near elevation +100 feet referencing the National Geodetic Vertical Datum of 1929 (NGVD29).
Surface Water	The USGS topographic quadrangle maps "Orlando East, Florida" and "Pine Castle, Florida" depict Lake George (formerly Lake Barber) to the north of the site with a recorded water level near +94 feet.

3.0 SUBSURFACE CONDITIONS

3.1 Soil Survey

The Soil Survey of Orange County, Florida as prepared by the United States Department of Agriculture (USDA), Soil Conservation Service (SCS; later renamed the Natural Resource Conservation Service - NRCS), identifies the soil types at the subject site as *Basinger fine sand, depressional (3), Ona fine sand (26), Seffner fine sand (43),* and *Zolfo fine sand (54)*. It should be noted that the Soil Survey is not intended as a substitute for site-specific geotechnical exploration; rather it is a useful tool in planning a project scope in that it provides information on soil types likely to be encountered. Boundaries between adjacent soil types on the Soil Survey maps are approximate (included in Appendix as Exhibit A-2). Descriptions of the mapped soil units are included in Appendix A as Exhibit A-3.

3.2 Typical Profile

Based on the results of the borings, subsurface conditions on the project site can be generalized as follows:

Approximate Depth to Bottom of Stratum (feet)	Material Description
1 to 3	Fine sand with silt (SP-SM) with occasional trace organics, indicative of topsoil, observed at the surface
At least 7 to 7.5 feet	Fine sand (SP)

Conditions encountered at each boring location and results of laboratory testing are indicated on the individual boring logs. Stratification boundaries on the boring logs represent the approximate location of changes in soil types. The in-situ transition between materials may be gradual. Details for each of the borings can be found on the boring logs in Appendix A of this report. Descriptions of our field exploration are included as Exhibit A-5 in Appendix A. Descriptions of our laboratory testing procedures are included as Exhibit B-1 in Appendix B. A more detailed description of the Unified Soil Classification System (USCS) is included as Exhibit C-1 in Appendix C.

3.3 Groundwater

The boreholes were observed during drilling for the presence and level of groundwater. Groundwater was observed in all of the borings, between depths of 0.8 and 1.5 feet below existing grade. It should be recognized that fluctuations of the groundwater table will occur due to seasonal variations in the amount of rainfall, runoff and other factors not evident at the time the boring was performed. In addition, perched water can develop within higher permeability soils overlying less permeable soils. Therefore, groundwater levels during construction or at other times in the future may be higher or lower than the levels indicated on the boring logs.

We estimate that during the normal wet season with rainfall and recharge at a maximum, groundwater levels will be near those observed during the field exploration. Our estimates of the seasonal groundwater conditions are based on the USDA Soil Survey, the encountered soil types, recent weather conditions, and the encountered water levels.

These seasonal water table estimates do not represent the temporary rise in water table that occurs immediately following a storm event, including adjacent to other stormwater management facilities. This is different from static groundwater levels in wet ponds and/or drainage canals which can affect the design water levels of new, nearby ponds. The high water

table may vary from normal when affected by extreme weather changes, localized or regional flooding, karst activity, future grading, drainage improvements, or other construction that may occur on our around the site following the date of this report.

4.0 RECOMMENDATIONS FOR DESIGN AND CONSTRUCTION

4.1 Geotechnical Considerations

Borings encountered sand to sand with silt. These materials are generally suitable for construction of the proposed playfields, pavements, and stormwater systems following the recommended Earthwork portions of this report.

Potential limitations to be considered during stormwater management design are the relatively shallow groundwater levels. Use of a wet bottom stormwater pond or shallow dry bottom swale, possibly constructed in fill, appears most appropriate. Underdrains may be required to provide adequate recovery for a dry system.

To improve surface infiltration and reduce the potential for prolonged periods of soggy, wet conditions following heavy rainfall, we recommend that the upper 12 inches of fill placed in playfield areas consist of well-draining, inorganic, non-cohesive sand with less than 5 percent fines content. Field surfaces should be sloped appropriately for drainage.

Design and construction recommendations for earth connected phases of the project are outlined below.

4.2 Earthwork

4.2.1 Site Preparation

We anticipate construction will be initiated by clearing any surface vegetation and other deleterious material and stripping the topsoil. Once stripping is complete, the exposed subgrade should be observed and proofrolled with a medium or heavy weight roller (minimum 10,000 pounds static weight). Proofrolling should be avoided in dry stormwater system areas, where stormwater infiltration is required to provide recovery. When the prevailing groundwater table is high, proofrolling should be performed in static mode. Proofrolling aids in providing a firm base for compaction of new fill and delineating soft or disturbed areas that may exist at or near the exposed subgrade level as well as overall densification of the upper loose sands. Proofrolling should be performed in the presence of a Terracon representative in order to aid in evaluating unstable subgrade areas. Unstable areas observed at this time should be improved as recommended by the engineer based on field conditions and typically includes scarification and recompaction or by undercutting and replacement with suitable compacted fill.

Where fill is placed on existing slopes steeper than 5H:1V, benches should be cut into the existing slopes prior to fill placement. The benches should have a minimum vertical face height of 1 foot and a maximum vertical face height of 3 feet and should be cut wide enough to accommodate the compaction equipment. This benching will help provide a positive bond between the fill and natural soils and reduce the possibility of failure along the fill/natural soil interface. Furthermore, we recommend that fill slopes be over filled and then cut back to develop an adequately compacted slope face.

4.2.2 Material Requirements

Compacted structural fill should meet the following material property requirements:

Fill Type [1]	USCS Classification	Acceptable Location for Placement	Maximum Lift Thickness (in.)
General [1]	SP (fines content < 5%)	All locations and elevations. This is the best fill for pavement subgrade and upper lifts of playfield areas.	12[2]
	SP-SM (fines content between 5 and 12%)	Most locations and elevations, except strict moisture control will be required during placement, particularly during the rainy season. This material is not recommended for upper foot of fill placed in playfield areas.	8 to 12[2]

1. Controlled, compacted fill should consist of approved materials that are free of organic matter and debris.
2. Loose thickness when heavy compaction equipment is used in vibratory mode. Lift thickness should be decreased if static compaction is being used, typically to no more than 8 inches, and the required compaction must still be achieved. Use 4 to 6 inches in loose thickness when hand-guided equipment (i.e. jumping jack or plate compactor) is required.

4.2.3 Compaction Requirements

Item	Description
Minimum Compaction Requirements [1]	95 percent of the material's maximum modified Proctor dry density (ASTM D 1557).
Moisture Content[2]	Within ±2 percent of optimum moisture content as determined by the Modified Proctor test, at the time of placement and compaction.
Minimum Testing Frequency	One field density test per 20,000 square feet or fraction thereof per 1-foot lift.

1. We recommend that engineered fill be tested for moisture content and compaction during placement. Should the results of the in-place density tests indicate the specified moisture or compaction limits have not been met, the area represented by the test should be reworked and retested as required until the specified moisture and compaction requirements are achieved.
2. Specifically, moisture levels should be maintained low enough to allow for satisfactory compaction to be achieved without the cohesionless fill material pumping when proofrolled.

4.2.4 Grading and Drainage

Final surrounding grades should be sloped away from the playfields on all sides to prevent ponding of water. Site grades should be set considering the estimated seasonal high groundwater presented in Section 3.3.

It is recommended that all exposed earth slopes be seeded to provide protection against erosion. Seeded slopes should be protected with erosion mats until the vegetation is established.

4.2.5 Earthwork Construction Considerations

After initial proofrolling and compaction, unstable subgrade conditions could develop during general construction operations, particularly if the soils are wetted and/or subjected to repetitive construction traffic. The use of static compaction and/or light construction equipment would aid in reducing subgrade disturbance.

As a minimum, all temporary excavations should be sloped or braced as required by Occupational Health and Safety Administration (OSHA) regulations to provide stability and safe working conditions. Temporary excavations will probably be required during grading operations. The grading contractor, by his contract, is usually responsible for designing and constructing stable, temporary excavations and should shore, slope or bench the sides of the excavations as required, to maintain stability of both the excavation sides and bottom. All excavations should

comply with applicable local, state and federal safety regulations, including the current OSHA Excavation and Trench Safety Standards.

Depending on groundwater levels at the time of construction, temporary lowering of the groundwater level (dewatering) at the site may be necessary. The purposes of dewatering are to facilitate compaction of the subgrade soils during proofrolling and to provide dry, stable footing excavations. Dewatering can probably be accomplished at this site by a system of temporary drainage ditches graded to drain to sumps which can be pumped sufficiently to maintain water levels at the ditch bottoms. However, dewatering methods should be determined by the contractor.

4.3 Pavements

The near surface soil throughout most of the site consisted of fine sand and fine sand with silt. Stabilizing material will likely be necessary for the construction of pavement subgrades.

4.3.1 Subgrade Preparation

Site grading is typically accomplished relatively early in the construction phase. Fills are placed and compacted in a uniform manner. However, as construction proceeds, excavations are made into these areas, rainfall and surface water saturates some areas, heavy traffic from concrete trucks and other delivery vehicles disturbs the subgrade and many surface irregularities are filled in with loose soils to temporarily improve ride comfort. As a result, the pavement subgrades, initially prepared early in the project, should be carefully evaluated as the time for pavement construction approaches.

We recommend the moisture content and density of the top 12 inches of the subgrade be evaluated and the pavement subgrades be proofrolled and tested within two days prior to commencement of actual paving operations. Compaction tests should be performed at a frequency of 1 test per 10,000 square feet or fraction thereof. Areas not in compliance with the required ranges of moisture or density should be moisture conditioned and recompacted. Particular attention should be paid to high traffic areas that were rutted and disturbed earlier and to areas where backfilled trenches are located. Areas where unsuitable conditions are found should be repaired by removing and replacing the materials with properly compacted fills.

If a significant precipitation event occurs after the evaluation or if the surface becomes disturbed, the subgrade should be reviewed by qualified personnel immediately prior to paving. The subgrade should be in its finished form at the time of the final review.

4.3.2 Design Considerations

Traffic patterns and anticipated loading conditions were not available at the time that this report was prepared. However, we anticipate that traffic loads will be produced primarily by automobile traffic and occasional delivery and trash removal trucks. The thickness of pavements subjected to

heavy truck traffic should be determined using expected traffic volumes, vehicle types, and vehicle loads and should be in accordance with local, city or county ordinances.

Pavement thickness can be determined using AASHTO, Asphalt Institute, PCA, and/or other methods if specific wheel loads, axle configurations, frequencies, and desired pavement life are provided. Terracon can provide thickness recommendations for pavements subjected to loads other than personal vehicle and occasional delivery and trash removal truck traffic if this information is provided. However, absent that data, we recommend the following minimum typical sections.

4.3.3 Estimates of Minimum Pavement Thickness

Typical Pavement Section (inches)						
Traffic Area	**Alternative**	**Asphalt Concrete Surface Course**	**Limerock, Soil-Cement or Crushed Concrete Base Course**	**Stabilized Subbase Course[2,3,4]**	**Portland Cement Concrete**	**Free Draining Subgrade**
Car Parking	PCC	--	--		5.0	18.0
	AC	1.5	6.0	12.0	--	--
Truck and Drive Areas	PCC	--	--		6.0	18.0
	AC	2.5	8.0	12.0	--	--
Trash Container Pad [1]	PCC	--	--		6.0	18.0

1. The trash container pad should be large enough to support the container and the tipping axle of the collection truck.
2. Often referred to as Stabilized Subgrade.
3. Use coarse granular materials such as recycled crushed concrete, shell, or gravel when seasonal high groundwater is within 4 feet of the profile grade. Clay stabilization is acceptable with deeper seasonal high groundwater.
4. Some municipalities do not require stabilized subbase beneath soil-cement base.

4.3.4 Asphalt Concrete Design Recommendations

The following items are applicable to asphalt concrete pavement sections.

- Terracon recommends a minimum separation of 12 inches between the bottom of the base course and the seasonal high water table, if a soil cement or crushed concrete base is used. If a limerock base is used, a minimum separation of 18 inches between the bottom of the base course and the estimated seasonal high groundwater table is recommended.

- Natural or fill subgrade soils to a depth of 18 inches below the base should be clean, free draining sands with a fines content passing a No. 200 sieve of 7 percent or less.
- Stabilized subgrade soils (also identified as stabilized subbase) should be stabilized to a minimum Limerock Bearing Ratio (LBR; Florida Method of Test Designation FM 5-515) value of 40 if they do not already meet this criterion, or modified/replaced with new compacted fill that meets the minimum LBR value. Although LBR testing has not been performed, our experience with similar soils indicates that the near surficial sands encountered in the soil borings are unlikely to meet this requirement.
- The stabilized subgrade course should be compacted to at least 98 percent of the Modified Proctor maximum dry density (AASHTO T-180 or ASTM D-1557). Any underlying, newly-placed subgrade fill need only be compacted to a minimum of 95 percent of the Modified Proctor maximum dry density. Compaction tests should be performed at a frequency of 1 test per 10,000 square feet or fraction thereof.
- Limerock base courses from an approved FDOT source should have a minimum LBR value of 100, and be compacted to a minimum of 98 percent of the maximum dry density as determined by the Modified Proctor test. Limerock should be placed in uniform lifts not to exceed 6 inches loose thickness. Recycled limerock is not a suitable substitute for virgin limerock for base courses but may be used as a granular stabilizing admixture.
- Soil cement base courses typically experience shrinkage cracking due to hydration curing of the cement. This shrinkage cracking typically propagates through the overlying asphalt course and reflects in the pavement surface. This reflective cracking is not necessarily indicative of a pavement structural failure, though it is sometimes considered to be aesthetically undesirable.
- Soil cement bases should have 7-day design strength of 300 psi. Soil cement base should be compacted to a minimum of 98 percent of the material's maximum dry density as determined by the Standard Proctor Test for Soil Cement (AASHTO T-134). Higher design strengths may result in increased cracking.
- Crushed (recycled) concrete base should meet the current FDOT specification 204 for recycled materials.
- Asphalt should be compacted to a minimum of 95 percent of the design mix density. Asphalt surface courses should be Type SP, Type S, or other suitable mix design according to FDOT and local requirements.
- To verify thicknesses, after placement and compaction of the pavement courses, core the wearing surface to evaluate material thickness and composition at a minimum frequency of 5,000 square feet or two locations per day's production.
- Underdrains or strip drains should be considered along all landscaped areas in, or adjacent to pavements to reduce moisture migration to subgrade soils. Underdrains will also be required below pavement if the separation between the bottom of the base course and the seasonal high groundwater table is less than 1 foot.
- All curbing should be full depth. Use of extruded curb sections which lie on top of asphalt surface courses can allow migration of water between the surface and base courses, leading to rippling and pavement deterioration.

4.3.5 Portland Cement Concrete Design Recommendations

The following items are applicable to rigid concrete pavement sections.

- At least 18 inches of free-draining material should be included directly beneath rigid concrete pavement. Fill meeting the requirements of "General Fill" presented in Section 4.2 (Earthwork) of this report may be considered free-draining for this purpose. Limerock should not be considered free draining for this purpose.
- The PCC should be a minimum of 4,000 psi at 28 days. PCC pavements are recommended for trash container pads and in any other areas subjected to heavy wheel loads and/or turning traffic.
- The upper 1 foot of rigid pavement subgrade soils should be compacted to at least 98 percent of the Modified Proctor maximum dry density (AASHTO T-180 or ASTM D-1557). Compaction tests should be performed at a frequency of 1 test per 10,000 square feet or fraction thereof.
- Rigid PCC pavements will perform better than ACC in areas where short-radii turning and braking are expected (i.e. entrance/exit aprons) due to better resistance to rutting and shoving. In addition, PCC pavement will perform better in areas subject to large or sustained loads. An adequate number of longitudinal and transverse control joints should be placed in the rigid pavement in accordance with ACI and/or AASHTO requirements. Expansion (isolation) joints must be full depth and should only be used to isolate fixed objects abutting or within the paved area.
- Adequate separation should be provided between the bottom of the concrete and the seasonal high water table. Terracon recommends that in no case should less than 1 foot of separation be provided.
- Sawcut joint patterns should generally be square or rectangular but nearly square, and extend to a depth equal to a quarter of the slab thickness. If the bottom of the concrete pavement is separated from the seasonal high water table by at least 1 foot, filter fabric will not be necessary beneath the expansion joints.

4.3.6 Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. The subgrade and the pavement surface should have a minimum ¼ inch per foot slope to promote drainage. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the base layer.

4.3.7 Pavement Maintenance

The pavement sections provided in this report represent minimum recommended thicknesses and, as such, periodic maintenance should be anticipated. Therefore preventive maintenance should be planned and provided for through an on-going pavement management program.

Maintenance activities are intended to slow the rate of pavement deterioration, and to preserve the pavement investment. Maintenance consists of both localized maintenance (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Preventive maintenance is usually the first priority when implementing a pavement maintenance program. Additional engineering observation is recommended to determine the type and extent of a cost effective program. Even with periodic maintenance, some movements and related cracking may still occur and repairs may be required.

4.4 Stormwater Management

Design of the stormwater management system has not been completed yet. Dry retention ponds generally need to be at least 1 foot and sometimes as much as 3 feet (or more for large ponds) above the seasonal high water table to recover adequately.

Use of shallow dry-bottom swales may be feasible. Construction of swales in suitable permeable fill or use of underdrains may be required to allow a dry pond/swale system to adequately recover. If swales are constructed in fill, use of naturally occurring clean sand is recommended to promote recovery.

Bulk samples of anticipated swale subgrade soils (Boring Locations B-6 and B-8, 1 to 2 feet below existing grade) had measured permeability rates of 3 and 23 feet/day. We consider this permeability rate to be indicative of a saturated vertical permeability. Past experience and published references have indicated that unsaturated vertical permeability as used in some locally available groundwater models is typically 2/3 the saturated value. Experience with the observed soil types has shown that horizontal permeability may be on the order of 1.5 times the saturated vertical permeability in undisturbed materials. Fill soils placed in the proposed swale areas should consist of similar relatively clean sands. Permeability rates used in recovery analyses should consider any fill placed in the swale areas during construction.

A confining layer was not observed within the explored depths of 7 feet. Therefore we conservatively recommend that you consider the maximum explored depth of 7 feet as the confining layer for the purpose stormwater system design. A fillable porosity of 25 percent is recommended for near surface sands. The table below summarizes our recommended stormwater design parameters:

Parameter	Boring Location B-6	Boring Location B-8
Estimated Confining Layer Depth,	7 feet	7 feet
Estimated Seasonal High Water Table Elevation	1 foot	1 foot
Unsaturated Vertical Infiltration Rate, k_V	20 feet/day	3 feet/day
Horizontal Saturated Hydraulic Conductivity, k_H	30 feet/day	5 feet/day
Fillable Porosity, η	25 percent	25 percent

5.0 GENERAL COMMENTS

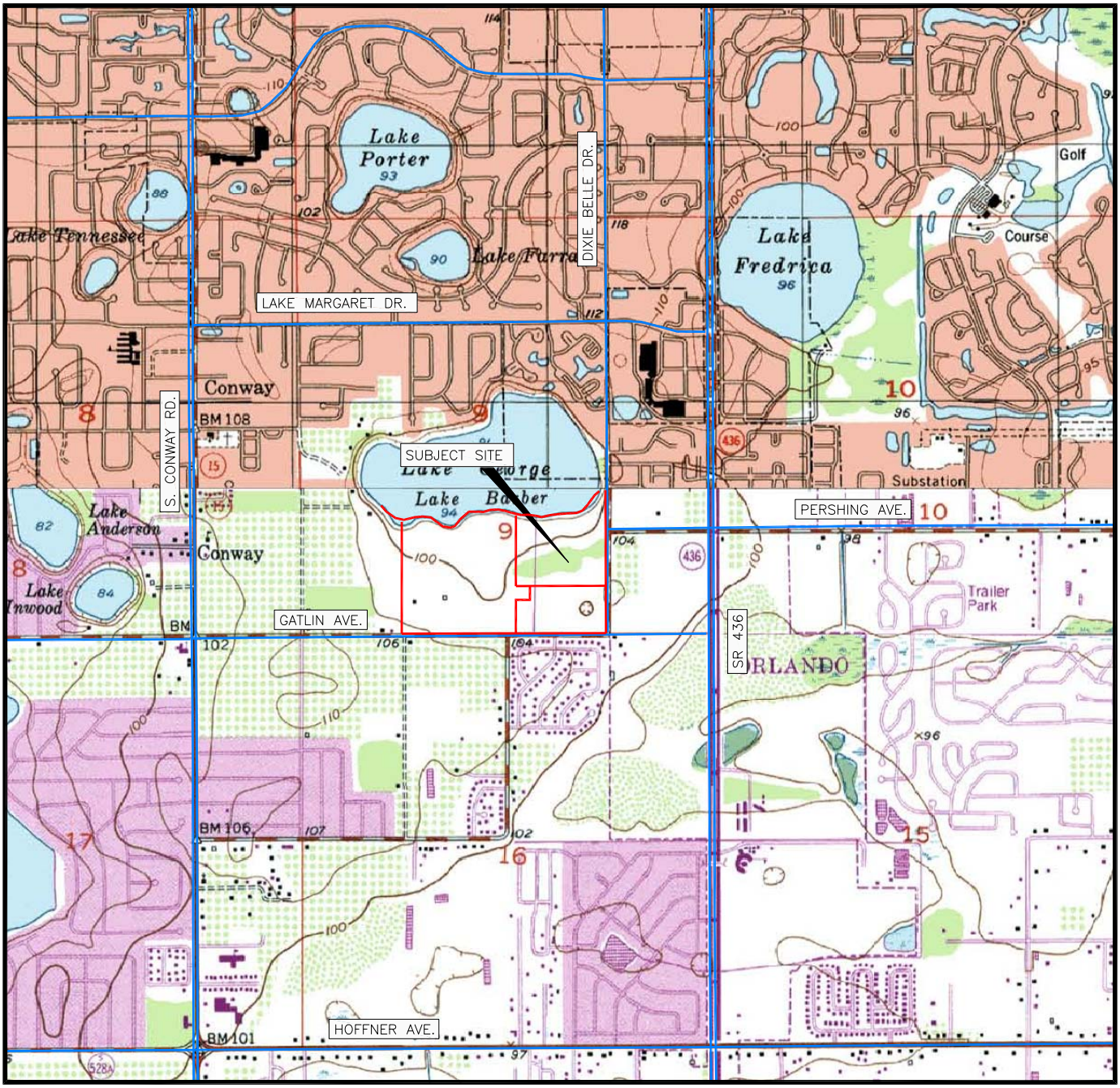
The analysis and recommendations presented in this report are based upon the data obtained from the borings performed at the indicated locations and from other information discussed in this report. This report does not reflect variations that may occur between borings, across the site, or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. If variations appear, we should be immediately notified so that further evaluation and supplemental recommendations can be provided.

The scope of services for this project does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

This report has been prepared for the exclusive use of our client for specific application to the project discussed and has been prepared in accordance with generally accepted geotechnical engineering practices. No warranties, either expressed or implied, are intended or made. Site safety, excavation support, and dewatering requirements are the responsibility of others. In the event that changes in the nature, design, or location of the project as outlined in this report are planned, the conclusions and recommendations contained in this report shall not be considered valid unless Terracon reviews the changes and either verifies or modifies the conclusions of this report in writing.

APPENDIX A
FIELD EXPLORATION

UNITED STATES – DEPARTMENT OF THE INTERIOR – GEOLOGICAL SURVEY



SCALE 1:24 000

1 .5 0 KILOMETERS 1 2

1000 0 1000 2000

MILES

1 .5 0 1

FEET

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

CONTOUR INTERVAL 5 FEET

NATIONAL GEODETIC VERTICAL DATUM OF 1929

N

SECTION: 9
TOWNSHIP: 23 SOUTH
RANGE: 30 EAST

ORLANDO EAST, FLORIDA ISSUED: 1994
PINE CASTLE, FLORIDA ISSUED: 1953 REVISED: 1980
7.5 MINUTE SERIES (QUADRANGLE)

Project Mngr:	SM
Drawn By:	SW
Checked By:	SM
Approved By:	JWC

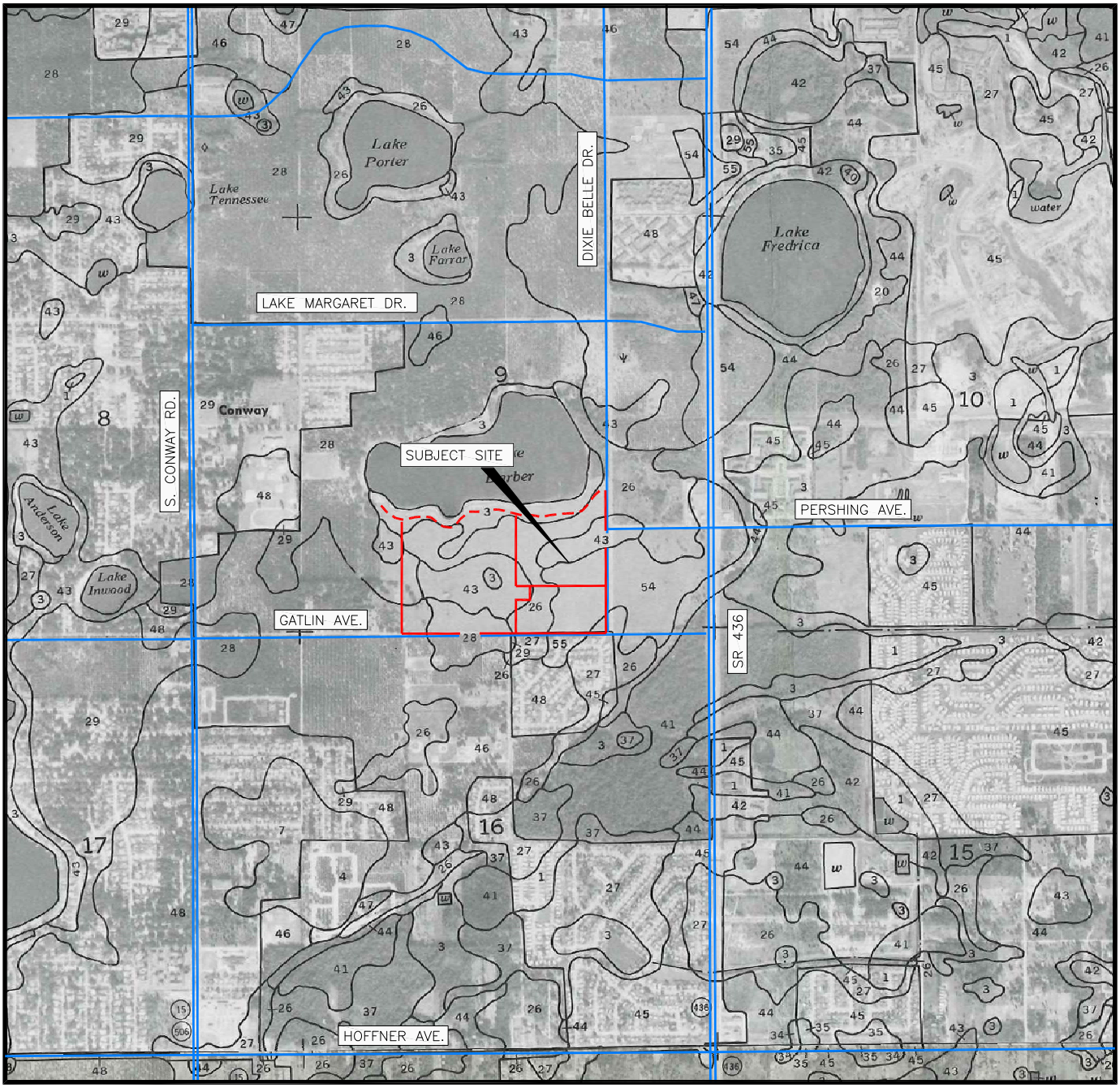
Project No.	H1155140
Scale:	AS SHOWN
File No.	H1155140-1
Date:	9-21-15

Terracon
Consulting Engineers and Scientists
1675 LEE ROAD WINTER PARK, FLORIDA 32789
PH. (407) 740-6110 FAX. (407) 740-6112

TOPOGRAPHIC VICINITY MAP
GEOTECHNICAL ENGINEERING EVALUATION
BARBER PARK EXPANSION
GATLIN AVENUE AND DIXIE BELLE DRIVE
ORANGE COUNTY, FLORIDA

EXHIBIT
A-1

Sep21, 2015–11:28am N:\Projects\2015\H1155140\PROJECT DOCUMENTS (Reports–Letters–Drafts to Clients)\Cad\5140–usgs.dwg



SCALE 1" = 2000'

FEET

1000 0 1000 2000 3000 4000 5000 6000 7000 8000 9000 10000

U.S.D.A. SOIL SURVEY FOR ORANGE COUNTY, FLORIDA
ISSUED: 1989

N

ORANGE COUNTY SOILS MAP INDEX	
3	BASINGER FINE SAND, DEPRESSIONAL
26	ONA FINE SAND
43	SEFFNER FINE SAND
54	ZOLFO FINE SAND

SECTION: 9
TOWNSHIP: 23 SOUTH
RANGE: 30 EAST

Project Mngr:	SM
Drawn By:	SW
Checked By:	SM
Approved By:	JWC
Project No.	H1135105
Scale:	AS SHOWN
File No.	H1135105-2
Date:	9-6-13

Terracon
Consulting Engineers and Scientists
1675 LEE ROAD WINTER PARK, FLORIDA 32789
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U.S.D.A. SOILS MAP
GEOTECHNICAL ENGINEERING EVALUATION
BARBER PARK EXPANSION
GATLIN AVENUE AND DIXIE BELLE DRIVE
ORANGE COUNTY, FLORIDA

EXHIBIT
A-2

Sep21, 2015–11:28am N:\Projects\2015\H1155140\PROJECT DOCUMENTS (Reports–Letters–Drafts to Clients)\Cad\5140–usda.dwg

Soil Survey Descriptions

3 – Basinger fine sand, depressional. This soil type is nearly level and poorly drained. It is typically found in shallow depressions and sloughs along edges of freshwater marshes and swamps. In its natural state, water stands on the surface of this soil type for 6 to 9 months during most years and is within 12 inches of the surface for the rest of the year. This soil type is sometimes associated with a surficial organic layer, typical thickness of 7 inches, typical organic contents of between 1 and 8 percent.

Typical permeability rates for this soil type generally range from 6 to 20 inches per hour (12 to 40 feet per day) throughout the defined profile of 80 inches (6.7 feet).

26 – Ona fine sand. This soil type is nearly level and poorly drained. It is typically found in broad areas on the flatwoods. In most years, a seasonal high water table is within 10 inches (0.8 feet) of the surface for 1 month to 2 months. It recedes to a depth of 10 to 40 inches (0.8 to 3.3 feet) for periods of 6 months or more.

Typical permeability rates for this soil type generally range from 6 to 20 inches per hour (12 to 40 feet per day) except between typical depths of 6 and 15 inches (0.5 and 1.3 feet) where typical permeability rates range from 0.6 to 2 inches per hour (1.2 to 4 feet per day).

43 – Seffner fine sand. This soil type is nearly level and somewhat poorly drained. It is encountered on the rims of depressions and on broad, low ridges on the flatwoods. Under natural conditions, and during years of normal rainfall, this soil type has a seasonal high water table at a depth of between 18 and 40 inches (1.5 and 3.3 feet) for 2 to 4 months, receding to a depth of less than 60 inches (5.0 feet) during prolonged dry periods. The water table also may rise to within 10 to 20 inches (0.8 to 1.7 feet) of the surface for periods of up to 2 weeks during wet periods.

54 – Zolfo fine sand. This soil type is nearly level and somewhat poorly drained. It is typically found on broad, slightly higher positions adjacent to the flatwoods. In its natural state, during years of normal rainfall, this soil type has a seasonal high water table at a depth of between 24 and 40 inches (2.0 and 3.3 feet) for 2 to 6 months, receding to a depth of 60 inches (5.0 feet) during prolonged dry periods.

Typical permeability rates for this soil type generally range from 6 to 20 inches per hour (12 to 40 feet per day) between the surface and a typical depth of 55 inches (4.6 feet) and from 0.6 to 2 inches per hour (1.2 to 4 feet per day) between typical depths of 55 inches and the maximum defined depth of 80 inches (4.6 and 6.7 feet).

APPROXIMATE LOCATION OF AUGER BORING

Project Mngr:	SM
Drawn By:	SW
Checked By:	SM
Approved By:	JWC

Project No.	H1155140
Scale:	AS SHOWN
File No.	H1155140-4
Date:	9-21-15

Terracon
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1675 LEE ROAD WINTER PARK, FLORIDA 32789
PH. (407) 740-6110 FAX. (407) 740-6112

BORING LOCATION PLAN
GEOTECHNICAL ENGINEERING EVALUATION
BARBER PARK EXPANSION
GATLIN AVENUE AND DIXIE BELLE DRIVE
ORANGE COUNTY, FLORIDA

EXHIBIT
A-4

Field Exploration Description

The boring locations were laid out at the project site by Terracon personnel. The borings were located in the field using GPS coordinates obtained from Google Earth imagery. The GPS unit used to locate the borings has an accuracy of about 20 feet. The locations of the borings should be considered accurate only to the degree implied by the means and methods used to define them.

The hand auger boring procedure consisted of manually turning a 3 inch diameter, 6 inch long sampler into the soil until it is full. The sampler was then retrieved and the soils in the sampler were visually examined and classified. The procedure was repeated until the desired termination depth was achieved or shallow groundwater levels cause collapse of the borehole.

Portions of the samples from the borings were sealed in glass jars to reduce moisture loss, and then the jars were taken to our laboratory for further observation and classification. Upon completion, the boreholes were backfilled with the site soil.

Field logs of each boring were prepared by the drill crew. These logs included visual classifications of the materials encountered during drilling as well as the driller's interpretation of the subsurface conditions between samples. The boring logs included with this report represent an interpretation of the field logs and include modifications based on laboratory observation of the samples.

BORING LOG NO. B-1

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: **Gatlin Avenue and Dixie Belle Drive Orange County, Fla.**

LOCATION See Exhibit A-4

Latitude: 28.498655° Longitude: -81.317284°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
	SAND WITH SILT (SP-SM), fine grained, dark brown		▽					
	1.5							
	SAND (SP), fine grained, gray-brown to light gray						25	4
		5						
	7.0							
	Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 Boring Completed: 9/2/2015

Drill Rig: Driller: Terracon

Project No.: H1 15 5140 Exhibit: A-6

BORING LOG NO. B-2

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: **Gatlin Avenue and Dixie Belle Drive**
Orange County, Fla.

LOCATION See Exhibit A-4

Latitude: 28.498717° Longitude: -81.314988°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
		SAND WITH SILT (SP-SM), trace organics (topsoil), fine grained, dark gray		▽					
	1.0								
		SAND WITH SILT (SP-SM), fine grained, gray-brown							
	3.0								
		SAND (SP), fine grained, brown to light brown	5						
	7.0								
		Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 0.8' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 | Boring Completed: 9/2/2015

Drill Rig: | Driller: Terracon

Project No.: H1 15 5140 | Exhibit: A-7

BORING LOG NO. B-3

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: **Gatlin Avenue and Dixie Belle Drive**
Orange County, Fla.

LOCATION See Exhibit A-4

Latitude: 28.49791° Longitude: -81.316235°

GRAPHIC LOG	DEPTH		DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
		SAND WITH SILT (SP-SM), trace organics (topsoil), fine grained, dark brown							
	1.0			▽					
		SAND WITH SILT (SP-SM), fine grained, dark gray-brown							
	3.0								
		SAND (SP), fine grained, light gray-brown						27	3
			5						
	7.0								
		Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 Boring Completed: 9/2/2015

Drill Rig: Driller: Terracon

Project No.: H1 15 5140 Exhibit: A-8

BORING LOG NO. B-4

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: **Gatlin Avenue and Dixie Belle Drive Orange County, Fla.**

LOCATION See Exhibit A-4

Latitude: 28.497968° Longitude: -81.314839°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
	SAND WITH SILT (SP-SM), fine grained, dark brown							
	1.5		▽					
	SAND (SP), fine grained, gray-brown to light brown to gray							
		5						
	7.5							
	Boring Terminated at 7.5 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1.5' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 Boring Completed: 9/2/2015

Drill Rig: Driller: Terracon

Project No.: H1 15 5140 Exhibit: A-9

BORING LOG NO. B-5

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: **Gatlin Avenue and Dixie Belle Drive**
Orange County, Fla.

LOCATION See Exhibit A-4

Latitude: 28.497172° Longitude: -81.317651°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
	SAND WITH SILT (SP-SM), fine grained, gray-brown		▽					
	3.0							
	SAND (SP), fine grained, light brown	5					29	3
	7.0							
	Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 | Boring Completed: 9/2/2015

Drill Rig: | Driller: Terracon

Project No.: H1 15 5140 | Exhibit: A-10

BORING LOG NO. B-6

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: Gatlin Avenue and Dixie Belle Drive
Orange County, Fla.

LOCATION See Exhibit A-4

Latitude: 28.4971° Longitude: -81.316257°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
	SAND WITH SILT (SP-SM), fine grained, dark brown		▽					
	1.5							
	SAND (SP), fine grained, gray-brown					23	34	3
		5						
	7.0							
	Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 Boring Completed: 9/2/2015

Drill Rig: Driller: Terracon

Project No.: H1 15 5140 Exhibit: A-11

BORING LOG NO. B-7

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: **Gatlin Avenue and Dixie Belle Drive**
Orange County, Fla.

LOCATION See Exhibit A-4

Latitude: 28.497263° Longitude: -81.315051°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
	SAND WITH SILT (SP-SM), fine grained, dark brown							
	1.0		▽					
	SAND (SP), fine grained, light brown to gray						34	4
		5						
	7.0							
	Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 Boring Completed: 9/2/2015

Drill Rig: Driller: Terracon

Project No.: H1 15 5140 Exhibit: A-12

BORING LOG NO. B-8

PROJECT: BARBER PARK EXPANSION

CLIENT: Orange County Capital Projects DIvision

SITE: Gatlin Avenue and Dixie Belle Drive
Orange County, Fla.

LOCATION See Exhibit A-4

Latitude: 28.497907° Longitude: -81.317399°

GRAPHIC LOG	DEPTH	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	PERMEABILITY (feet/day)	WATER CONTENT (%)	PERCENT FINES
	SAND WITH SILT (SP-SM), fine grained, gray to dark brown		▽					
	1.5							
	SAND (SP), fine grained, light gray					3	17	4
		5						
	7.0							
	Boring Terminated at 7 Feet							

Stratification lines are approximate. In-situ, the transition may be gradual.

Advancement Method:
Auger Boring

Abandonment Method:

See Exhibit A-5 for description of field procedures

See Appendix B for description of laboratory procedures and additional data (if any).

See Appendix C for explanation of symbols and abbreviations.

Notes:

WATER LEVEL OBSERVATIONS

▽ *Observed Groundwater Level at 1' Depth*

Terracon
1675 Lee Road
Winter Park, Florida

Boring Started: 9/2/2015 Boring Completed: 9/2/2015

Drill Rig: Driller: Terracon

Project No.: H1 15 5140 Exhibit: A-13

APPENDIX B – LABORATORY TESTING

Laboratory Testing

During the field exploration, a portion of each recovered sample was sealed in a glass jar and transported to our laboratory for further visual observation and laboratory testing. Selected samples retrieved from the borings were tested for moisture (water) content, fines content (soil passing a US standard #200 sieve), and laboratory permeability. Those results are included in this report and on the respective boring logs. The visual-manual classifications were modified as appropriate based upon the laboratory testing results.

The soil samples were classified in general accordance with the appended General Notes and the Unified Soil Classification System based on the material's texture and plasticity. The estimated group symbol for the Unified Soil Classification System is shown on the boring logs and a brief description of the Unified Soil Classification System is included in Appendix C. The results of our laboratory testing are presented in the Laboratory Test Results section of this report and on the corresponding borings logs.

Permeability testing was performed on bulk samples obtained from adjacent to Borings B-6 and Boring B-8, from between depths of 1 and 2 feet below existing grade, the presumed subgrade soils for the proposed stormwater management areas. The bulk samples were remolded in a permeameter to subjectively approximate in-place relative density of the sampled soil. Water was allowed to flow into the soil sample until the sample was apparently saturated. Once saturated, the amount of water which flows through the sample while maintaining a constant hydraulic head was measured over a certain time period.

APPENDIX C
SUPPORTING DOCUMENT

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]					Soil Classification	
					Group Symbol	Group Name [B]
Coarse Grained Soils: More than 50% retained on No. 200 sieve	**Gravels:** More than 50% of coarse fraction retained on No. 4 sieve	**Clean Gravels:** Less than 5% fines [C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$ [E]		GW	Well-graded gravel [F]
			$Cu < 4$ and/or $1 > Cc > 3$ [E]		GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH		GM	Silty gravel [F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel [F,G,H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	**Clean Sands:** Less than 5% fines [D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$ [E]		SW	Well-graded sand [I]
			$Cu < 6$ and/or $1 > Cc > 3$ [E]		SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH		SM	Silty sand [G,H,I]
			Fines classify as CL or CH		SC	Clayey sand [G,H,I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	**Silts and Clays:** Liquid limit less than 50	**Inorganic:**	PI > 7 and plots on or above "A" line [J]		CL	Lean clay [K,L,M]
			PI < 4 or plots below "A" line [J]		ML	Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay [K,L,M,N]
			Liquid limit - not dried			Organic silt [K,L,M,O]
	Silts and Clays: Liquid limit 50 or more	**Inorganic:**	PI plots on or above "A" line		CH	Fat clay [K,L,M]
			PI plots below "A" line		MH	Elastic Silt [K,L,M]
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay [K,L,M,P]
			Liquid limit - not dried			Organic silt [K,L,M,Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \dfrac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

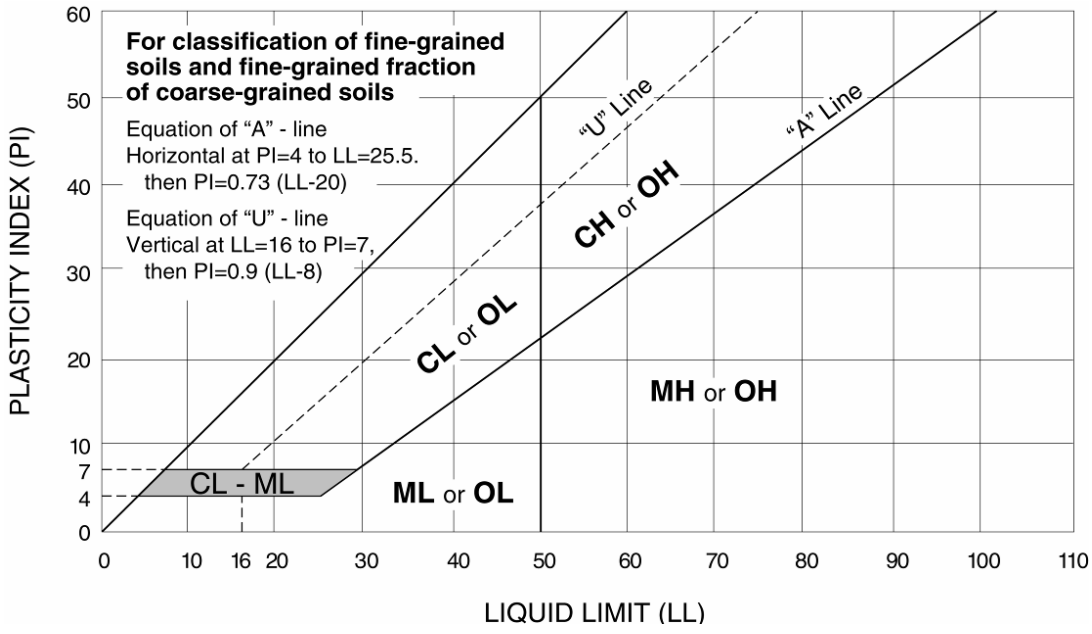
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



SECTION 02110 - SITE CLEARING

PART 1 - GENERAL

1.01 SCOPE OF WORK:

Site clearing work includes, but is not limited to:

Removal of trees and other vegetation.
Topsoil stripping.
Clearing and grubbing.
Removing above grade improvements.
Removing below grade improvements.

1.02 RELATED SECTIONS:

Section 02200 - Earthwork

1.03 JOB CONDITIONS:

A. Traffic:

Conduct site clearing operations to ensure minimum interference with roads, streets, walks, and other adjacent occupied or used facilities. Do not close or obstruct streets, walks, or other occupied or used facilities without permission from authorities having jurisdiction.

B. Protection of Existing Improvements:

Provide protection necessary to prevent damage to existing improvements indicated to remain in place.

Protect bench marks and existing work from damage or displacement.

Protect improvements on adjoining properties and on Owner's property.

Restore damaged improvements to original condition as acceptable to parties having jurisdiction.

C. Regulatory Requirements:

Conform to applicable local code for disposal of debris.

1.04 EROSION CONTROL:

Whether otherwise shown on the plans or not, provide adequate protection to eliminate contamination of streams, canals, lakes, reservoirs and other impoundments by oil, fuels, bitumen, calcium chloride or other harmful materials. Take positive steps to minimize erosion and resultant siltation.

Where air pollution is a factor water the haul roads and construction areas to help reduce the dust.

Where soil or other materials from the work area have been allowed, for whatever reason, to enter public lands, roads or streams, the Contractor shall remove the materials and repair any damage to the public facility.

Permanent erosion control features shall be installed as early as possible. Do not expose large areas of erodible earth at any one time and make every effort to protect against such erosion.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Topsoil:

Sandy clay surface soil found in depth of not less than 6". Satisfactory topsoil is reasonably free of subsoil, clay lumps, stones, and other objects over 2" in diameter, and without weeds, roots, and other objectionable material.

PART 3 - EXECUTION

3.01 SITE CLEARING:

Remove trees, shrubs, grass, other vegetation, improvements, or obstructions interfering with installation of new construction.

Remove items elsewhere on site or premises as specifically indicated. Removal includes digging out stumps and roots.

Strip topsoil to whatever depths encountered to prevent intermingling with underlying subsoil or other objectionable material. Remove heavy growths of grass from areas before stripping.

Stockpile topsoil in storage piles in areas shown or where directed. Construct storage piles to freely drain surface water. Cover storage piles if required to prevent windblown dust.

Dispose of unsuitable or excess topsoil same as specified for waste material.

3.02 Clearing and Grubbing:

The trees selected by the Project Engineer for saving shall be protected from construction equipment by the Contractor in a manner approved by the Project Engineer and meeting the criteria for such protection as required by the applicable governmental agency.

Clear site of trees, shrubs, and other vegetation.

Completely remove stumps, roots, and other debris protruding through ground surface.

Fill depressions caused by clearing and grubbing operations with satisfactory soil material, unless further excavation or earthwork is indicated.

Place fill material in horizontal layers not exceeding 6" loose depth, and thoroughly compact to density equal to adjacent original ground, unless otherwise shown on the plans.

3.03 Removal of Improvements: Remove existing above grade and below grade improvements necessary to permit construction and other work.

Remove abandoned underground piping or conduit interfering with construction.

3.04 DISPOSAL OF WASTE MATERIALS:

Removal from Owner's Property: Remove waste materials and unsuitable and excess topsoil from Owner's property and dispose of off-site in legal manner.

END OF SECTION

SECTION 02200 - EARTHWORK

PART 1 - GENERAL

1.01 SCOPE OF WORK:

Provide all labor, tools, materials, equipment and supervision necessary for excavation and site grading as specified herein.

1.02 RELATED WORK:

Section 02110 – Site Clearing

1.03 STANDARDS:

Comply with state and local environmental standards and as specified herein.

1.04 EARTHWORK:

Borrow material to be used for fill shall be tested for radon level. The contractor shall collect three samples of material at the borrow pit and submit them to a certified laboratory for testing. Radon levels shall not exceed 2pCi/g. The contractor shall submit certifications to the architect showing that the borrow material meets this criteria before bringing any material to the project site.

PART 2 - PRODUCTS

NOT USED

PART 3 - EXECUTION

3.01 EXCAVATION:

Excavation shall conform to the limits indicated on the plans or specified herein. This work shall include shaping and sloping and other work necessary in bringing the excavation to the required grade, alignment and cross section.

All suitable materials removed by the excavation shall be used as far as practicable in the formation of the embankments, subgrades, shoulders, and other places as directed. No excavated material shall be wasted without permission, and where necessary to waste such material, it shall be disposed of as directed by the Owner. Waste excavated material shall be considered property of the Owner and disposed of as directed by the Owner.

3.02 AREA EXCAVATION:

The area of excavation shall be as indicated on the construction plans.

3.03 FILLING AND COMPACTING:

Replace excavated material as necessary. Place fill in layers and compact to a minimum density at optimum moisture as required.

3.04 EMBANKMENT:

Embankments shall be constructed of material containing no muck, stumps, roots, brush, vegetable matter, rubbish or other material that will not compact into a stable finished grade surface.

Embankments shall be formed of suitable material placed in layers of not more than 8 inches in depth measured loose and rolled and/or vibrated with suitable equipment until compacted. Each layer shall be uniformly compacted, using equipment that will achieve the required density. As compaction operations progress, each layer shall be shaped and manipulated as necessary to assure density throughout the embankment or backfill. Moisture content shall be such that the specified density can be reached and, if necessary, water shall be added or the material manipulated to assist drying. Thickness of layers may be increased provided the equipment and methods used are proven by field density testing to be capable of compacting thicker layers to specified densities. Layer thickness shall be decreased if equipment and methods used are proven to be incapable of compacting layers to specified densities.

Embankment on building sites, shall be compacted to a density of not less than 100 percent of its maximum density as determined by AASHTO T 99, Method C.

The bottoms of the drainage retention areas shall not be compacted so as to not reduce the soil infiltration capacity.

Final earthwork elevations shall be within 0.2 feet of the proposed elevations.

3.05 MAINTENANCE AND PROTECTION OF WORK:

The Contractor shall maintain all earthwork construction throughout the life of the contract, unless otherwise provided, and shall take all reasonable precautions to prevent loss of material from the site due to the action of wind or water. He shall repair at his expense, except as otherwise provided herein, any slides, washouts, settlement, subsidence, or other mishap which may occur prior to final acceptance of work.

3.06 FINAL DRESSING:

Before final acceptance, the Contractor shall dress all earthwork to the planned line, grade and cross section. Ditches shall be shaped so that no water is impounded, unless otherwise shown on the plans. Earthwork shall be shaped to match adjacent grades, structures, etc.

3.07 SUBGRADE STABILIZATION

Methods of Subgrade Stabilization: Subgrade shall be stabilized by either: (i) addition of approved materials to the existing subgrade, or (ii) manipulating materials already in existence in the subgrade to achieve the desired results. It is the intent of this Specification that the subgrade be uniform, compact, capable of carrying reasonable loads, meet the required density and the required bearing value specified in the plans and/or these Specifications.

Mixing and Compacting: Additive materials shall be spread uniformly over the entire surface to be stabilized using a mechanical spreader, for a length that will provide sufficient distance to promote uniform mixing. A spreading tolerance of three inches (3) in excess of plan width will be tolerated on each side.

Mixing shall be done, with rotary tillers, or other equipment meeting the Engineer's approval, for the full depth shown in the plans, and for the full width of the stabilizing limits.

The Contractor may, if he so elects, mix the materials in a plant of an approved type in lieu of the spreading and mixing operation described above.
Where the subgrade is of rock, the Engineer shall determine whether or not it is necessary to undercut and stabilize the subgrade and, if he determines the rock subgrade is extensive enough in nature to waive the requirement for subgrade stabilization, he shall so notify the Contractor in writing.

At the completion of the mixing any particles within the limits of the stabilizing area not passing a three and one half inch (3 1/2") sieve shall be removed or broken down.

After mixing has been completed and requirements for bearing value, uniformity and particle size have been satisfied, the stabilized area shall be compacted to at least 96 percent of its maximum density as determined by AASHTO T180. If the moisture content of the material is improper for attaining the specified density, either water shall be added or the material permitted to dry to the proper moisture.

Spreading, mixing and compacting shall be done as one lift unless otherwise specified in the plans.

After stabilizing and compacting operations have been completed the subgrade shall be firm and substantially unyielding, to the extent it will support construction equipment, and will have the bearing value required by the plans. All soft and unyielding material and any 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, with proper allowance for subsequent compaction.

Maintenance of Completed Subgrade: The Contractor shall be wholly responsible for maintaining the completed subgrade free from ruts, depressions, damage from hauling or handling of materials, tools and equipment. Such responsibility shall include any repairs, replacements, etc. of curbs, curb and gutter, sidewalks or other structures which might become necessary in order to recompact the subgrade in the event of underwash or other damage occurring to the previously compacted subgrade. The subgrade shall be restored to an acceptable condition prior to placement of base.

Tolerances in Bearing Value Requirements: The following under-tolerances from the specified bearing value will be allowed as based on tests performed on samples obtained after mixing operations have been complete:

SPECIFIED LIMEROCK BEARING RATION	MAXIMUM PERMITTED UNDER TOLERANCE
LBR 40	5.0
LBR 35	4.0
LBR 30 or Under	2.5

Local Materials:

Local materials used for stabilizing may be high bearing value soils or sand-clay materials. The portion of the material passing the 40 mesh sieve shall have a liquid limit not greater than 30 and a plasticity index not greater than ten (10). Local materials, may, if so approved by the Engineer, be blended to achieve the above requirements but, if so blended shall be tested and approved before spreading on the roadway.

Commercial Materials:

Commercial materials used for stabilization may consist of commercial limerock, lime-rock overburden or crushed shell. For limerock and limerock overburden the percentage of carbonates of calcium and magnesium shall be at least 70, and the plasticity index shall not exceed ten (10). The gradation of limerock and limerock overburden shall be such that 97 percent of the material will pass a one inch (1") sieve.

Crushed shell for this use shall be mollusk shell (oyster, mussels, clams, cemented coquina, etc.). Steamed shell shall not be permitted. At least 97 percent by weight of the crushed shell shall pass the three and one-half inch (3 1/2") sieve and at least 50 percent by weight of the total material shall be retained in the No. 4 sieve. In addition, no more than 15 percent by weight of the total material shall pass the No. 200 sieve when washed over the sieve. In the event the shell meets the above criteria without crushing, the crushing will not be required.

END OF SECTION

SECTION 02220 - EXCAVATING, BACKFILLING, AND COMPACTING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work included under this Section consists of excavating, backfilling and compacting as required for the construction of the utility system consisting of piping and appurtenances as shown on the Drawings and specified herein.

B. Definitions:

1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material.

2. Optimum Moisture: Percentage of water in a specific material at maximum density.

3. Rock Excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.

4. Suitable: Suitable materials for fills shall be a noncohesive, nonplastic granular local sand and shall be free from vegetation, organic material, marl, silt or muck. The Contractor shall furnish all additional fill material required.

5. Unsuitable: Unsuitable materials are highly organic soil (Peat or muck) classified as A-8 in accordance with AASHTO Designation M 145.

C. Plan For Earthwork: The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of his bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract. Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations to the Engineer for review. The Contractor shall consider, and his plan for excavation shall reflect, the equipment and methods to be employed in the excavation. The prices established in the Proposal for the work to be done will reflect all costs pertaining to the work.

1.02 QUALITY ASSURANCE

A. A testing laboratory employed by the Owner will make such tests as are deemed advisable. The Contractor shall schedule his work so as to permit a reasonable time for

testing before placing succeeding lifts and shall keep the laboratory informed of his progress. Costs for all testing shall be paid by the Owner. However, any and all tests which have to be repeated because of the failure of the tested material to meet specification shall be paid for by the Contractor and the cost of any tests shall be deducted from payments due the Contractor.

B. Standards:

1. OSHA 29 CFR Subpart P - Excavations and Trenches a) 1926.650, 1926.651, 1926.652.

2. OSHA 29 CFR Subpart J - a) 1910.146 for Confined Space Entry.

1.03 JOB CONDITIONS

A. Test borings made on the site and the surface exploration data are available upon request and are for the Contractor's information only.

B. If, in the opinion of the Engineer, conditions encountered during construction warrant a change in the footing elevation, or in the depth of removal of unsuitable material from that indicated on the Drawings, an adjustment will be made in the contract price, as provided in the Schedule of cost for Changes in Quantities.

1.04 PROTECTION

A. Sheeting and Bracing:

1. Furnish, put in place, and maintain such sheeting and bracing as may be 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, power poles, etc. from undermining, and to protect workers from hazardous conditions or other damage. Such support shall consist of braced steel sheet piling, braced wood lagging and soldier beams or other approved methods. If the Engineer/RPR is of the opinion that at any points sufficient or proper supports have not been provided, he may order additional supports put in at the expense of the Contractor, and compliance with such order shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and compacted. Where soil cannot be properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the Owner.

2. The Contractor shall construct the sheeting outside the neat lines of the foundation unless indicated otherwise to the extent he deems it desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall be adequate to withstand all pressure to which the structure or trench will be

subjected. Any movement or bulging which may occur shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.

3. Where sheeting and bracing is required to support the sides of excavations for structures, the Contractor shall engage a Professional Geotechnical Engineer, registered in the State of Florida, to design the sheeting and bracing. The sheeting and bracing installed shall be in conformity with the design, and certification of this shall be provided by the Professional Engineer.

4. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures because of sheeting installation.

5. The Contractor shall leave in place to be embedded in the backfill all sheeting and bracing not shown on the Drawings but which the Owner may direct him in writing to leave in place at any time during the progress of the work for the purpose of preventing injury to structures, utilities, or property, whether public or private. The Engineer/R.P.R. may direct that timber used for sheeting and bracing be cut off at any specified elevation.

6. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, or otherwise as may be directed by the Engineer/R.P.R.

7. The right of the Engineer/R.P.R. 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.

8. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than 1 foot above the top of any pipe.

B. Groundwater Observation Wells:

1. Prior to excavation, the Contractor shall install groundwater observation wells at locations to be approved by the Engineer adjacent to structures under construction for the purpose of measuring water levels during excavation. The observation well shall consist of a screen, casing and cap of approved size and material of construction. The observation well shall be placed in a 2-1/2-inch bore hole which shall be carried to an elevation at least 2 feet below final bottom grade of structure. The annular space

surrounding the intake point and the riser pipe shall be sealed in such a way as to prevent infiltration from surface water. The observation well shall be developed in such a manner as to insure proper indication of subsurface water levels adjacent to the well.

2. The Contractor shall be responsible for maintaining the observation wells and for observing and recording the elevation of groundwater in them until adjacent structure is completed and backfilled. Each observation well shall be observed and recorded daily. Measurements shall be supplied daily to the R.P.R. and Engineer. The Engineer may require that the observation wells reflect true groundwater levels by adding water to the well recording the drop in level from the time the water was added. A plugged observation well shall be redeveloped as necessary to indicate true groundwater levels.

3. Observation well shall be abandoned when directed by the Engineer/R.P.R. and in a manner acceptable to the Engineer.

C. Pumping and Drainage:

1. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fills, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels as stipulated in Section 02140. The Contractor shall engage a Professional Geotechnical Engineer registered in the State of Florida, to design the dewatering systems for all structures. The Contractor shall submit to the Engineer for review a plan for dewatering systems prior to commencing work. The dewatering system installed shall be in conformity with the overall construction plan, and certification of this shall be provided by the Professional Engineer. The Professional Engineer shall be required to monitor the performance of the dewatering systems during the progress of the work and require such modifications as may be required to assure that the systems are performing satisfactorily.
2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation and to preserve the integrity of adjacent structures. Well or sump installations shall be constructed with proper sand filters to prevent drawing of finer grained soil from the surrounding ground.

3. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.

4. The Contractor shall take all additional precautions to prevent uplift of any structure during construction.

5. The conveying of water in open ditches or trenches will not be allowed. Permission to use any storm sewers, or drains, for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. However, the Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the Engineer or the authority having jurisdiction, at no cost to the Owner.

6. Floatation shall be prevented by the Contractor by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.

7. Removal of dewatering equipment shall be accomplished after the system is no longer required; the material and equipment constituting the system, shall be removed by the Contractor.

8. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on groundwater quality.

PART 2 - PRODUCTS

2.01 MATERIALS

A. General:

1. All fill material shall be subject to the approval of the Engineer.

2. All fill material shall be free of organic material, trash, or other objectionable material. Excess or unsuitable material shall be removed from the job site by the Contractor.

B. Common Fill Material: Common fill shall be sand and shall not contain stones, rock, concrete or other rubble larger than two (2) inches in diameter. It shall have physical properties which allow it to be easily spread and compacted.

C. Structural Fill: Structural fill shall be reasonably well graded sand to gravelly sand having the following gradation:

U.S. Sieve Size	Percent Passing By Weight
1 - in.	100
No. 4	75-100
No. 40	15-80
No. 100	0-30

No. 200 0-12

D. Class 1 Soils*: Manufactured angular, granular material, 1/4 to 1 1/2 inches (6 to 4 mm) size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately.

Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming with ASTM C33 stone size No. 89 and with particle size limits as follows:

U.S. Sieve Size	Percent Passing By Weight
1/2	100
3/8	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 50	0- 5

E. Class II Soils**:

1. GW: Well-graded gravels and gravel-sand mixtures, little or no fines. Fifty (50) percent or more retained on No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. Fifty (50) percent or more retained on No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
3. SW: Well-graded sands and gravelly sands, little or no fines. More than fifty (50) percent passes No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.
4. SP: Poorly graded sands and gravelly sands, little or no fines. More than fifty (50) percent passes No. 4 sieve. More than 95 percent retained on No. 200 sieve. Clean.

* Soils defined as Class I materials are not defined in ASTM D2487.
** In accordance with ASTM D2487, less than 5 percent pass No. 200 sieve.

F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as follows:

U.S. Sieve Size	Percent Passing By Weight
3/8 inch	100
No. 10	85-100
No. 40	20-40
No. 200	0-12

G. Other Material: All other material, not specifically described, but required for proper completion of the work shall be selected by the Contractor and approved by the Engineer.

PART 3 - EXECUTION

3.01 PREPARATION

A. Clearing:
1. The construction areas shall be cleared of all obstructions and vegetation including large roots and undergrowth, within 10 feet of the lines of the excavation.

2. Strip and stockpile topsoil on the site at the location to be determined by the Owner.

3.02 EXCAVATION

A. General: Excavations for roadways, structures and utilities must be carefully executed in order to avoid interruption of utility service.

B. Excavating for Roadways/Structures/Utilities:

1. Excavation shall be made to such dimensions as will give suitable room for building the foundations and the structures, for bracing and supporting, for pumping and draining, and for all other work required.

a. Excavation for precast or prefabricated structures shall be carried to an elevation 2 feet lower than the proposed outside bottom of the structure to provide space for the select backfill material. Prior to placing the select backfill, the excavation shall be measured by the Engineer to indicate to the satisfaction of the Owner that the excavation has been carried to the proper depth and is reasonably uniform over the area to be occupied by the structure.

b. Excavation for structures constructed or cast in place in dewatered excavations shall be carried down to the bottom of the structure where dewatering methods are such

that a dry excavation bottom is exposed and the naturally occurring material at this elevation leveled and left ready to receive construction. Material disturbed below the founding elevation in dewatered excavations shall be replaced with Class B concrete.

c. Footings: Cast-in-place concrete footing sides shall be formed immediately after excavation. Forming for footing sides is specified elsewhere.

2. Immediately document the location, elevation, size, material type and function of all new subsurface installations, and utilities encountered during the course of construction.

3. Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the Drawings and should anticipate the encounter of unknown obstructions during the course of the work.

4. Encounters with subsurface obstructions shall be hand excavated.

5. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of subgrade soils. Subgrade soils which become soft, loose, "quick" or otherwise unsatisfactory for support of structures as a result of inadequate dewatering or other construction methods, shall be removed and replaced by crushed stone as required by the Engineer/R.P.R. at the Contractor's expense.

6. The bottom of excavations shall be rendered firm and dry before placing any structure. Excavated material not suitable for backfill shall be removed from the site and disposed of by the Contractor.

7. All pavements shall be cut prior to removal, with saws or approved power tools.

8. Excavated material shall be stockpiled in such a manner as to prevent nuisance conditions. Surface drainage shall not be hindered.

9. All locations and elevations as required herein must be permanently documented by the Contractor, on the Record Drawings prior to the Engineer's approval of the Application for Payment for that work.

10. When force main pipe is less than 10 feet from a water main, the depth of cover shall be increased to 5 feet or 18 inches below the water main, whichever is greater.

3.03 DRAINAGE

A. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations, and keep such excavations dry so as to obtain a satisfactory undisturbed

subgrade foundation condition. The dewatering method used shall prevent disturbance of earth below grade.

B. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, without damage to surrounding property, and in accordance with pertinent rules and regulations.

C. No construction, including pipe laying, shall be allowed in water. No water shall be allowed to contact masonry or concrete within 24 hours after being placed. The Contractor shall constantly guard against damage due to water and take full responsibility for all damage resulting from his failure to do so.

D. The Contractor will be required at his expense to excavate below grade and refill with crushed stone (gradation 57 or 89) or other approved fill material if the Engineer determines that adequate dewatering has not been provided.

3.04 UNDERCUT

A. If the bottom of any excavation is below that shown on the Drawings or specified because of Contractor error, convenience, or unsuitable subgrade due the Contractor's excavation methods, he shall refill to normal grade with fill at his own cost. Fill material and compaction method shall be as directed by the Engineer.

3.05 FILL AND COMPACTION

A. Compact and backfill excavations and construct embankment according to the following schedule. (Proctor standard shall be ASTM D-698):

STRUCTURES AND ROADWORK

Area	Material	Compaction
Beneath Structures	Structural Fill	12" lifts, compacted to 95% maximum density as determined by AASHTO T-180. Fill should not be placed over any in-place soils until those deposits have been compacted to 95% Modified Proctor.
Around structures	Structural Fill	8" lifts, 95% of maximum density as determined by AASHTO T-180. Use light rubber-tired or vibratory plate compactors.
Beneath Paved Surfaces	Common Fill	12" lifts, 98% by maximum density as determined by AASHTO T-180 or as required by the FDOT Standards.
Open Areas	Common Fill	12" lifts, 95% by maximum density as determined by AASHTO T-180.

B. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or elsewhere in the Contract Documents.

C. Excavations shall be backfilled to the original grade or as indicated on the Drawings. Deviation from this grade because of settling shall be corrected. Backfill operation shall be performed to comply with all rules and regulation and in such a manner that it does not create a nuisance or safety hazard.

D. Embankments shall be constructed true to lines, grades and cross sections shown on the plans or ordered by the Owner. Embankments shall be placed in successive layers of not more than 8 inches in thickness, loose measure, for the full width of the embankment. As far as practicable, traffic over the work during the construction phase shall be distributed so as to cover the maximum surface area of each layer.

E. If the Contractor requests approval to backfill material utilizing lifts and/or methods other than those specified herein, such request shall be in writing to the Owner. Approval will be considered only after the Contractor has performed tests, at the Contractor's expense, to identify the material used and density achieved throughout the backfill area utilizing the method of backfill requested. The Owner's approval will be in writing.

END OF SECTION

SECTION 02221 - TRENCHING, BACKFILLING AND COMPACTING

PART I - GENERAL

1.01 SCOPE OF WORK

A. Furnish all labor, materials, equipment and incidentals necessary to perform all trenching, removal of unsuitable or unsatisfactory material, backfilling and compaction for utilities required to complete the work shown on the Drawings and specified herein. The work shall include, but not necessarily be limited to, all trenching; all backfilling; compaction, disposal of waste and surplus materials; and all related work such as sheeting, bracing and dewatering.

B. The Contractor shall examine the site and review the available data prior to submitting his proposal, taking into consideration all conditions that may affect his work. The Owner and Engineer will not assume responsibility for variations of subsurface conditions.

C. The Contractor shall be solely responsible for the means, methods, techniques, sequences and procedures of construction, for safety precautions and programs incident to the work and regulations, ordinances, codes and orders applicable to the furnishing and performance of the work.

RELATED DOCUMENTS

A. Drawings and general provisions of the Contract, including General and Special Conditions and other Division 1 Specification Sections, apply to this Section.

1.03 APPLICABLE PUBLICATIONS:

A. The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by the basic designation only.

B. American Association of State Highway and Transportation Officials (AASHTO) Standards:

M145-82 The Classification of Soils and Soil Aggregate Mixtures for Highway Construction Purposes.

T180-74 Moisture-Density Relations of Soils Using a 10-lb. (4.54 kg) Rammer and an l8-inch (457 mm) Drop. (Modified Proctor Test).

T l91-61 Density of Soil In-Place by the Sand-Cone Method.
(R l982)

C. Florida Department of Transportation; "Standard Specifications for Road and Bridge Construction", (FDOT) l996 edition.

ASTM D2487: "Unified Classification System."

1.04 DEFINITIONS:

A. Common Fill: Common fill shall consist of any material classified as SW, SW-SM, SW-SC, SP, SP-SM, or SP-SC under Unified Classification System (ASTM D2487) which does not contain stones larger than 2 inches in any dimension and which has no more than 12 percent of its material by weight passing the No. 200 sieve.

B. Unsatisfactory Materials: Unsatisfactory materials shall be materials that do not comply with the requirements for common fill. Unsatisfactory materials include, but are not limited to, those materials containing roots and other organic matter, trash, debris, and stones larger than 2 inches, and materials classified in AASHTO M145 as groups A-2-4, A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7, A-7-5 and A-7-6. Unsatisfactory materials also include man-made fills, refuse, or backfills from previous construction.

C. Unyielding Material: Unyielding material shall consist of rock and gravelly soils with stones greater than 2 inches in any dimension, or maximum size stones as defined by the pipe manufacturer, whichever is smaller.

D. Unstable material shall consist of material without the sufficient bearing capacity to support the utility pipe conduit or appurtenance structure.

E. Select Common Fill: Select common fill shall meet the requirements for common fill specified above with the exception that select common fill shall not have more than 5 percent of its material by weight passing the No. 200 sieve. Also, the maximum allowable aggregate size for select common fill shall be 1 inch, or the maximum size recommended by the pipe manufacturer, whichever is smaller.

F. Degree of compaction: Degree of compaction shall be expressed as a percentage of the maximum density obtained by the test procedure presented in AASHTO T180. Field verification will be obtained by the test procedure presented in AASHTO T191. The term "maximum density" shall mean the maximum density determined under AASHTO T180.

G. Bedding Rock: Coarse aggregate structural bedding and support for utilities appurtenances and structures equal to FDOT Number 57, or as required by pipe manufacturer’s recommendations for water mains.

1.05 PROTECTION

A. Prior to commencing trenching or dewatering, the Contractor shall take precautions to ensure that existing structures, which may be subject to settlement or distress resulting from trenching or dewatering are protected. Such precautions shall include establishing reference elevation markings on structures which are adjacent to new work and monitoring them to

ascertain evidence of settlement or distress throughout construction. If settlement or distress becomes evident, modifications to the trenching, dewatering or protection procedures shall be made to prevent additional settlement or distress and any damage caused to the structure shall be repaired at the Contractor's expense.

B. The Contractor shall furnish, put in place, and maintain such sheeting and bracing as may be required to support the sides of trenches, to prevent any movement which could in any way diminish the width of the trench below that necessary for proper construction, and to protect adjacent structures and other facilities from undermining or other damage. The stability of all excavated faces shall be maintained in compliance with the Occupational Safety and Health Administration's excavation safety standards, 29 C.F.R. S. 1926.650 Subpart P until final acceptance of the work. The Contractor shall also comply with all applicable requirements of the Florida "Trench Safety Act" (90-96, Laws of Florida), and all other applicable rules and regulations.

C. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove all water entering trenches, and shall keep such trenches dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the utilities to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels. Dewatering shall be conducted in such a manner as to preserve the undisturbed bearing capacity and composition of the subgrade soils at the proposed bottom of the trench. Grading shall be done as may be necessary to prevent surface water from flowing into the trench, and any water accumulating therein shall be removed so that the stability of the bottom and sides of the excavations is maintained.

1.06 SUBMITTALS

A. Submit to the Owner for review, the proposed methods of construction, including dewatering, excavation, bedding, filling, compaction, and backfilling for the various portions of the work. Review shall be for informational purposes only. The Contractor shall remain responsible for the adequacy and safety of the methods.

1.07 SOIL TESTING

The Owner will employ the services of a testing laboratory to perform all soils testing.

B. The Owner shall have sole authority over the frequency of testing and shall direct the testing laboratory in its work. The Owner may order the excavation down to any depth of backfilled material which has not been tested and have a test performed. The Contractor shall excavate for the test and backfill after the test at no additional cost to the Owner. The Contractor shall re-excavate to the depth required and re-compact any areas found to be improperly backfilled.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Only common fill or select common fill, as defined above, may be used as backfill unless otherwise directed by the Owner.

PART 3 - EXECUTION

3.01 TRENCHING

A. The trench shall be excavated as recommended by the manufacturer of the pipe to be installed and as shown on Drawings. Trench walls below the top of the pipe shall be vertical to the extent possible to 1 foot above the proposed top of pipe. From 1 foot above the top of the pipe, trench walls shall be sloped 1:1 vertical to horizontal ratio. The maximum width of trench in the vertical pipe zone shell not exceed the pipe outside diameter plus a 9 inch allowance on each side of the pipe.

B. The bottoms of trenches shall be accurately graded to provide uniform bearing and support for the bottom half of each section of the pipe. Bell holes shall be excavated to the necessary size at each joint or coupling to eliminate point bearing. The trench bottom shall be free from unyielding material. Where unyielding material is encountered in the bottom of the trench, such material shall be removed 4 inches below the required grade and replaced with select common fill compacted to minimum 95% AASHTO T-180.

C. Where unstable material is encountered in the bottom of the trench, such material shall be removed to the depth directed and replaced to the proper grade with select common fill or bedding rock as directed by the Owner.

D. Unless otherwise specified or indicated on the Contract drawings, pipe trenches shall be of a depth to provide a minimum cover of three (3) feet from the existing ground surface, or from the indicated finished grade, whichever is lower, to the top of the pipe. The pipe shall be buried a minimum of three (3) feet from the top of the pipe to the existing grade or three (3) feet below the proposed adjoining road surface grade, whichever results in the greatest depth.

3.02 DEMUCKING

A. The Contractor shall remove all muck in all areas where it is encountered. The muck shall be excavated to the depth required for complete removal, and disposed of at an approved dump site in accordance with all applicable rules and regulations. The Contractor shall notify the Owner if muck is encountered on the site.

3.03 MISCELLANEOUS EXCAVATION

A. The Contractor shall perform all the remaining miscellaneous excavation. The Contractor shall make all excavations necessary to permit the completion of the work as shown on the Drawings and specified herein.

3.04 BACKFILLING

A. Backfill material shall consist of common fill or select common fill as defined herein and as shown on the drawings. Backfill shall be placed in layers not exceeding 6 inches loose thickness for compaction by hand operated machine compactors, and 12 inches loose thickness for other than hand-operated machines, unless otherwise specified. Each layer shall be compacted to at least 95 percent of the maximum dry density as determined by AASHTO T180 for cohesionless soils unless otherwise specified. The bottoms of all excavations shall be compacted to at least 95 percent of the maximum density prior to backfill.

B. Trench Backfilling: For trenches, unyielding material removed from the bottom of the trench and unsuitable or unstable material removed from the trench shall be replaced with select common fill as specified. Replacement materials and backfill materials shall be select common fill and shall be placed in layers not exceeding 6 inches loose thickness from the bottom of the trench to 12 inches above the top of pipe. Backfill materials from 12 inches above the pipe to finished grade in unpaved areas and finished subgrade in paved areas shall be common fill placed in layers not exceeding 12 inches loose thickness. In unpaved areas, each layer of replacement material, or backfill material, shall be compacted to at least 95 percent of maximum density. In paved areas, each layer of replacement material, or backfill material, shall be compacted to at least 98 percent of maximum density. The bottoms of all trenches shall be in an undisturbed condition or, if disturbed, shall be compacted to at least 95 percent of maximum density to a depth of at least 1-foot below the trench bottom. Specified densities shall be as determined by AASHTO T180.

C. Moisture Control: Where subgrade or layer of soil material must be moisture conditioned before compaction, uniformly apply water to surface or subgrade, or layer of soil material. Prevent free water from appearing on surface during or subsequent to compaction operations.

Remove and replace, or scarify and air-dry, soil material that is too wet to permit compaction to specified density.

2. Soil material that has been removed because it is too wet to permit compaction, but is otherwise satisfactory, may be stockpiled or spread and allowed to dry until moisture is reduced to a satisfactory value.

3.05 SURPLUS MATERIAL

A. Excavated material or borrow fill to be used in construction shall be neatly piled so as to inconvenience, as little as possible, the public and adjoining property owners until used or otherwise disposed of. Suitable excavated material may be used for fill, trench backfill or backfill on the different parts of the work as required. Surplus fill shall become the property of the Contractor, and shall be removed and disposed of by him off the site.

B. The Contractor shall remove and dispose of all pieces of rock (ledge) and boulders which are not suitable for use in other parts of the work. Rock disposed of by hauling away to spoil areas is to be replaced by approved surplus excavation obtained elsewhere in the work insofar as it is available. Any deficiency in the backfill material shall be made up with satisfactory material provided by the Contractor at no additional cost to the Owner. Rock may be used in embankment fill only with approval of the Owner.

C. The right is reserved to make minor adjustments or revisions in lines or grade, if found necessary, as the work progresses, due to discrepancies on the Drawings or in order to obtain satisfactory construction of utilities.

END OF SECTION

SECTION 02222 - EXCAVATING, BACKFILLING AND COMPACTING FOR UTILITIES

PART 1 - GENERAL

1.01 SCOPE OF WORK:

This section includes excavation, bedding, and backfilling for utilities necessary to perform all work necessary to prepare for laying the piping or main, including clearing, digging the trench, preparing the pipe bed, compacting, and preparing the surface restoration, and disposal of surplus material.

Maintain in operating condition existing utilities, active utilities, and drainage systems encountered in utility installation. Repair any surface or subsurface improvements shown on Drawings.

Verify location, size, elevation, and other pertinent data required to make connections to existing utilities and drainage systems as indicated on Drawings. Comply with permits and regulations according to General Conditions.

1.02 SUBMITTALS:

Shop Drawings or details pertaining to excavation and backfill are not required unless use of materials, methods, equipment, or procedures contrary to Drawings or these specifications are proposed. Do not perform work until required shop drawings have been accepted by Owner and Engineer.

1.03 JOB CONDITIONS:

Set all lines, elevations, and grades for utility system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments, or other reference points.

1.04 TRENCH SAFETY:

Care shall be taken to strictly observe all applicable, State, local and Federal standards with respect to the safety of persons during excavation and backfill. The contractor shall recognize OSHA excavation safety standards, agree to abide by them, and identify the costs to comply. The bidder, therefore, acknowledges that the total bid price includes costs for complying the Florida Trench Safety Act (90-96, Laws of Florida), effective October 1, 1990.

1.05 JACK AND BORE, DIRECT BORE CONSTRUCTION (IF APPLICABLE):

Jack and bore, direct bore construction shall be conducted in accordance with the Florida Department of Transportation Utilities Accommodation Guide.

1.06 TESTING:

Testing shall be conducted in accordance with AASHTO T-180, modified proctor density test. Tests shall be conducted on all trench backfill within 10 feet of pavement or proposed pavement areas and under all existing paved areas.

Frequency tests shall be conducted at each public roadway crossing and at no less than 300-foot intervals along the pipeline or on each pipeline run between manholes, inlets or junction boxes in accordance with these specifications. There shall be at least one test per layer placed.

Test report results shall be furnished to the Owner and Engineer.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Bedding Material

Processed sand and gravel free from clay lumps, organic, or other deleterious material, and complying with following gradation requirements:

U.S. Sieve Size	Passing by Weight, Percent
1 Inch	100
3/4 Inch	90-100
3/8 Inch	20- 55
No. 4	0- 10
No. 8	0- 5

PART 3 - EXECUTION

3.01 EXCAVATION, TRENCHING, AND BACKFILLING:

Performing excavation as indicated or specified depths. During excavation, pile materials suitable for backfilling in orderly manner far enough from bank of trench to avoid overloading, slides, or cave-ins.

Remove excavated materials not required or not suitable for backfill or embankments and waste as specified.

Prevent surface water from flowing into trenches or other excavations by temporary grading or other methods, as required. Remove accumulated water in trenches or other excavations by pumping or other acceptable methods.

Open cut excavation with trenching machine or backhoe. Where machines other than ladder or wheel-type trenching machines are used, do not use clods for backfill. Dispose of unsuitable material and provide other suitable material at no additional cost to Owner.

3.02 TRENCH EXCAVATION:

Dig trench at proper width and depth for laying pipe, conduit, or cable. Cut trench banks as nearly vertical as practical and remove stones as necessary to avoid point-bearing. Over excavate wet or unstable soil, if encountered, from trench bottom as necessary to provide suitable base for continuous and uniform bedding. The amount of trench to be open at any one time shall be limited at the discretion of the Engineer to minimize public inconvenience and/or damage to life or property. Not more than 1,000' feet of trench shall be opened ahead of pipe laying operations, unless greater length of trench is approved by the Engineer.

All existing utilities such as pipes, poles and structures shall be carefully supported and protected from injury, and in case of damage, they shall be restored at no cost to the Owner.

Any pipes, conduits, wires, mains footings, or other underground structures encountered in trenching operations shall be carefully protected from injury or displacement. Any damage thereto shall be fully, promptly and properly repaired by the Contractor to the satisfaction of the Engineer and the Owner thereof.

Failure of the plans to show the exact location, nature or extent of any sub-surface obstruction shall not be the basis of a claim for extra work.

All trench excavation side walls greater than 5 feet in depth shall be sloped, shored, sheated, braced or otherwise supported by means of the sufficient strength to protect the workmen within them in accordance with the applicable rules and regulations established for construction by the Department of Labor, Occupational Safety and Health Administration (OSHA), and by local ordinances. Lateral travel distance to and exit ladder or steps shall not be greater than 25 feet in trenches 4 feet or deeper.

Accurately grade trench bottom to provide uniform bearing and support for each section of pipe on undisturbed soil or bedding material at every point along entire length, except where necessary to excavate for bell holes, proper sealing of pipe joints, or other required connections. Dig bell holes and depressions for joints after trench bottom has been graded. Dig no deeper, longer, or wider than needed to make joint connection properly.

The minimum width of the trench shall be equal to the outside diameter of the pipe at the bell plus six (6) inches on each side of the pipe. All other trench width requirements for pipe,

conduit, or cable shall be least practical width that will allow for proper compaction of trench backfill.

3.03 SHEETING AND BRACING:

Provide sheeting and bracing, when necessary, in trenches and other excavations where protection of workmen required. Sheeting may be removed after excavation has been backfilled sufficiently to protect against damaging or injurious caving.

3.04 PIPE BEDDING:

Accurately cut trenches for pipe or conduit that is installed to designated elevations and grades to line and grade 4" below bottom of pipe and to width as specified. Place 4" of bedding material, compact in bottom of trench, and accurately shape to conform to lower portion of pipe barrel. After pipe installation, place select backfill and compact in maximum 6" layers, measured loose, to at least 1'0" above top of pipe.

3.05 TRENCH BACKFILLING:

A. Criteria

Do not backfill trenches until required tests are performed, utility systems, as installed, comply with specified requirements, and are accepted by applicable governing authority. Backfill trenches as specified. If improperly backfilled, reopen to depth required to obtain proper compaction. Backfill and compact, as specified, to properly correct condition in an acceptable manner.

B. Backfilling

After pipe or conduit has been installed, bedded, and tested as specified, backfill trench or structure excavation with specified material placed in lifts or layers not exceeding 8" of loose material. Compact to minimum density of 95% of optimum density in accordance with ASTM D 698 or AASHTO T-99.

C. Compaction

Exercise proper caution when compacting immediately over top of pipes or conduits. Water jetting or flooding is not permitted as method of compaction.

D. Compaction Testing

Independent testing laboratory shall perform test at intervals not exceeding 300 feet of trench for each 12" of compacted trench backfill and furnish copies of test results as specified.

3.06 RESTORATION OF SURFACE:

The top surface of the trench fill shall be restored to the original or planned condition. Paved sections shall conform in grade to the adjacent area. Restoration shall be completed as promptly as practicable and shall not be prolonged until the end of the construction period.

3.07 DEWATERING:

If dewatering activity is required, unless specifically authorized by the Engineer, all pipe shall be laid "in the dry". The Contractor shall minimize the length of excavation in advance of pipe laying so as to minimize the amount of trench dewatering required. The Contractor shall dewater before trench excavation, utilizing one or more of the following approved methods: well point system, trench gravity underdrain system, or sumps with pumps.

Well point systems must be efficient enough to lower the water level in advance of the excavation and maintain it continuously in order that the trench bottom and sides shall remain firm and reasonably dry. The well points shall be designed especially for this type of service, and the pumping unit used shall be capable of maintaining of high vacuum, and at the same time, of handling large volumes of air as well as water.

If the material encountered at trench grade is suitable for the passage of water without destroying the sides or bottom of the main trench, sumps may be provided at intervals to the side of the main excavation, and pumps may be used to lower the water level by taking their suction from these sumps. In the event such pumps are employed, care shall be exercised to prevent the movement of pipe foundation material and to this end a bed of crushed stone may be required.

The Contractor shall be responsible for disposing of all water resulting from trench dewatering operations, and shall dispose of the water without damage or undue inconvenience to the work, the surrounding area, or the general public. He shall not dam, divert, or cause water to flow in excess in existing gutters, pavements, or other structures.

END OF SECTION

SECTION 02400 - SITE DRAINAGE

PART-1 - GENERAL

1.01 SCOPE OF WORK:

Installation and furnishing of all materials, equipment, and accessories to be used in the construction of the storm sewer and site drainage system.

1.02 STORM DRAINAGE STRUCTURES:

Pipe
Inlets, Manholes and Junction Boxes
Concrete Curb
Sidewalk

1.03 RELATED WORK:

Section 02222: Excavation, Backfilling, And Compacting For Utilities.

1.04 JOB CONDITIONS:

Set lines, elevations, and grades for drainage system work and control system for duration of work, including careful maintenance of bench marks, property corners, monuments, or other reference points.

PART-2 - PRODUCTS

2.01 PIPE USED SHALL MEET THE FOLLOWING SPECIFICATIONS::

Round Concrete Pipe or HDPE Pipe (over 12" in dia.) ASTM C76-70

PVC pipe (12" in diameter or less) ASTM D 3034

2.02 INLETS, MANHOLES AND JUNCTION BOXES:

Inlets, manholes and junction boxes shall be constructed of precast concrete or cast-in - place concrete. A maximum of 12 inches of brick risers may be used for precast units. If cast in place is used, no allowance for riser changes will be allowed with brick.

Concrete shall be Class I, as specified by the Florida Department of Transportation Standard Specifications for Road and Bridge Construction Latest Edition.

Mortar for brick masonry shall be of one (1) part portland cement to three (3) parts sand. Hydrated lime in an amount not to exceed ten percent (10%) of the amount of cement used may, at the Contractor's option, be added to the mortar. Masonry cement, delivered in packages properly identified with the brand name of the manufacturer and showing the net weight as well as whether it is Type 1 or Type 2, may be used in lieu of mixed mortar, provided it has not been in storage for more than six (6) months.

Grating and frames fabricated from structural steel shall be galvanized in accordance with the requirements of ASTM A123.

Forms may be of wood or metal construction, shall be constructed true to line and grade and shall be approved by the Engineer before being filled with concrete.

The Contractor may substitute precast inlets, manholes and junction boxes in lieu of cast-in-place units. Such precast units shall be in accordance with ASTM C478 or with Florida Department of Transportation Standards.

PART-3 - EXCAVATION

3.01 INLETS AND MANHOLES:

Excavation shall be in accordance with Section 02222 of these Specifications.

If the Contractor elects to construct units of cast-in-place concrete, the concrete shall be placed in the approved forms to the depths shown on the plans and thoroughly vibrated. After the concrete has hardened sufficiently, it shall be covered with suitable material and kept moist for not less than three days.

Reinforcing steel for cast-in-place construction shall be in place, securely tied and properly spaced prior to placement of the concrete.

After the concrete or mortar has cured, the frame of the casting shall be set in a full mortar bed composed of one part portland cement to two parts fine aggregate.
Inlet and outlet pipes shall be of the same size and kind as the connection pipe. They shall extend through the walls for a distance beyond the outside surface sufficient for the intended connections and the concrete constructed around them so as to prevent leakage along their outer surface. The inlet and outlet pipe ends shall be flush with the inside face of the wall.

Inlets, manholes and junction boxes shall be backfilled completely by use of mechanical tampers and in six-inch (6") compacted layers.

3.02 PIPES AND PIPE CULVERTS:

Trenches for pipe culverts, storm sewers, sanitary sewers, water lines and other conductors shall be excavated to the required depth and to a width sufficient to provide adequate working room. For pipe lines placed above the natural ground line, the embankment shall be placed and compacted to an elevation of at least two feet (2') above the top of pipe and at least four (4) pipe diameters each side of the pipe before excavating the pipe trench. It is the express intent of this specification that all pipes will be placed in trenches.

For all pipe culverts, storm sewers and sanitary sewers of 24 inches or more inside diameter the pipe bedding shall be shaped to conform to the outside of the pipe, for a depth of not less than ten percent (10%) of its total outside height and recesses provided to receive the bell. For pipes of less than 24 inches inside diameter, the trench bottom may be either flat or shaped to fit the pipe, except that the recesses for bells are required in any event. The pipe barrel shall be fully supported by the trench bottom.

Where rock, boulders or other hard, lumpy or unyielding materials are encountered in the trench bottom, they shall be removed to a depth at least twelve inches (12") below the bottom of pipe and the resultant excavation backfilled. Muck or other soft material considered by the Engineer to be unsuitable as foundation for the pipe shall be removed to the depth required to obtain a firm foundation and backfilled.

All pipes shall be carefully laid, true to line and grade, with hubs up-grade and the tongue end fully entered into the hub. When pipe with quadrant reinforcement, or circular pipe with elliptical reinforcement, is used the pipe shall be installed in a position such that the manufacturer's marks designating "top" and "bottom" of the pipe shall not be more than five degrees from the vertical plane through the longitudinal axis of the pipe. Any pipe which is not in true alignment or which shows any settlement after laying shall be taken up and re-laid without additional compensation.

For all round concrete pipe, other than side drain pipe, the pipe joints shall be sealed by use of round rubber gaskets. Those gaskets shall meet the requirements of Article 5.9 of ASTM C361. Pipe joints shall meet the requirements of Article 941-1.5 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction, Latest Edition. The gasket and joints shall be free of grit, dirt and other foreign matter at the time the joints are made. In order to facilitate closure of the joint, application of an approved vegetable soap lubricant immediately prior to closing the joint will be permitted. For concrete pipe used as side drain the joints shall be welded before the inside mortar is placed and before succeeding section of the pipe are laid, the lower half of the joint portion of the pipe in place shall be filled with cement mortar and the upper half of the tongue portion of the next joint wiped with cement mortar, both in sufficient thickness to bring the inner surface of the abutting pipe flush and even when the pipe is laid. After the pipe is laid, the inside of the joint shall be wiped and finished smooth and a mortar bead not less than 3/4 inches thick shall be formed completely around the outside of the joint.

For concrete pipe laid with rubber gasket joints, any deviation from true alignment or grade which would result in a displacement from the normal position of the gasket of as much as 1/4 inch, or which would produce a gap exceeding 1/2 inch between sections of pipe for more than 1/3 of the circumference of the inside of the pipe will not be acceptable and, where such occurs, the pipe shall be re-laid without additional compensation. Where minor imperfections in the manufacturing of the pipe causes a gap greater than 1/2 inch between pipe sections, the joint will be acceptable provided the gap does not extend more than 1/3 the circumference of the inside of the pipe. No mortar, joint compound, or other filler which would tend to restrict the flexibility of the gasket joint will be applied to the gap.

Corrugated steel pipe shall be field jointed with locking bands as specified by AASHTO M36-70. The joints shall be gasketed with a rubber or neoprene gasket of a design shown to secure a soil tight or water tight joint. The gasket for annular pipe joints shall be at least seven inches wide and at least 3/8 inch thick and at least one inch thick and at least one inch (1") and five inches (5") wide for helical pipe joints. Suitable alternate joints will be considered by the Engineer if the Contractor requests such consideration. Field joints for aluminum pipe except the material used in the bands and band connectors shall be of the same alloy as the culvert sheeting and shall meet the requirements of AASHTO M196.

Immediately prior to final inspection, coated corrugated steel pipe shall be cleaned and inspected for breaks or other damage to the coating or to the pipe itself and any repairs necessary shall be made by the Contractor. Grade required shall be cut down or extended and made to conform to the required grade.

PVC pipe laying shall proceed up grade with spigot ends pointing in the direction of flow. Before pipe is joined, gaskets shall be cleared of all dirt and stones and other foreign material. The spigot ends of the pipe shall be lubricated lightly with a lubricant specified by the pipe manufacturer and approved by the project engineer. Sufficient pressure shall be applied to the pipe so as to properly seat the socket in the bell of the pipe. All pipes shall be laid straight, true to the lines and grades shown on the plan.

Where manholes are to be raised, the adjustment may be made, if the Contractor so chooses, by the use of adjustable extension rings of the type which do not require the removal of the existing manhole frame. The extension device shall provide positive locking action and shall permit adjustment in height as well as diameter. The particular type of device used shall meet the approval of the Engineer.

3.03 CONCRETE CURB & SIDEWALK:

A. Concrete Curb

All concrete curb shall be constructed in accordance with the Florida Department of Transportation Standard Specifications of Road and Bridge Construction,

Section 520.

B. Concrete Sidewalk

This work shall consist of constructing cement concrete sidewalks in accordance with these specifications and within reasonable close conformity to the lines, grades and dimensions shown on the drawings established by the Engineer. Materials for sidewalk construction shall be 2500 psi, concrete and Class I (DOT) steel wire fabric AASHTO Designation M-55. The foundation for the bed shall be formed a depth of 4 inches below and parallel with the finished surface of the sidewalks, unless otherwise indicated on the drawings or specified. Unsuitable material shall be removed and replace with approved material, and the foundation shall be thoroughly compacted and finished to a firm, even surface. Edge dimensions shall conform to the plan details, with one #5 continuous bar on each side.

Forms shall be of wood or metal, straight, free form warp, and of sufficient strength when staked to resist the pressure of the concrete without springing. If wood, they shall be nominal 2-inch planks surfaced on the inside and the top; or if of metal, they shall be of approved section. Forms shall have a depth equal to the depth of the concrete and shall be thoroughly cleaned and oiled before concrete is placed against them. Forms that are worn, bent, or damaged shall not be used.

Sidewalks shall be constructed in separate slabs 15 feet in length except for closures. These slabs shall be separated by transverse premolded expansion joint filler, if an inch in thickness, for the full depth of the concrete. Transverse premolded expansion joint filler shall also be placed adjacent to existing structures where directed. The slabs between expansion joints shall be divided into blocks 5 feet in length, by scoring transversely. Where the slabs are more than 5 feet in width they shall be scored longitudinally in the center. Transverse and longitudinal scoring shall extend for a depth of at least the thickness of the concrete slab.

Premolded expansion joint filler, of an inch in thickness for the full depth of the concrete, shall be placed longitudinally where the sidewalk slab is to be constructed in contact with curbs.

Where existing light standards, poles, fire hydrants, and similar structures are within the limits of the sidewalk area, the concrete around such structures shall be scored in a block 8 inches wider than the maximum dimension of the structure at the sidewalk elevation. Prior to placing the concrete around such structures, premolded expansion joint filler, of an inch in thickness, shall be placed around the structure for the full depth of the concrete in the sidewalk.

The concrete shall be placed in the forms and tamped and spaded to prevent

honeycomb and until the tip of the structure can be floated smooth and the edges rounded to the radius shown in the plans. A light broom finish shall be applied once the concrete has set enough to be permanently marked.

Side forms shall not be removed within 12 hours after the concrete has been placed. After removal of the forms, minor honeycombed areas shall be filled with mortar composed of 1 part of cement and 2 parts of fine aggregate. Major honeycombed areas will be considered as defective work, and shall be removed and replaced at no expense to the Owner.

All expansion joints, and scoring cracks where required, shall be sealed with joint sealing material having ASTM designation D1190.

After the concrete has cured for a period of not less than 72 hours, the spaces adjacent to the sidewalk shall be backfilled with approved material in layers of not more than 4 inches in depth, which shall be thoroughly compacted mechanically to the required elevation and cross-section.

END OF SECTION

SECTION 02500 - ROADWAY BASE COURSE

PART 1 - GENERAL

1.01 SCOPE OF WORK:

Furnish and install roadway and parking area base course in accordance with the contract drawings and specifications.

REFERENCED PUBLICATIONS:

A. Florida Department of Transportation "standard specifications for road and bridge construction" latest edition, hereafter referred to as FDOT Standard Specifications.

RELATED SECTIONS:

Section 02200 – Earthwork
Section 02511 – Asphaltic Concrete Paving

PART 2 - PRODUCTS

2.01 Base course material shall be in accordance with FDOT Standard Specifications, Section 200, Limerock Base or Section 204, Graded Aggregate Base.

A. Limerock may be of either Miami or Ocala formation and shall meet the following requirements:

1) Minimum percentage of carbonates of calcium and magnesium in the limerock material shall be seventy (70) percent.
2) Maximum percentage of water sensitive clay material shall be three (3) percent by weight.
3) Maximum Liquid Limit shall not exceed thirty-five (35).
4) Plastic Index shall not exceed ten (10).
5) At least ninety-seven (97) percent of the material, by weight, shall pass a three and one half (3 1/2) inch sieve and the material shall be graded uniformly down to dust. All crushing or breaking-up, which is necessary to meet this requirement, shall be done before the material is placed on the roadbed.
6) Material shall not contain cherty or other extremely hard pieces, or lumps, balls or pockets of sand or clay size materials in sufficient quantity as to be detrimental to the proper bonding, finishing or strength of the limerock base.

2.02 PRIME COAT:

A. Materials

Unless otherwise called for on the plans or in Special Provisions, material used in the prime coat shall be Cut-Back Asphalt, Grade RC-70 or RC-250 or Emulsified Asphalt, Grade RS-2. Cutback Asphalt shall meet the requirements of AASHTO M81 except that the penetration range shall be 60-120 instead of 80-120. Emulsified Asphalt shall meet the requirements of AASHTO M140 (for anionic) and M208 (for cationic). The viscosity requirements for Grade RS-2 shall not apply. Other types and grades of bituminous material may be allowed if it can be shown that the alternate material will properly perform the function of prime coat material.

Cover material shall consist of a sand bituminous hot- mix containing from two (2) to four (4) percent Asphalt Cement, viscosity Grade AC-20 and fine aggregate consisting of a clean sand or screenings. Sand shall contain no more than ten (10) percent material by weight, passing the No.200 sieve. Screenings shall not contain any material retained on a three eighth (3/8) inch sieve and not more than ten (10) percent, by weight, passing the No.200 sieve.

PART 3 - EXECUTION

3.01 Equipment

Limerock shall be spread by mechanical rock spreaders equipped with a device to strike the rock off uniformly to laying thickness and capable of producing an even distribution of the rock. In areas where the use of a mechanical spreader is impractical, and with the approval of the Architect, limerock may be spread by means of a dozer or grader blade.

Hauling, Spreading And Compacting: As much as possible, rock shall be hauled over rock previously placed. Hauling over the subgrade is permitted, provided that any soft spots that develop in the subgrade as a result of that hauling shall be immediately repaired to the satisfaction of the Architect.

When the specified compacted thickness of the base is six (6) inches or less, the base shall be constructed in one (1) layer. For bases of greater than six (6) inch thickness, the base shall be constructed in two (2) or more layers, with the final layer approximately one-half (1/2) the total thickness, but in no case less than four (4) inches. Before compaction effort starts, all segregated areas of fine or coarse rock shall be removed and replaced with properly graded rock.

After the limerock has been spread, it shall be brought to the proper moisture content by wetting or drying. When water is added, it shall be uniformly mixed-in by disking to the full depth of the course which is being compacted. Wetting or drying operations shall be across the full width and the full depth of the course being compacted.

The limerock base for roadways shall be compacted to a density of not less than ninety-five (95) percent of the maximum density as determined by AASHTO T180. Limerock base for shoulder

paving or under sidewalks or driveways shall be compacted to a density of not less than ninety-five (95) percent of the maximum density as determined by AASHTO T180.

Density tests shall be made on each day's final compaction operation on each course. The frequency of those tests shall be as specified herein. All bladeing, manipulation or other operations shall be complete prior to performing the tests.

If, at any time, subgrade material should become mixed with the base material, the contaminated base material shall be removed and replaced with suitable material. If the subgrade has been affected to the degree its integrity is questionable, then that subgrade shall be replaced as well.

3.02 FINISHING BASE:

Limerock base shall be finished to true line, grade and cross-section. As soon as the finishing operation is complete the finished surface shall be checked with a template cut to the required cross-section and with a fifteen (15) foot straightedge laid parallel to the road. The straightedge shall be placed in alternating overlaps to assure complete coverage. Any straightedge shall be placed in alternating overlaps to assure complete coverage. Any irregular ties greater than three eighths (3/8) inch shall be corrected by scarifying and removing or adding rock as needed after which the area shall be re-compacted and re-tested.

Thickness of base shall be measured at the intervals as specified herein. Base which is deficient by more than five (5) percent of its planned thickness shall be corrected by scarifying, adding rock, reshaping and recompacting for a distance of one hundred (100) feet each side of the edge of the deficient area. As an exception to this requirement, where only one area is deficient and that area is less than twenty (20) feet long, or less than one (1) percent of the total day's base work, whichever is smaller, then the Architect may waive the requirement for reconstructing the area providing the deficiency is less than ten (10) percent of the planned thickness.

3.03 APPLICATION OF PRIME COAT:

Before any bituminous material is applied, all loose material, dust, caked clay, dirt and other foreign material which might prevent proper bond with the existing surface shall be removed for the full width of the application.

Bituminous material shall be applied by pressure distributor equipped with pneumatic tires having a sufficient width of rubber in contact with the road surface to avoid breaking the bond or forming a rut in the surface. The outside nozzle at each end of the spray bar shall have an opening of not less than twenty-five (25) percent nor more than seventy-five (75) percent in excess of the interior nozzles. All other nozzles shall have uniform

openings and shall be spaced so as to provide an even distribution of the bituminous material on the surface.

The surface to be primed shall be lightly sprinkled with water and rolled with a traffic roller immediately before applying the bituminous material.

The moisture content of the base material shall not exceed ninety (90) percent of the optimum moisture of the material at the time the prime material is applied. The bituminous material shall be applied by a pressure distributor at a temperature between 100 degrees F. and 150 degrees F., that will insure even distribution.

The rate of application shall be not less than 0.10 gallon per square yard. Sand-bituminous hot-mix shall be applied at the rate of ten (10) pounds of mix per square yard.

The entire surface, after covering, shall be rolled with a traffic roller to obtain a reasonable dense mat.

3.03 FIELD QUALITY CONTROL:

An Independent Testing Laboratory approved by the Owner and paid by the contractor, shall be retained to perform construction testing on site except as may be amended in the supplemental conditions.

Fill Placed in Areas to be Paved: At least one compaction test of every 2,000 sq. ft. of each eight (8) lift or layer.

If compaction requirements are not complied with at any time during construction process, remove and recompact deficient areas until proper compaction is obtained at no additional expense to Owner.

The following tests shall be performed on each type of material used as compacted fill as part of construction testing requirements:

Moisture and Density Relationship: ASTM D 698.
Mechanical Analysis: AASHTO T-88.
Plasticity Index: ASTM D 424.

Field density tests for in-place materials shall be performed according to one of the following standards as part of construction testing requirements.

Sand-Cone Method: ASTM D 1556.
Nuclear Method: ASTM D 2922.

Base course construction testing shall be performed as follows:

Base Material Thickness: Perform one test for each 8,000 sq. ft. in-place base course.

Base Course Compaction: Perform one test for each 2,000 sq. ft. of in-place course.

Test each source of material for base course in accordance with applicable state highway specifications.

Owner, Engineer and Contractor shall be provided with copies of reports within twenty-four (24) hours of time test was performed.

In event that any test performed fails to meet these Specifications, Owner and Contractor shall be notified immediately by Independent Testing Laboratory.

Owner reserves right to employ Independent Testing Laboratory and to direct any testing that is deemed by Owner to be necessary. Contractor shall provide free access to site of testing activities.

END OF SECTION

SECTION 02511 - ASPHALTIC CONCRETE PAVING

PART 1 - GENERAL

1.01 SCOPE OF WORK:

Furnish and install asphaltic concrete paving, including prime and tack coat in accordance with the contact drawings and specifications.

1.02 REFERENCED PUBLICATIONS:

A. "Standard Specifications for Road and Bridge Construction," Florida Department of Transportation (latest edition), hereafter referred to as "FDOT Standard Specifications"

1.03 RELATED SECTIONS:

Section 02500 – Roadway Base Course

1.04 SUBMITTALS

A. Design Mix:

Before any asphalt surface is constructed, the Contractor shall submit actual design mix for asphalt to the Project Manager for acceptance.

B. Material Certificates:

Furnish copies of materials certificates signed by material producer and Contractor certifying that each material item complies with, or exceeds, specified requirements.

1.04 JOB CONDITIONS

A. Weather Limitations:

Apply prime and tack coats when ambient temperature is above 50 percent, and when temperature has not been below thirty-five (35) degrees for twelve (12) hours immediately prior to application. Do not apply when base is wet or contains excess moisture.

Construct asphalt concrete surface course when atmospheric temperature is above forty (40) degrees and when base is dry. Base course may be placed when air temperature is above thirty (30) degrees and rising.

B. Grade control:

Establish and maintain required lines and elevations.

PART 2 - PRODUCTS

2.01 ASPHALTIC CONCRETE

This section specifies the material, the compositions, and the job mix formula for Type S asphaltic concrete pavements as specified in Section 331 of the Standard Specifications. The requirements for plant and equipment for these pavements are specified in Section 320 of the FDOT Standard Specifications. The Contractor shall submit a job mix formula as required by FDOT Standard Specification, Section 331.4.3, prior to the start of production.

2.02 PRIME AND TACK COAT

Governing specifications for materials shall be as per FDOT Standard Specifications, Section 300, Prime and Tack Coats for Base Courses.

PART 3 - EXECUTION

3.01 PREPARATION

Remove loose material from compacted base surface to check for unstable areas and areas requiring additional compaction. Do not begin paving work until deficient base areas have been corrected and are ready to receive paving.

3.02 PRIME COAT

Apply bituminous prime coat to base surfaces where asphaltic concrete paving will be constructed.

Apply bituminous prime coat in accordance with FDOT Standard Specification, Section 300-6.

Apply at minimum rate of 0.20 to 0.50 gal./sq. yd. over compacted base. Apply material to penetrate and seal, but not flood, surface.

Cure and dry as long as necessary to attain penetration and evaporation of volatile.

3.03 TACK COAT

Apply to contact surfaces of previously constructed asphalt or portland cement concrete and surfaces abutting or projecting into asphalt concrete and surfaces abutting or projecting into asphalt concrete pavement.

Apply tack coat to full depth asphalt and sand asphalt base. Apply emulsified asphalt tack coat between each lift or layer of full depth asphalt and sand asphalt bases and on surface of such bases where asphaltic concrete paving will be constructed.

Apply emulsified asphalt tack coat in accordance with FDOT Standard Specification Section 300-7.

Distribute at rate of 0.05 to 0.15 gal./sq.yd. of surface.

Allow tack coat to dry until at proper condition to receive paving.

3.04 PLACING MIX

Place asphalt concrete mixture on prepared surface, spread, and strike off. Spread mixture at following minimum temperatures:

When ambient temperature is between forty (40) degrees F and fifty (50) degrees F: Two hundred eight-five (285) degrees F.

When ambient temperature is between fifty (50) degrees and sixty (60) degrees F: Two hundred eighty (280) degrees F.

When ambient temperature is higher than sixty (60) degrees F. Two hundred seventy-five (275) degrees F.

Place inaccessible and small areas by hand. Please each course to required grade, cross-section, and compacted thickness.

3.05 PAVER PLACING

Place in strips not less than 10'-0" wide, unless otherwise acceptable to Owner. After first strip has been placed and rolled, place succeeding strips and extend rolling to overlap previous strips. Complete base course for section before placing surface course.

3.06 JOINTS

Make joints between old and new pavements, or between successive days work, to ensure continuous bond between adjoining work. Construct joints to have same texture, density, and smoothness as other sections of asphalt concrete course. Clean contact surfaces and apply tack coat.

3.07 ROLLING

Begin rolling when mixture will bear roller weight without excessive displacement.

Compact mixture with hot hand tampers or vibrating plate compactors in areas inaccessible to rollers.

3.08 BREAKDOWN ROLLING

Accomplish breakdown or initial rolling immediately following rolling of joints and outside edge. Check surface after breakdown rolling, and repair displaced areas by loosening and filling, if required, with hot material.

3.09 SECOND ROLLING

Follow breakdown rolling as soon as possible, while mixture is hot. Continue second rolling until mixture has been thoroughly compacted.

3.10 FINISH ROLLING

Perform finish rolling while mixture is still warm enough for removal of roller marks. Continue rolling until roller marks are eliminated and course has attained maximum density.

3.11 PATCHING

Remove and replace paving areas mixed with foreign materials and defective areas. Cut out such areas and fill with fresh, hot asphalt concrete. Compact by rolling to maximum surface density and smoothness.

3.12 PROTECTION

After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened.

Erect barricades to protect paving from traffic until mixture has cooled enough not to become marked.

3.13 FIELD QUALITY CONTROL

Independent Testing Laboratory, selected and paid by Contractor, shall be retained to perform construction testing of in-place asphalt concrete courses for compliance with requirements for thickness and surface smoothness. Asphalt surface and base course shall be randomly cored at a rate of one core for every 20,000 square feet of paving. However, no less than three cores in light duty areas and three cores in heavy-duty areas shall be obtained. Asphalt pavement samples shall be tested for aggregate gradation and bitumen content for conformance with the mix design. The asphalt pavement shall also have Extraction and Marshall Stability tests taken on the material placed each day. Density of asphaltic concrete surface course shall be 93 percent of job mix Marshall Laboratory density.

ACCEPTANCE OF MIXTURE

Plant Mixture

1. Acceptance of the bituminous mixture at the plant will be based on the Contractor's testing lab results. Asphalt must meet a minimum Marshall Stability of 1500 lbs. Extraction and Gradation results shall meet the variance acceptable values provided in Table 331-6. One sample shall be tested in the morning and one in the afternoon for each day's paving.

Any load or loads of mixture, which in the opinion of the Project Manager or Owner are unacceptable due to being segregated, aggregates improperly coated, or an excessively high or low temperature, shall be rejected for use in the work. The Owner may reject the asphalt or direct the Contractor to remove the asphalt due to failure to meet any F.D.O.T. requirements.

Field Density Requirements

Field density requirements shall conform to F.D.O.T. – Section 330-10.3.

3.15 THICKNESS

In-place compacted thickness shall not be less than thickness specified on the drawings.

3.16 SURFACE SMOOTHNESS

Test finish surface of each asphalt concrete course for smoothness, using 10'-0" straightedge applied parallel with, and at right angles to centerline of paved area. Surfaces will not be acceptable if exceeding following tolerances for smoothness:

Base Course Surface: 1/4"
Wearing Course Surface: 3/16"

Check surface areas at intervals necessary to eliminate ponding areas.

Repair or remove and replace unacceptable paving as directed by Owner.

Areas of deficient paving thickness shall receive a minimum 3/4" overlay until specified thickness of the course is met or exceeded.

END OF SECTION

SECTION 02520 - SITEWORK CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Construction of concrete curb and gutter, concrete valley gutters and sidewalk, as shown on the Drawings and as herein specified.

B. Related Work Specified Elsewhere

1. Section 02221: Trenching, Backfilling and Compacting

C. Supplementary Specifications

1. All Florida Department of Transportation Standard Specifications for Road and Bridge Construction - 1991 (FDOT Standard Specs) herein referred to and/or herein amended form a part of these technical specifications.

1.02 QUALITY ASSURANCE

A. Qualifications of Installer

1. At all times during execution of this portion of the work, provide at least 1 person who is thoroughly familiar with the type of materials being installed and is directly responsible for all work performed under this section.

B. Quality Control Requirements

1. Requirements shall be as set forth in other related specifications as herein referred to.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete

1. All work under this section shall be of Class II concrete, as set forth in FDOT Standard Specifications.

B. Steel

1. All reinforcing steel shall be Grade 60 Reinforcement, in accordance with the provisions set forth in FDOT Standard Specifications Section 415 "Reinforcing Steel".

C. Joint Materials

1. All joint materials shall be in accordance with the provisions set forth in FDOT Standard Specifications Section 932-1 "Joint Materials".

PART 3 - EXECUTION

3.01 CONSTRUCTION

A. Concrete Gutter, Curb Elements and Traffic Separator

1. Concrete curb and gutter and concrete valley gutter construction shall be in accordance with FDOT Standard Specifications 520 "Concrete Gutter, Curb Elements and Traffic Separator", except as hereinafter amended and as shown on the Drawings.

B. Concrete Sidewalks

1. Construction shall be in accordance with FDOT Standard Specifications Section 522 "Concrete Sidewalk", except as hereinafter amended and as shown on the Drawings.

END OF SECTION

SECTION 02577 - PAVEMENT MARKINGS

PART-1 - GENERAL

1.01 SCOPE OF WORK:

Furnish all tools, equipment, materials, machinery, appurtenances and labor, unless otherwise specified to establish all pavement markings for fire lanes, lane striping, parking, stall striping, handicapped symbols and other necessary striping for traffic control and public safety.

The Contractor shall maintain access for vehicular and pedestrian traffic as required for other construction activities.

Flagman shall be utilized, where necessary, along with barricades, warning signs, and warning lights.

1.02 RELATED WORK

Florida Department of Transportation Standard Specifications for road and bridge construction latest edition (referred to herein as "Standard Specifications").

PART-2 - PRODUCTS

2.01 MATERIALS:

The paint utilized for striping shall be Thermoplastic compound meeting AASHTO M 249-79 as detailed in Section 711-2 of the Standard Specifications. The paint colors shall be selected as follows:

Exterior Sidewalk Curbs:	Yellow (Per D.O.E.)
Lane Striping:	White
Handicapped Symbols:	Blue
Parking Stall Striping:	White

PART-3 - EXECUTION

3.01 PREPARATION:

Application surface shall be swept and cleaned to eliminate loose materials and dust per Section 710-6.3 of the FDOT Standard Specifications.

3.02 APPLICATION:

All paint shall be applied in accordance with the manufacturer's recommendations and Section 711-4 of the FDOT Standard Specifications.

Paint shall be applied with mechanical equipment to provide uniform and straight edges.

END OF SECTION

SECTION 03100 - CONCRETE FORMWORK

PART 1 - GENERAL

1.01 DESCRIPTION

A. The work included in this Section consists of providing all labor, materials and equipment necessary for providing and installing formwork for concrete.

B. Related Work Described Elsewhere:

1. Concrete Reinforcement: Section 03200.

2. Concrete Joints and Waterstops: Section 03262.

3. Cast-in-Place Concrete: Section 03300.

C. General Design and Responsibility:
Structural design responsibility: All forms and shoring shall be designed at the Contractor's expense by a Professional Engineer registered in the State of Florida Formwork shall be designed and erected in accordance with the requirements of ACI 301 and ACI 318 and as recommended in ACI 347 and shall comply with all applicable regulations and codes. The design shall considered any special requirements due to the use of platicized and/or retarded set concrete. The Contractor shall be responsible for safety in its construction and removal.

1.02 QUALITY ASSURANCE

A. Qualifications: Formwork shall be constructed in accordance with the specified standards, as well as all pertinent codes and regulations. Where provisions of pertinent codes conflict with the requirements of this section of these specifications, the more stringent provisions shall govern.

B. Standards: Unless otherwise indicated, all materials, workmanship and practices shall conform to the following standards:

1. American Concrete Institute (ACI):

a. ACI 347 - Guide for Concrete Formwork.

b. ACI 301 - Specifications for Structural Concrete for Buildings.

c. ACI 318 - Building Code Requirements for Reinforced Concrete.

2. American Plywood Association (APA):

a. Material grades and designations as specified.

3. Building Codes:

a. Florida Building Code

b. Local Codes and regulations.

C. Preplacement checklist. The Contractor, as part of his Quality Control Plan, shall develop and submit for approval a Preplacement Checklist form to cover the following items:

1. Reference Drawings covering the placement for all trades and disciplines.

2. Date and time scheduled for placement and the actual date and time of placement.

3. Foreman name, placement number, number of truckloads and number of cylinders.

4. Checklist items such as embeds (list each), subgrade, rebar, forms, alignment, plumbness, etc.

5. Signoff's for foreman, Contractor's Quality Control representative, each subcontractor foreman (major subs, mechanical, electrical, plumbing, etc.) and Engineer.

D. No concrete may be placed until the checklist is properly and completely signed off. Failure to comply with this provision can be grounds for rejecting the work. The checklist shall be weather protected and located with the foreman or at the foreman's station.

1.03 SUBMITTALS

A. Submit shop drawings and product data in accordance with Section 01340, showing materials of construction and details of installation for:

1. Location and sequence of the concrete placements. Indicate locations of joints and panel sizes and patterns. Show location of form ties on architectural surfaces.

2. Review of pour sequence, form system, and panel layout shall be for appearance and strength of the completed structure only. Review by the Engineer of forming plans or procedures shall not relieve the Contractor of responsibility for the strength, safety or correctness of methods used, the adequacy of equipment, or from carrying out the work in full compliance with the requirements of the Drawings and Specifications.

B. Samples:

1. The Contractor shall demonstrate to the Engineer on a designated area of the concrete substructure exterior surface that the form release agent will not adversely affect concrete surfaces to be painted, coated or otherwise furnished and will not affect the forming materials.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Form Lumber: Use form lumber when in contact with exposed concrete, conforming to one (1) of the following, a combination thereof, or equivalent as approved by the Engineer.

1. Lumber: Southern Pine No. 2 grade, seasoned, surfaced on four (4) sides.

2. Plywood: Shall be new and unused "Plyform", Class I or II, bearing the label of the American Plywood Association (Minimum 3/4 inch thickness).

a. All joints or gaps in forms shall be taped, gasketed, plugged, and/or caulked with an approved material so that the joint will remain watertight and will withstand placing pressures without bulging outward or creating surface patterns.

B. Form Ties: Use form ties which do not leave an open hole through the concrete and which permit neat and solid patching at every hole. Use embedded rods with integral waterstops and cones to provide a 1½ inch breakback. Wire ties and wood spreaders will not be permitted.

C. Form Release Agent:

1. Coat all forming surfaces in contact with concrete using an effective, nonstaining, non-residual, water based, bond-breaking form coating that leaves the concrete with a paintable surface unless otherwise noted. Form release agents used in potable water containment structures shall be suitable for use in contact with potable water and shall be non-toxic and free of taste or odor.

D. Chamfer Strips and Moldings: Chamfer strips shall be polyvinyl strips or approved equal, designed to be nailed in the forms to provide a 3/4 inch chamfer (unless indicated otherwise) at exposed edges of concrete members. Rectangular or trapezoidal moldings shall be placed in locations requiring sealants where specified or shown on the Drawings. Sizes of moldings shall conform to the sealants manufacturer's recommendations.

E. Metal Forms: Metal forms may be used when approved by the Engineer and shall be of an appropriate type for the class of work involved.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Construction of Formwork: Forms shall be sufficiently strong to withstand the pressure resulting from the placement and vibration of concrete and shall be sufficiently rigid to maintain specified tolerances. Forms shall be sufficiently tight to prevent loss of mortar, and shall be adequately braced against lateral, upward or downward movement.

B. Coating of Forms: Apply form coating to board forms prior to placing reinforcing. Keep form coatings off steel reinforcing, items to be embedded and previously placed concrete.

C. Form Erection:

1. Provide a means of holding adjacent edges and ends of panels and sectionstightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects of the finished concrete. Insure that forms may be removed without injury to the surface of the finished concrete.

2. Provide a positive means of adjustment of shores and struts. Insure that all settlement is taken up during concrete placing.

3. Temporary openings shall be provided in wall forms to limit the free fall of concrete to a maximum of 6 feet unless an elephant trunk is used. Such openings shall be located to facilitate placing and consolidation and shall be spaced no more than 8 feet apart. Temporary openings shall also be provided in the bottom of wall and column forms and elsewhere as necessary to facilitate cleaning and observation immediately prior to placing.

4. Do not embed any form-tying device or part thereof other than metal in concrete.

5. Form surfaces of concrete members except where placement of the concrete against the ground is shown on the drawings. The dimensions of concretemembers shown on the Drawings apply to formed surfaces, except where otherwise indicated.

D. Formwork Reuse: Reuse only forms which maintain a uniform surface texture onexposed concrete surfaces. Apply light sanding between uses to obtain such a uniformtexture. All surfaces to be in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn and all protrusions smoothed. Plug unused tie rod holes with corks, shave flush, and sandpaper on the concrete surface side. Reuse of wooden forms for other than rough finish will be permitted only if a "like new" condition of the form is maintained.

E. Metal Forms:
Metal forms shall be thoroughly cleaned and mill scale and other ferrous deposits shall be sandblasted or otherwise removed from the contact surface for all forms, except those utilized for surfaces receiving a rough finish. All forms shall have the contact surfaces coated with a release agent.

3.02 TOLERANCES

A. Concrete Tolerance:

1. Vertical, lateral, and level alignments and cross-sectional dimensions shall comply with ACI 117.

2. The following table indicates tolerances or allowable variations from dimensions or positions of structural concrete work:

Maximum Tolerance	(inches)
Sleeves and Inserts	+1/4 to -1/4
Projected ends of anchors	+1/4 to 0.0
Anchor bolt setting	+1/4 to -1/4
Finished concrete, all locations	+1/4 to -1/4 per in. 10-feet of length

The planes or axes from which the above tolerances are to be measured shall be is follows:

Sleeves and Inserts	Centerline of sleeve or insert
Projected Ends of	Plane perpendicular to the end of the anchor
Anchor	as located on the Drawings.
Anchor Bolt Setting	Centerline of anchor bolt
Finish Concrete	The concrete surface as located on the Drawings.

3. Where equipment is to be installed, comply with manufacturer's tolerances if more severe than above.

B. Form Tolerances:

1. Forms shall be surfaced, designed, and constructed in accordance with the recommendations of ACI 347 and shall meet the following additional requirements for the specified finishes.

2. Formed Surface Exposed to View: Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar, water and grout. The maximum deviationof the finish wall surface at any point shall not exceed 1/4-inch from the intended surface as shown on the Drawings. Form panels shall be arranged symmetrically and in an orderly manner to minimize the number or seams.

3. Formed surfaces not exposed to view or buried shall meet requirements of Class "C" Surface in ACI 347.

4. Formed rough surfaces including mass concrete, pipe encasement, electrical duct encasement, and other similar installations shall have no minimum requirements for surface smoothness and surface deflections. The overall dimensions of the concrete shall be plus or minus 1-inch

5. Formed concrete Surfaces to Receive Paint: Surface deflections shall be limitedto 1/32-inch at any point and the variation in wall deflection shall not exceed 1/16-inch per 4 feet. The

maximum deviation of the finish wall surface at any point shall not exceed 1/4-inch from the intended surface as shown on the Drawings.

C. Formed Openings: Openings shall be of sufficient size to permit final alignment of the items within it without deflection or offsets of any kind and to allow space for packing where the items pass through the wall to ensure water tightness around openings so formed. Provide openings with continuous keyways with waterstops where required, and provide a slight flare to facilitate grouting and the escape of entrained air during grouting. Provide formed openings with reinforcement as indicated and specified. Reinforcing steel shall be at least 2 inches clear from the opening.

D. Embedded Items: Set anchor bolts and other embedded items accurately and hold securely in position in the forms until the concrete is placed and set. Check all special castings, channels, or other metal parts that are to be embedded in the concrete prior to and again after concreting. Check all nailing, blocks, plugs and strips necessary for the attachment of trim, finish and similar work prior to concreting.

E. Pipes and Wall Spools Cast in Concrete:

1. Install wall spools, wall flanges and wall anchors before placing concrete. Do not weld, tie or otherwise connect the wall spools to the reinforcing steel.

2. Support pipe and fabricated fittings to be encased in concrete on concrete piers or pedestals. Carry concrete supports to firm foundations so that no settlement will be possible during construction.

3.03 REMOVAL OF FORMS

A. The Contractor shall be responsible for all damage resulting from removal of forms. Forms and shoring for structural slabs or beams shall remain in place in accordance with ACI 301 and ACI 347. Form removal shall conform to the requirements specified in Section 03300, Cast-in-Place Concrete.

3.04 INSPECTION

A. The Engineer shall be notified when the forms are complete and ready for inspection at least six hours prior to the proposed concrete placement.

B. Failure of the forms to comply with the requirements specified herein, or to produce concrete complying with requirements of these Specifications, shall be grounds for rejection of that portion of the concrete work. Rejected work shall be repaired or replaced as approved by the Engineer at not addition cost to the Owner. Such repair or replacement shall be subject to the requirements of these Specifications and approval of the Engineer.

END OF SECTION

SECTION 03200 - CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work in this Section consists of providing all labor, materials,equipment and incidentals required to install all steel bars, steel wire and wire fabricrequired for the reinforcement of concrete, as shown on the Drawings, and as specified herein.

B. Related Work Described Elsewhere:

1. Concrete Formwork: Section 03100.

2. Concrete Joints and Waterstops: Section 03262.

3. Cast-in-Place Concrete: Section 03300.

1.02 QUALITY ASSURANCE

A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall conform to the following standards:

1. American Concrete Institute (ACI)

a. ACI 117 - Standard Tolerance for Concrete Construction and Materials.

b. ACI 301 - Specifications for Structural Concrete.

c. ACI 318 - Building Code Requirements for Reinforced Concrete.

d. ACI 350R - Environmental Engineering Concrete Structures.

e. ACI 315 - ACI Detailing Manual.

2. American Society for Testing and Materials (ASTM)

a. ASTM A82 - Specification for Steel Wire, Plain, for Concrete Reinforcement.

b. ASTM A184 - Specification for Fabricated Deformed Steel Bar Mats for Concrete Reinforcement.

c. ASTM A185 - Specification for Steel Welded Wire Fabric, Plain, for Concrete Reinforcement.

d. ASTM A496 - Specification for Steel Wire Deformed, for Concrete Reinforcement.

e. ASTM A497 - Specification for Welded Deformed Steel Wire Fabric for Concrete Reinforcement.

f. ASTM A615 - Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement.

g. ASTM A767 - Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement.

h. ASTM A775 - Specification for Epoxy-Coated Reinforcing Steel Bars.

i. ASTM A884 - Specification for Epoxy-Coated Steel Wire and Welded Wire Fabric for Reinforcement.

3. American Welding Society (AWS)

a. AWS D1.4 Structural Welding Code - Reinforcing Steel.

4. Concrete Reinforcing Steel Institute (CRSI)

a. CRSI Manual of Standard Practices.

5 Building Codes

a. Florida Building Code.

b. Local codes and regulations.

1.03 SUBMITTALS

A. Materials and Shop Drawings:

1. Submit mill test certificates identifying chemical and physical analyses for each load of reinforcing steel delivered.

B. Submit shop drawings for review in accordance with Section 01300: Shop Drawings, Working Drawings and Samples. Submit reinforcing bending lists and placing drawings for all reinforcing. Placing drawings shall include wall elevations, plan views, and sections to clearly show the reinforcing placing procedures. Placing drawings shall indicate all openings (mechanical, electrical, equipment), including additional reinforcing at openings and intersecting wall, beam and footing arrangements as indicated on the structural drawings and specified herein. Placing drawings shall be coordinated with the concrete placing schedule. Each bending list and placing drawing submitted shall be complete for each major element of a structure (grade slabs, footings, walls, floor or beams), including all dowels and other bars as required. Furnishing such lists shall not be construed that the list will be reviewed for accuracy. The Contractor shall be wholly and completely responsible for the accuracy of the lists and for

furnishing and placing reinforcing steel in accordance with the details shown on the plans and as specified.

1.04 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Reinforcement shall be shipped to the work with bars of the same size and shape fastened in bundles with metal identification tags with waterproof markings giving size and mark securely wired on. The identification tags shall be labelled with the same designation as shown on the submitted bar lists and shop drawings.

B. All bars shall be stored off the ground and shall be protected from moisture and be kept free from dirt, oil, or injurious contaminants.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Concrete reinforcement in sizes No. 3 (3/8 inch) and larger shall be deformed steel bars of the same sizes and shapes indicated on the Drawings. The steel shall be newly rolled stock of domestic manufacture, substantially free from mill scale, rust, dirt, grease, or other foreign matter. Bars shall be of intermediate grade, deformed billet steel conforming to ASTM Specification A-615, Grade 60, including all supplementary requirements.

B. Rail-steel bars will not be allowed in the work.

C. Reinforcement shall be accurately fabricated to the dimensions indicated on the Drawings. Particular care shall be exercised not to have stirrups oversized in order to maintain proper coverage of concrete. Stirrups and tie bars shall be made around a pin having a diameter not less than two (2) times the maximum thickness of the bar. Bends for other bars shall be made around a pin having a diameter not less than five (5) timesthe minimum thickness of the bar except for bars larger than 1 inch, in which case the bends shall be made around a pin of eight (8) bar diameters. All bars shall be bent cold. Bars reduced in section or with kinks or bends not shown on the Drawings will not be accepted.

D. Wire fabric shall conform to ASTM Specification A-185, galvanized for Welded Steel Wire Fabric for Concrete Reinforcement. Welded wire fabric shall be furnished in flat sheets, rolled WWF is not permitted.

E. Wire tie shall be 16-gauge minimum, zinc coated annealed, conforming to ASTM Specification A82.

F. Bar supports in beams and slabs exposed to view after for stripping shall be galvanized or plastic coated. Use concrete supports for reinforcing in concrete placed on grade.

G. Coupler Splice Devices: Tension couplers capable of developing the ultimate strength of the bar as manufactured by Erico Products Inc., Solon, Ohio, or equal and where approved by the Engineer.

H. Reinforcing Steel Accessories

1. Plastic Protected Bar Supports: CRSI Bar Support Specifications, Class 1 - Maximum Protection.

2. Stainless Steel Protected Bar Supports: CRSI Bar Support Specifications, Class 2 - Moderate Protection.

3. Precast Concrete Block Bar Supports: CRSI Bar Support Specifications, Precast Blocks.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Surface condition, bending, spacing, and tolerances of placement of reinforcement shall comply with the CRSI. The CONTRACTOR shall be solely responsible for providing an adequate number of bars and maintaining the spacing and clearances shown on the Drawings.

B. Except as otherwise indicated on the Drawings, the minimum concrete cover of reinforcement shall be as follows:

1. Concrete cast against and permanently exposed to earth: 3-in.

2. Concrete exposed to soil, water, sewage, or weather: 2-in.

3. Concrete not exposed to soil, water, sewage, or weather:

a. Slabs (top and bottom cover), walls and joists: 3/4 in.

b. Beams and columns (principal reinforcement, ties, spirals, and stirrups) 1-1/2 inc.

C. Reinforcement which will be exposed for a considerable length of time after being placed shall be coated with a heavy coat of neat cement slurry.

D. No reinforcing steel bars shall be welded either during fabrication or erection unless specifically shown on the Drawings or specified, or unless prior written approval has been obtained from the Engineer. All bars that have been welded, including tack welds, without such approval shall be immediately removed from the work. When welding of reinforcement is approved or called for, it shall comply with AWS D1.4.

E. Reinforcing steel interfering with the location of other reinforcing steel, conduits or embedded items, may be moved within the specified tolerances or one bar diameter, whichever is greater.

Greater displacement of bars to avoid interference, shall only be made with the approval of the Engineer. Do not cut reinforcement to install inserts, conduits, mechanical openings or other items without the prior approval of the Engineer.

F. Securely support and tie reinforcing steel to prevent movement during concrete placement by using zinc coated wire ties of not less than No. 16 gauge or suitable clips at intersections. Secure dowels in place before placing concrete.

G. Do not press dowels into the concrete after the concrete has been placed.

H. Flat sheet wire mesh shall be placed as follows. Support and tie mesh to prevent movement during concrete placement. Support welded wire fabric by high chairs or bolster with baseplates, all plastic supports, and concrete blocks. It is not permissible to place the WWF on the subbase and pulling it up or laying the WWF on top of the concrete and walking it into the concrete. Extend fabric to within 2 inches or the edges of the slab and lap splices at least 1-1/2 courses of the fabric and a minimum of 6 inches. Tie laps and splices securely at ends and at least every 24 inches with 16 gauge annealed steel wire.

I. Reinforcing steel bars shall not be field bent except where shown on the Drawings or specifically authorized in writing by the Engineer. If authorized, bars shall be cold-bent around the standard diameter spool specified in the CRSI. Do not heat bars. Closely inspect the reinforcing steel for breaks. If the reinforcing steel is damaged, replace, Cadweld or otherwise repair as approved by the Engineer. Do not bend reinforcement after it is embedded in concrete unless specifically shown otherwise on the Drawings.

3.02 REINFORCEMENT AROUND OPENINGS

A. Unless specific additional reinforcement around openings is shown on the Drawings, provide additional reinforcing steel on each side of the opening equivalent to one half of the cross-sectional area of the reinforcing steel interrupted by an opening.. The bars shall have sufficient length to develop bond at each end beyond the opening or penetration.

3.03 SPLICING OF REINFORCEMENT

A Splices designated as compression splices on the Drawings, unless otherwise noted, shall be 30 bar diameters, but not less than 12-in. The lap splice length for column vertical bars shall be based on the bar size in the column above.

B. Tension lap splices shall be provided at all laps in compliance with the applicable tables in the ACI 315. Splices in adjacent bars shall be staggered. Class A splices shall be used when 50 percent or less of the bars are splices within the required lap length. Class B splices shall be used at all other locations.

C. Except as otherwise indicated on the Drawings, splices in circumferential reinforcement in circular walls shall be Class B tension splices and shall be staggered. Adjacent bars shall not be spliced within the required lap length.

D. Install wire fabric in as long lengths as practicable. Splices in welded wire fabric shall be lapped in accordance with the requirements of ACI-318 but not less than 12-in. The splices fabrics shall be tied together with wire ties spaced not more than 24-in on center and laced with wire of the same diameter as the welded wire fabric. Do not position laps midway between supporting beams, or directly over beams of continuous structures. Offset splices in adjacent widths to prevent continuous splices.

3.04 ACCESSORIES

A. The Contractor shall be solely responsible for determining, providing and installing accessories such as chairs, chair bars, and the like in sufficient quantities and strength to adequately support the reinforcement and prevent its displacement during the erection of the reinforcement and the placement of concrete.

B. Use precast concrete blocks where the reinforcing steel is to be supported over soil.

C. Stainless steel bar supports or steel chairs with stainless steel tips shall be used where the chairs are set on forms for a concrete surface that will be exposed to weather, high humidity, or liquid (including bottom of slabs over liquid containing areas). Use of galvanized or plastic tipped metal chairs is permissible in all other locations unless otherwise noted on the Drawings or specified.

D. Alternate methods of supporting top steel in slabs, such as steel channels supported on the bottom steel or vertical reinforcing steel fastened to the bottom and top mats, may be used if approved by the Engineer.

3.05 INSPECTION

A. In no case shall any reinforcing steel be covered with concrete until the installation of the reinforcement, including the size, spacing and position of the reinforcement has been observed by the Engineer and the Engineer's release to proceed with the concreting has been obtained. The Engineer shall be given at least 24 hours advance notice of the readiness of placed reinforcement for observation. The forms shall be kept open until the Engineer has finished his observations of the reinforcing steel.

END OF SECTION

SECTION 03262 – CONCRETE JOINTS AND WATERSTOPS

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The work included in this section consists of providing all labor, materials and equipment necessary to install expansion joints, construction joints, and waterstops.

B. Related Work Described Elsewhere:

1. Concrete Formwork: Section 03100.
2. Concrete Reinforcement: Section 03200.
3. Cast-in-place Concrete: Section 03300.

1.02 SUBMITTALS

A. Materials: Submit manufacturer's literature, materials and samples of waterstops in accordance with Section 01340: Shop Drawings, Working Drawings and Samples including a statement of compliance with ASTM and U.S. Federal Specifications. Manufacturer shall demonstrate five (5) years, minimum, of continuous, successful experience in their product line.

1. Waterstops: Product data including catalog cut, technical data, storage requirements, splicing methods, and conformance to ASTM standards.

2. Premolded joint fillers: Product data including catalog cut, technical data, storage requirements, installation requirements, location of use, and conformance to ASTM standards.

3. Bond breaker: Product data including catalog cut, technical data, storage requirements, installation requirements, location of use, and conformance to ASTM standards.

4. Expansion joint dowels: Product data on the complete assembly including dowels, coatings, lubricants, spacers, sleeves, expansion caps, installation requirements, and conformance to ASTM standards.

5. Compressible joint filler: Product data including catalog cut, technical data, storage requirements, installation requirements, location of use, and conformance to ASTM standards.

6. Bonding agents: Product data including catalog cut, technical data, storage requirements, product life, application requirements, and conformance to ASTM standards.

B. Certifications

1. Certification from the manufacturer that all materials used within the joint system are compatible with each other.

1.04 REFERENCE STANDARDS

A. American Society for Testing and Materials (ASTM)

1. A615 - Dowel Bars, Plain Steel

2. ASTM C881 - Epoxy-Resin-Base Bonding Systems for Concrete. 3. ASTM C1059 - Latex Agnets for Bonding Fresh to Hardened Concrete. 4. ASTM D1751 - Preformed Expansion Joint Fillers for Concrete Paving and Structural Construction.

5. ASTM D1752 - Preformed sponge rubber and cork expansion joint fillers for concrete paving and structural construction.

B. U.S. Army Corps of Engineers (CRD)

1. CRD C572 - Specification for Polyvinylchloride Waterstops.

1.05 DELIVERY, STORAGE, AND HANDLING

A. Store all products under tarps to protect from oil, dirt and sunlight.

PART 2 - PRODUCTS

2.01 GENERAL

A. The use of manufacture's name and model or catalog number is for the purpose of establishing the standard of quality and general configuration desired.

B. All materials used together in a given joint (bond breakers, backer rods, joint fillers, sealants, etc.) shall be compatible with one another. Coordinate selection of suppliers and products to ensure compatibility.

2.02 MATERIALS

A. Waterstops: Waterstops shall be extruded from a PVC compound and shall be 9 inches by 3/8 inch non-tapered ribbed profile as shown on the Drawings. Corners, tees, and crosses shall be supplied by factory. Waterstops shall comply with Corps of Engineers Specification CRD-C-572. All material shall be virgin material. The uses of reworked PVC or other substitute will not be permitted. Natural color, off white, milky color.

B. Premolded Joint Filler

1. Premolded joint filler - structures. Self-expanding cork, premolded joint filler shall conform to ASTM D1752 Type III. The thickness shall be 3/4-in unless otherwise shown on the Drawings.

2. Premolded joint filler - sidewalk and roadway concrete pavements. Joints where fiber is specifically noted on the Drawings, shall be asphalt-impregnated fiber board. Joint filler shall conform to ASTM D1751. Thickness shall be 3/4-in unless otherwise shown on the Drawings.

C. Bond Breaker

1. Bond breaker tape shall be an adhesive-backed glazed butyl or polyethylene tape which will satisfactorily adhere to the premolded joint filler or concrete surface as required. The tape shall be the same width as the joint.

2. Bond breaker for concrete other than where tape is specifically called for shall be either bond breaker tape or a nonstaining type bond prevention coating.

D. Expansion Joint Dowel

1. Dowels shall be smooth steel conforming to ASTM A615, Grade 60. Dowels must be straight and clean, free of loose flaky rust and loose scale. Bars shall be coated with a bond breaker on the expansion end of the dowel. Expansion caps shall be provided on the expansion end.

E. Bonding Agent

1. Epoxy bonding agent shall be a two-component, solvent-free, moisture insensitive, epoxy resin material conforming to ASTM C881, Type V.

2. Latex bonding agent shall be a non-reemulsifiable acrylic-polymer latex conforming to ASTM C1059 Type II.

F. Compressible Joint Filler

1. The joint filler shall be a non-extruded watertight strip materials use to fill expansion joints between structures. The material shall be capable of being compressed at least 40 percent for 70 hours at 68 degrees F and subsequently recovering at least 20 percent of its original thickness in the first one-half hour after unloading. Compressible Joint filler shall be Evasote 380 E.S.P., by E-Poxy Industries, Inc., Ravena, NY or equal.

G. Joint Sealant

1. Joint sealant for continuous immersion shall be a multipart, gray, polyurethane sealant meeting U.S. Federal Specification TT-S-00227E (3) Type I, Class A for horizontal joints and Type II, Class A for vertical joints. Additionally, the sealant must be recommended by the manufacturer for continuous immersion in water.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Construction Joints:

1. Provide construction joints where shown on the Drawings, or as recommended by the Contractor and approved by the Engineer. In case of emergency, place additional construction joints. (An interval of 45 minutes between two consecutive batches of concrete shall constitute cause for an emergency construction joint.)

2. Construction joints shall be keyed, unless otherwise detailed. Form keyways by beveled strips or boards placed at right angles to the direction of shear. Except where otherwise shown on the Drawings or specified, keyways shall be at least 1- 1/2 inches in depth over at least 25 percent (25%) of the area of the section.

3. When it is necessary to make a joint because of an emergency, furnish and place reinforcing dowels across the joint. Embed dowels 48 bar diameters each side of the joint. Size and number of dowels shall match reinforcing in the member. Furnishing and placing such reinforcing steel shall be at the Contractor's expenses.

4. After the pour has been completed to the construction joint and the concrete has hardened, thoroughly clean the entire surface of the joint of surface laitance, loose or defective concrete, and foreign material, and expose clean aggregate by sandblasting the surface of construction joints before placing the new concrete. At least two hours before and again shortly before the new concrete is deposited, the joints shall be dampened, but not saturated. After glistening water disappears, the joints shall be given a thorough coating of neat cement slurry mixed to the consistency of very heavy paste. The surfaces shall receive a coating at least 1/8-in thick, well scrubbed-in by means of stiff bristle brushes whenever possible. New concrete shall be deposited before the neat cement dries.

B. Expansion Joints:

1. Provide expansion joints of sizes and at locations as shown on the Drawing.

2. Place expansion joint fillers every 30 feet in straight runs of walkways, at right angles turns and wherever concrete butts into vertical surfaces.

C. Time Between Pours: At least 2 hours shall elapse after depositing concrete in columns or walls before depositing in beams, girders or slabs supported thereon. Place beams, girders, brackets, column capitals and haunches monolithically as part of the floor or roof system.

D. Joint Sealants: Joint sealants shall be required where indicated on the Drawings. Preparation of surfaces, priming and the handling and preparation of materials shall be in complete compliance with the manufacture's instructions as approved.

E. Waterstops:

1. Waterstops shall be properly heat spliced at ends and intersections to ensure continuity. Construct forms for construction joints in such a manner as to prevent injury to waterstops.

Installed waterstops in construction joints in hydraulic structures which will contain liquid or resist the entry of groundwater.

2. Make field splices with a thermostatically controlled heating iron in conformance with the manufacturer's current recommendations. Allow at least 10 minutes before pulling or straining the new splice in any way. The finished splices shall provide a cross section that is dense and free of porosity with tensile strength of not less than 80 percent (80%) of the unspliced materials.

3. Center waterstop in joint and secure waterstop in correct position using hog rings or grommets spaced at 12 inches on center along the length of the waterstop and wire tie to adjacent reinforcing steel.

4. Provide factory made waterstop fabrications for all changes of direction, intersections, and transitions leaving only straight butt joint splices for the field.

END OF SECTION

SECTION 03300 - CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 DESCRIPTION

A. Scope of Work: The Contractor shall furnish all labor and materials required and install cast-in-place concrete complete as shown on the Drawings and as specified herein.

B. Related Work Described Elsewhere:

1. Concrete Formwork: Section 03100.

2. Concrete Reinforcement: Section 03200.

3. Concrete Joints and Waterstops: Section 03262.

1.02 QUALITY ASSURANCE

A. Standards: Unless otherwise indicated, all materials, workmanship and practices shall conform to the requirements of the following standards:

1. American Concrete Institute (ACI)

a. ACI 301 - Specifications for Structural Concrete.

b. ACI 304 - Guide for Measuring, Mixing, Transporting, and Placing Concrete.

c. ACI 305 - Hot Weather Concreting.

d. ACI 306 - Cold Weather Concreting.

e. ACI 308 - Standard Practice for Curing Concrete.

f. ACI 309 - Guide for Consolidation of Concrete.

g. ACI 318 - Building Code Requirements for Reinforced Concrete.

h. ACI 347 - Guide for Concrete Formwork.

i. ACI 350 - Environmental Engineering Concrete Structures.

2. American Society for Testing and Materials (ASTM)

a. ASTM C31 - Making and Curing Concrete Test Specimens in the Field.

b. ASTM C33 - Concrete Aggregates.

c. ASTM C39 - Compressive Strength of Cylindrical Concrete Specimens.

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

e. ASTM C94 - Standard Specification for Ready-mix Concrete.

f. ASTM C143 - Slump for Portland Cement Concrete.

g. ASTM C150 - Standard Specification for Portland Cement.

h. ASTM C171 - Standard Specification for Sheet Materials for Curing Concrete.

i. ASTM C173 - Air Content of Freshly Mixed Concrete by the Volumetric Method.

j. ASTM C231 - Air Content of Freshly Mixed Concrete by the Pressure Method.

k. ASTM C260 - Air Entraining Admixtures for Concrete.

l. ASTM C309 - Liquid Membrane-Forming Compounds for Curing Concrete.

m. ASTM C494 - Chemical Admixtures for Concrete.

n. ASTM C618 - Fly Ash and Raw or Calcined Natural Pozzolan for Use as

a Mineral Admixture in Portland Cement Concrete.

3. Building Codes

a. Florida Building Code.

b. Local Codes and Regulations.

B. Plant Qualification: Plant equipment and facilities shall meet all requirements of the Check List for Certification of Ready Mixed Concrete Production Facilities of the National Ready Mixed Concrete Association and ASTM C-94.

C. Evaluation And Acceptance Of Concrete: Evaluation and acceptance of concrete will be in accordance with ACI-318, Chapter 4.

1. Watertightness
All structures to contain wastewater or water shall be watertight and shall be free from any perceptible leakage, as determined by the Engineer.

1.03 SUBMITTALS

A. Materials and Shop Drawings: The following information shall be submitted for approval in accordance with Section 01300: Shop Drawings, Working Drawings and Samples. No concrete shall be furnished until submittal has been approved.

1. Plant Qualification: Satisfactory evidence shall be submitted indicating compliance with the specified qualification requirements.

2. Materials: Satisfactory evidence shall be submitted indicating that materials to be used, including cement, aggregates and admixtures meet the specified requirements. Provide catalog data, chemical and mechanical analysis, and conformance with ASTM requirements.

a. Sources of cement, pozzolan and aggregates.

b. Air-entraining admixture.

c. Water reducing admixture.

d. High range water-reducing admixture (plasticizer).

e. Sheet curing material.

f. Liquid curing compound.

3. Design Mix: The design mix to be used shall be prepared by qualified persons and submitted for approval. The design of the mix is the responsibility of the Contractor subject to the limitations of the Specifications. Approval of this submission will be required only as minimum requirements of the Specifications have been met. Such approval will in no way alter the responsibility of the Contractor to furnish concrete meeting the requirements of the Specifications relative to strength and slump.

4. Ready Mix Concrete: Provide delivery tickets or weighmasters certificate per ASTM C-94, including weights of cement and each size aggregate, amount of water in the aggregate, and amount of water added at the plant. Write in the amount of water added on the job.

PART 2 - PRODUCTS

2.01 MATERIALS

A. Cement

1. Cement for all concrete shall be domestic Portland cement that conforms to the requirements of ASTM Designation C-150 Type I, Type II or Type III. All sanitary sewer manholes, wet wells, pumping stations, and structures exposed to wastewater shall be constructed with Type II cement. Type III cement for high early strength concrete shall be used only for special locations and only with the approval of the Engineer. Type I cement may be used for buildings and tremie concrete.

2. Only one (1) brand of cement shall be used in any individual structure unless approved by the Engineer. Cement which has become damaged, partially set, lumpy or caked shall not be used and the entire contents of the sack or container which contains such cement will be rejected. No salvaged or reclaimed cement shall be used.

B. Pozzolan

1. Fly ash shall be Class C or F conforming to the requirements of ASTM C618, including the requirements of Table 1 except the loss of ignition, LOI, shall be limited to 3% maximum. Fly ash shall not exceed 20% of the cementitious content of the mix.

C. Aggregates

1. ASTM C-33. Coarse aggregates shall be size No. 67 (3/4 inch). Block cell fill shall be size #8.

2. In addition to requirements of ASTM C-33 for structures exposed to wastewater the following shall apply:

a. Soft particles: 3.0 percent (3%).

a. Chert as a soft impurity (defined in Table 3 of ASTM C-33): 2.0 percent (2%).

b. Total of soft particles and chert as a soft impurity: 5.0 percent (5%).

c. Flat and elongated particles (long dimension greater than 5 times short dimension): 15.0 percent (15%).

D. Water: Clean and free from injurious amounts of deleterious materials.

E. Air Entraining Admixture: ASTM C-260.

F. Water Reducing and Retarding Admixtures:

1. For concrete without superplasticizer: ASTM C-494, Type D, and shall contain no calcium chloride by weight of cement.

2. For concrete with superplasticizer

a. ASTM C-494, Type F or G. The admixture shall be a second generation type, free of chlorides and alkalis (except for those attributable to water) and composed of a synthesized sulfonated complex polymer. The concrete shall be capable of maintaining its rheoplastic state in excess of two (2) hours if necessary. Superplasticizers admix shall be induced at the batch plant only, job site redosage shall not be permitted without prior approval from the Engineer.

b. Approved Materials:

(1) Rheobuild 716 as manufactured by MAC-USA, Inc., Boca Raton, Florida, telephone: (407) 368-0121 or Rheobuild 716 as manufactured by Master Builders Technologies, Cleveland, Ohio.

(2) Daracem 100 as manufactured by W.R. Grace & Co. Construction Products Division, Pompano Beach, Florida.

c. Manufacturer's job site representation: A competent field service representative from the manufacturer of each of the admixtures (superplasticizer) selected for use shall be available at the job site to provide advice and consultation on the use of the admixture materials, including the effect on the concrete in place. The representative shall be available on short call at any time requested by the Owner, Contractor, or concrete producer.

d. Manufacturer's representative will be responsible to recommend maximum discharge time for superplasticizer and to recommend method and procedure to induce superplasticizer into mixer.

e. Manufacturer's representative will be responsible to recommend quantities of admixtures to be used if variations are required because of temperature/humidity, wind, or other environmental considerations.

f. Concrete with super plasticizer shall be used for all cast-in place walls of structures.

G. Curing Compound: ASTM C-309, Type 1. The compound shall contain no ingredient which will adversely affect the bond of coatings or toppings. Curing compound shall be approved for use in contact with potable water after 30 days.

1. Curing compound for exposed concrete not to receive special finishes, protective coatings and/or concrete toppings shall be "Super Rez-Seal", as manufactured by Euclid Chemical Co., Cleveland, Ohio or equal.

2. Curing compound for exposed concrete to receive special finishes, protective coatings and/or concrete toppings shall be "Kurez-DR", as manufactured by Euclic Chemical Co., Cleveland, Ohio or equal.

H. Mortar for Repair of Concrete: Mortar used for repair of concrete shall be made of the same materials as used for concrete, except that the coarse aggregate shall be omitted and the mortar shall consist of not more than one (1) part cement to two and one-half (2-1/2) parts sand by damp loose volume. The quantity of mixing water shall be no more than necessary for handling and placing.

I. Burlap Mats: Conform to AASHTO Specification M-182.

J. Epoxy Bonding Agent: Sikadur 32 Hi Mod, or equal.

2.02 MIXES

A. General Requirements:

1. Mix Design: Proportioning shall be on the basis of field experience and/or trial mixtures as specified in ACI-318, Section 4.3. Data on consecutive compression tests and standard deviation shall be submitted. Proportioning for small structures may be by the water/cement ratio under special approval by the Engineer. Concrete mix design shall comply with the Standard Building Code requirements.

2. Air Content: Range 3.5 to 6% for Class A and B.

3. Slump: 4 inches plus or minus 1 inch for Class A and B without superplasticizer.
8 inches plus or minus 1 inch for concrete with superplastizer.
6 inches plus or minus 1 inch for tremie concrete.

4. Water cement ratio = 0.45 (Class A Concrete) without superplasticizer.

= 0.55 (Class B Concrete) without superplasticizer.

= 0.37 Concrete with superplasticizer.

5. Minimum Compressive Strength at 28 days:

a. Class A, 4,000 psi: Wastewater structures inclusive of mat foundations, footings, tanks, ditches, pumping station, tremie concrete and other structures in contact with treated waters.

b. Class B, 3,000 psi: Slab on grade, masonry fillcell grout, encasements, thrust blocks, and pipe supports, concrete curbs, fills and sidewalks, etc. not in contact with treated waters.

c. Slab on grade shall include all slabs 10 inches thick or less and requires Class B 3000 psi concrete. Exception: Sludge Loading Station, 10-inch Slab Drawing S-39 shall be Class A 4000 psi.

B. Production of Concrete:

1. General: Concrete shall be ready mixed and shall be batched, mixed and transported in accordance with ASTM C-94, except as otherwise indicated.

2. Air Entraining Admixture: Air entraining admixture shall be charged into the mixture as a solution and shall be measured by means of an approved mechanical dispensing device. The liquid shall be considered a part of the mixing water.

3. Water Reducing and Retarding Admixture: Water reducing and retarding admixture shall be added and measured as recommended by the manufacturer. The addition of the admixture shall be separate from the air entraining admixture. The addition of the admixture shall be completed within one minute after addition of water to the cement has been completed, or prior to the beginning of the last three-quarters of the required mixing, whichever occurs first. Admixtures shall be stored, handled and batched in accordance with the recommendation of ASTM C-94.

C. Delivery Tickets: In addition to the information required by ASTM C-94, delivery tickets shall indicate the cement content and the water/cement ratio.

D. Temperatures: The temperature of the concrete upon delivery from the truck shall not exceed 95 degrees Fahrenheit (°F), otherwise ice shall be used to reduce the temperature of the concrete as recommended by ACI.

E. Modifications To The Mix: No modifications to the mix shall be made in the plant or on the job which will decrease the cement content or increase the water-cement ratio beyond that specified. No modifications of any kind shall be made except by a qualified and responsible representative of the concrete producer.

1. Any addition of water must be approved by the Engineer. Added water shall be incorporated by additional mixing of at least 35 revolutions. All added water shall be metered and the amount of water added shall be shown on each delivery ticket. Addition of water shall follow procedures of ASTM C-94 for slump adjustment.

PART 3 - EXECUTION

3.01 PREPARATION

A. Preparations Before Placing: No concrete shall be placed until the approval of the Engineer has been received. Approval will not be granted until forms are thoroughly clean, and reinforcing and all other items required to be set in concrete have been placed and thoroughly secured. The Engineer shall be notified a minimum of 24 hours before concrete is placed.

B. Conveying:

1. General: Concrete shall be handled from the truck to the place of final deposit as rapidly as practicable by methods which will prevent segregation or loss of ingredients to maintain the quality of the concrete. No concrete shall be placed more than 90 minutes after mixing has begun for that particular batch.

2. Buckets and Hoppers: Buckets and hoppers shall have discharge gates with a clear opening equal to no less than one-third of the maximum interior horizontal area, or five (5) times the maximum aggregate size being used. Side slopes shall be no less than 60 degrees. Controls on gates shall permit opening and closing during the discharge cycle. It is suggested the Contractor provide one (1) standby bucket and hopper for use in case of equipment failure.

3. Runways: Extreme care shall be exercised to avoid displacement of reinforcing during the placing of concrete.

4. Elephant Trunks: Hoppers and elephant trunks shall be used to prevent the free fall of concrete for more than 6 feet.

5. Chutes: Chutes shall be metal or metal lined, and shall have a slope not exceeding one vertical to two horizontal, and not less than one vertical to three horizontal. Chutes more than 20 feet long and chutes not meeting the slope requirements, may be used only if they discharge into a hopper before distribution.

6. Pumping Equipment: Pumping equipment and procedures, if used, shall conform to the recommendations contained in the report of ACI Committee 304 on "Placing Concrete by Pumping Methods", ACI 304.2R. The specified slump shall be measured at the point of discharge. The loss of slump in pumping shall not exceed 1-1/2 inches.

7. Conveying Equipment Construction: Aluminum or aluminum alloy pipe for tremies or pump lines and chutes, except for short lengths at the truck mixer shall not be permitted.

8. Cleaning: Conveying equipment shall be cleaned at the end of each concrete operation.

3.02 APPLICATION

A. Placing:

1. General: Concrete shall be deposited continuously, or in layer of such thickness (not exceeding 2 feet in depth) that no concrete will be deposited on concrete that has hardened sufficiently to cause the formation of seams or planes of weakness.

2. Supported Elements: At least 2 hours shall elapse after depositing concrete in columns or walls before depositing in beams, girders, or slabs supported thereon.

3. Segregation: Concrete shall be deposited as nearly as practicable in its final position to avoid segregation due to rehandling or flowing. Concrete shall not be subjected to procedures which will cause segregation.

4. Concrete Under Water: All concrete, except that indicated on the Drawings as Tremie concrete, shall be placed in the dry.

5. Concrete Fill and Tank Bottom Slab: Concrete fill for the tank bottoms, whereshown on Drawings, shall be placed within the tolerances described in this Section and as per equipment manufacturer's recommendations

B. Seals and Tremie Concrete:

1. General:

a. Wherever practicable, all foundation excavations shall be dewatered and the concrete deposited in the dry. Where conditions are encountered which render it impracticable to dewater the foundation before placing concrete, a concrete foundation seal shall be placed. The foundation shall then be dewatered, and the balance of the concrete placed in the dry.

b. When seal concrete is required to be placed, the satisfactory performance of the seal in providing a watertight excavation for placing structural concrete shall be the responsibility of the Contractor. Seal concrete placed by the Contractor, which subsequently fails to perform properly, shall be repaired as necessary to perform its required function, at the expense of the Contractor.

2. Method of Placing: Concrete deposited under water shall be carefully placed in the space in which it is to remain by means of a tremie, a closed-bottom dump bucket of not less than one cubic yard capacity, or other approved method, and shall not be disturbed after it is deposited. All seal concrete shall be deposited in one (1) continuous pour. No concrete shall be placed in running water. All form work designed to retain concrete under water shall be watertight, and the

design of the form work and excavation sheeting shall be by a Professional Engineer, registered in the State of Florida.

3. Use of Tremie: The tremie shall consist of a tube having a minimum inside diameter of 10 inches, and shall be constructed in sections having tight joints. No aluminum parts which have contact with the concrete will be permitted. The discharge end shall be entirely seated at all times and the tremie tube kept full to the bottom of the hopper. When a batch is dumped into the hopper the tremie shall be slightly raised (but not out of the concrete at the bottom) until the batch discharges to the bottom of the hopper, after which the flow shall be stopped by lowering the tremie. The means of supporting the tremie shall be such as to permit the free movement of the discharge end over the entire top surface of the work, and shall permit it being lowered rapidly when necessary to choke off or retard the flow. The flow shall preferably be continuous and in no case shall be interrupted until the work is completed. Special care shall be exercised to maintain still water at the point of deposit.

4. Use of Bottom-dump Bucket: When the concrete is placed by means of a bottom-dump bucket, the bucket shall be lowered gradually and carefully until it rests upon the concrete already placed. The bucket shall then be raised very slowly during the discharge travel; the intent being to maintain, as nearly as possible, still water at the point of discharge and to avoid agitating the mixture. Aluminum buckets will not be permitted.

5. Time of Beginning Pumping: Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure, and in no case earlier than 72 hours after placement of the concrete.

C. Consolidating Concrete:

1. General: Concrete, with the exception of slabs less than 8 inches thick, shall be consolidated by means of internal vibrators operated by competent workmen. a. Concrete Slabs: Concrete for slabs less than 8 inches shall b consolidate with vibrating screeds: slabs 8-inches to 12-inches thick shall be compacted with internal vibrators and (optionally) with vibrating screeds. Vibrators shall always to placed into concrete vertically and shall not be laid horizontally or laid over.

2. Vibrators: Vibrators shall have a minimum head diameter of at least 2 inches, a minimum centrifugal force of 700 and a minimum frequency of 8,000 vibrations per minute.

3. Vibrators for Confined Areas: In confined areas, the specified vibrators shall be supplemented by others having a minimum head diameter of 1-1/2 inches, a minimum centrifugal force of 300 pounds and a minimum frequency of 9,000 vibrations per minute.

4. Spare Vibrator: One (1) spare vibrator for each three (3) in use shall be kept on the site during all concrete placing operations.

5. Use of Vibrators: Vibrators shall be inserted and withdrawn at points approximately 18 inches apart. The duration of each insertion shall be from 5 to 15 seconds. Concrete shall not be transported in the forms by means of vibrators. D. Protection: Rainwater shall not be allowed to increase the mixing water, nor to damage the surface finish. Concrete shall be protected from construction overloads. Design loads shall not be applied until the specified strength has been attained.

E. Construction Joints: Except as otherwise indicated on the Drawings, horizontal construction joints shall be provided at top of foundation members and slabs on grade and at the soffit of supported slabs and beams. Other horizontal and vertical construction joints shall be located as indicated on the Drawings. Joints will not be permitted except in the locations shown, unless recommended by the Contractor and approved by the Engineer.

F. Bonding: Before depositing new concrete on or against concrete that has set, the surfaces of the set concrete shall be thoroughly cleaned so as to expose the coarse aggregate and be free of laitance, coating, foreign matter and loose particles. Forms shall be retightened. The hardened concrete of joints shall be dampened, but not saturated, and then thoroughly covered with a coat of cement grout of similar proportions to the mortar in the concrete. The grout shall be as thick as possible on vertical surfaces and at least 1/2 inches thick on horizontal surfaces. The fresh concrete shall be placed before the grout has attained its initial set.

G. Embedded Items: In addition to steel reinforcement, pipes, inserts and other metal objects as shown, specified or ordered shall be built into, set in or attached to the concrete. All necessary precautions shall be taken to prevent these objects from being displaced, broken or deformed. Before concrete is placed, care shall be taken to determine that all embedded parts are firmly and securely fastened in place as indicated. They shall be thoroughly clean and free from paint or other coating, rust, scale, oil, or any foreign matter. No wood shall be embedded in concrete. The concrete shall be packed tightly around pipes and other metal work to prevent leakage and to secure proper adhesion. Drains shall be adequately protected from intrusion of concrete.

H. Concrete Finishes: Complete concrete surfaces in accordance with the following schedule:

1. Finish
Designation Area Applied

F-1 Exterior walls below grade not exposed to water. Repair defective concrete, fill depressions deeper than 1/2 inch and fill tie holes.

F-2 Exterior and interior walls of all structures. Repair defective concrete, remove fins, fill depressions and fill tie holes.

F-3 Walls of all structures or buildings exposed to public view and the underside of formed floors or slabs that will not be finish coated or sealed. In addition to Finish F-2, fill depressions and airholes with mortar. Dampen surfaces and then spread a slurry within 72 hours of removing forms consisting of one part cement and one and one-half parts sand by volume on the surface with clean burlap pads or sponge rubber floats. Remove any surplus by scraping and then rubbing with clean burlap.

F-4 Walls of all structures and buildings exposed to public view and the underside of formed floors or slabs that will be finish per the Drawings. In addition to Finish F-2, surfaces shall be sand blasted and holes patched and depressions and airholes filled with a patching compound consisting of sand, portland cement and a liquid, acrylic-polymer bonding additive. Refer to Section 03300 Cast-In-Place Concrete, for concrete surface preparation requirements.

S-1 Slabs and floors not water bearing. Smooth steel trowel finish.

S-2 Slabs and floors which are water bearings. Slab Surfaces on which mechanical equipment moves. Steel trowel finish free from trowel marks and all irregularities.

S-3 Slabs and floors of structures or building exposed to view. Steel trowel finish without local depressions or high points and apply a light hair-broom finish. Do not use stiff bristle brooms or brushes. Leave hair-broom lines parallel to the direction of slab drainage.

S-4 Slabs and floors at slopes greater than 10 percent. Steel trowel finish without local depressions or high points. Apply a stiff bristle broom finish. Leave broom lines perpendicular to the direction of slope drainage.

E-1 Exposed edges of slabs, floors and tops of walls. Finish with a 1/4 inch radius edge if a chamfer is not indicated. E-2 Tops of walls, beams and similar unformed surfaces occurring adjacent to formed surfaces shall be struck smooth after concrete is placed and shall be floated to a texture reasonably consistent with that of formed surfaces.

2. General: As soon as forms can safely be removed, all irregular projections shall be chipped off flush with the concrete surfaces. All voids produced by spacers or any honeycombing shall be pointed up with grout and troweled flush with the concrete surface immediately after removal of forms and water cured to prevent shrinkage. Honeycombing shall be cut out to expose a sound concrete surface prior to pointing. The use of mortar pointing or patching shall be confined to the repair of small defects in relatively green concrete. Where in the opinion of the Engineer substantial repairs are required, the defective concrete shall be cut out to sound concrete and repaired with gunite or the concrete shall be removed and reconstructed as directed.

3. All concrete slabs to be troweled shall receive a floated finish. After floating, all concrete slabs except as otherwise indicated and in areas to receive roofing, insulation, tile or topping

shall be troweled and immediately light broom finished. Stair treads shall receive a light broomed finish.

4. Floated Finish: After concrete has been placed. Consolidated, struck off and leveled, it shall not be worked further until water sheen has disappeared and the surface has hardened sufficiently to permit floating, the planeness of the slab shall be checked with a 10 foot straightedge applied at no less than two (2) angles. All high spots shall be cut down and all low spots shall be filled toproduce a surface having a Class B Tolerance throughout. The slab shall then be refloated to a uniform sandy texture.

5. Light Broomed Finish: After floating, slabs to receive a light broomed finish shall be power troweled and finished struck with a soft broom rag. The trowelingshall produce a smooth surface, relatively free of defects and a Class B Tolerance. Before the surface sets, the soft broom drag shall be passed over the surface to produce a surface uniform in texture and appearance.

6. Troweled Finish: After floating, slabs to receive a troweled finish shall be power troweled and finally hand troweled. The first troweling after power floating shall produce a smooth surface, relatively free of defects. Surfaces shall be hand troweled after the surface has hardened sufficiently. The final troweling shall be done by hand when a ringing sound is produced as the trowel is moved over the surfaces. Hand troweling shall produce a surface which is thoroughly consolidated, free from trowel marks, uniform in texture and appearance and plane to a Class B tolerance.

7. Finishing Tolerance: Surfaces shall be true planes within the following limits: a. Class B: 1/4 inch in 10 feet is determined by a 10 foot straightedge placed anywhere on the slab in any direction.

I. Saw cut Joints: Joints that are to be saw cut shall be cut not sooner than 2 hours after the concrete is poured and not later than 8 hours after the pour.

3.03 PROTECTING

A. Curing:

1. All exposed surfaces, including slabs, walls, beams and columns shall receive a spray coat of curing compound applied in accordance with the manufacturer's recommendations. Exposed steel keyways and other embedded items shall be protected from the curing compound. Concrete surfaces to be exposed to wastewater and are to be coated with an epoxy system, shall be cured by the wet burlap method. Curing compounds shall not be used on surfaces to be coated and exposed to sewage or wastewater.

2. Curing compound shall be uniformly applied to the surfaces to be cured, in a single coat, continuous film by a mechanical sprayer. Application shall be in compliance with the manufacturer's recommendations.

3. Curing compound shall be applied in accordance with manufacturer's instructions. Should the film become damaged from any cause within the repaired curing period, the damaged portions shall be required immediately with additional compound. Upon removal of forms, the newly exposed surfaces shall immediately be coated to provide a curing treatment equal to that provided for the surface.

B. Wet Burlap Curing Method: All concrete for wastewater/water retaining structures to be cured by the wet burlap method. All concrete shall be covered with a double thickness of burlap, cotton mats, or other approved material kept thoroughly saturated with water. The forms shall be kept wet until removed and upon removal, the curing specified herein shall be started immediately. Concrete shall be cured for a period of 7 days for normal Portland cement or 4 days for high early strength cement. Concrete poured in the dry shall not be submerged until it has attained sufficient strength to adequately sustain the stress involved nor shall it be subjected to flowing water across its surface until it has cured 4 days. Curing the gunite shall be started as soon as possible without damaging surface and not later than 2 hours after placing. Begin wet cure as soon as concrete attains an initial set and maintain wet cure 24 hours a day.

C. Sheet Material Curing: Cover entire surface with sheet material. Securely anchor sheeting to prevent wind and air from lifting the sheeting or entrapping air under the sheet. Place and secure sheet as soon as initial concrete set occurs.

3.04 REMOVAL OF FORMS

A. Except as otherwise specifically authorized by the Engineer, forms shall not be removed before the concrete has attained a strength of at least 70 percent of the 28 day compressive strength prescribed by the design, nor before reaching the following number of day-degrees of curing (whichever is the longer):

TABLE 4

Forms for	Degree Davs
Beams and slabs	500
Walls and vertical surfaces	100

B. Shores shall not be removed until the concrete has attained at least 60 percent of the specified strength and also sufficient strength to support safely its own weight and the construction live loads upon it.

3.05 TESTING

A. An independent testing laboratory employed by the Contractor will make such tests required.

B. Standard laboratory compressive test cylinders will be obtained by the laboratory when concrete is discharged at the point placing (i.e., discharge end of pumping equipment), and cylinders will be made and cured in accordance with the requirements of ASTM Designation C-31. A set of five (5) cylinders will be obtained for each 50 cubic yards, or fraction thereof placed each day, nor less than once for each 5,000 sq. ft. or surface area of slabs or walls for each type of concrete. The cylinders will be cured under laboratory conditions and will be tested in two groups of two (2) at 7 and 28 days of age, with one (1) group held until released by the Engineer in accordance with the requirements of ASTM Designation C-39.

C. The laboratory will conduct tests of Class A and Class B concrete as it is discharged from the mixer at the point of placing. Slump tests will be made for each truckload of concrete. Slump tests may be made on any batch, and failure to meet specified slump requirements will be sufficient cause for rejection of the batch. If water is added after initial test then the "load" shall be tested.

D. Air content of the concrete mixture will be tested on every other truck in accordance with ASTM C173 or ASTM C231.

E. Historical strength/break data may be submitted with mix design and may be used in the approval process provided the mix design is otherwise acceptable. If the mix design required modifications, a test batch may still be required.

3.06 FIELD CONTROL

A. The Contractor shall advise the Engineer of his readiness to proceed at least twenty four (24) working hours prior to each concrete placement. The Engineer will inspect the preparations for concreting including the preparation of previously placed concrete, the reinforcing and the alignment and tightness of formwork. No placement shall be made without the prior approval of the Engineer.

1. The Contractor's Superintendent shall submit a certification that indicates reparedness to place concrete and is in accord with contract drawings and specifications. This certification shall be submitted on forms provided by the Engineer.

B. The Engineer may have cores taken from any questionable area in the concrete work such as construction joints and other locations as required for determination of concrete quality. The results of test on such cores shall be the basis for acceptance, rejection or determining the continuation of concrete work.

C. The Contractor shall cooperate in obtaining cores by allowing free access to the Work and permitting the use of ladders, scaffolding and such incidental equipment as may be required. The

Contractor shall repair all core holes. The work of cutting and testing the cores will be at the expense of the Owner.

3.07 FAILURE TO MEET REQUIREMENTS

A. Should the strengths shown by the test specimens made and testing in compliance with the previous provisions fall below the values given in Section 2.02.A.5, the Engineer shall have the right to require changes in proportions outlined to apply on the remainder of the Work. Furthermore, the Engineer shall have the right to require additional curing on those portions of the structure represented by the test specimens which failed. The cost of such additional curing shall be at the Contractor's expense. In the event that such additional curing does not give the strength required, as evidenced by core and/or load tests, the Engineer shall have the right to require strengthening or replacement of those portions of the structure which fail to develop the required strength. The cost of all such core borings and/or load tests and any strengthening or concrete replacement required because strengths of test specimens are below that specified, shall be entirely at the expense of the Contractor. In cases of failure to meet strength requirements the Contractor shall adjust the concrete mix to meet contract requirements.

B. When the tests on control specimens of concrete fall below the required strength, the Engineer will permit check tests for strengths to be made by means of typical cores drilled from the structure in compliance with ASTM C42 and C39. In case of failure ofthe core, the Engineer, in addition to other recourses, may require, at the Contractor's expense, load tests on any one of the slabs, beams, piles, caps, and columns in which such concrete was used. Test need not be made until concrete has aged 60 days.

C. Should the strength of test cylinders fall below 85 percent of the required minimum 28 day strength, the concrete shall be rejected and shall be removed and replaced.

3.08 PATCHING

A. As soon as the forms have been stripped and the concrete surfaces exposed, fins and other projections shall be removed, recesses left by the removal of form ties shall be filled, and surface defect which do not impair structural strength shall be repaired. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to approval of the Engineer.

B. Immediately after removal of forms remove plugs and break off metal ties as required by Section 03100-Concrete Formwork. Holes are then to be promptly filled upon stripping as follows: Moisten the hole with water, followed by a 1/16-inch brush coat of neat cement slurry mixed to the consistency of a heavy paste. Immediately plug the hole with a 1 to 1.5 mixture of cement and concrete sand mixed slightly damp to the touch. Compact the grout into the hole until dense and an excess of paste appears on the surface. Trowel smooth with heavy pressure. Avoid burnishing.

C. When patching exposed surfaces the same source of cement and sand as used in the parent concrete shall be employed. Adjust color if necessary by addition of proper amounts of white cement. Rub lightly with a fine Carborundum stone at an age of one to five days if necessary to bring the surface down to the adjacent concrete. Exercise care to avoid damaging or staining the surrounding concrete. Wash thoroughly to remove all rubbed matter.

3.09 REPAIRS

A. It is the intent of these Specifications to require quality work including adequate forming, proper mixture and placement of concrete and curing so completed concrete surfaces will not require patching.

B. Defective concrete and honeycombed areas as determined by the Engineer shall be repaired as specified.

1. General: Surface defects, including tie holes shall be repaired immediately after form removal. The areas to be patched and an area at least 6 inches wide surrounding it shall be dampened to prevent absorption of water from the patching mortar. The Engineer shall be notified prior to commencing operations.

2. Removal of Defective Concrete: All honeycombed and other defective concrete shall be removed down to sound concrete. Edges shall be cut perpendicular to the surface or slightly under cut. Sand blast surfaces to receive repair.

3. Bonding Grout: Surfaces to be patched shall be thoroughly dampened and shall receive a coat of bonding grout brushed into the surface. Grout shall consist of one part cement to one part fine sand passing a No. 30 sieve. Grout shall be the consistency of thick cream.

4. Placing Patching Mortar: After the bonding grout begins to lose its water sheen, a premixed patching mortar shall be applied. Patching mortar shall be thoroughly consolidated into place and stuck off so as to leave the patch slightly higher than the surrounding surface. It shall be left undisturbed for one hour to permit initial shrinkage and then finally finished.

5. Tie Holes: After being cleaned and thoroughly dampened, the tie holes shall be filled solid with patching mortar.

3.10 MISCELLANEOUS WORK

A. All bolts, anchors, miscellaneous metals or other sleeves and steel work required to be set in the concrete forms for attachment of masonry, structural, and mechanical equipment shall be set or installed under this Section. The Contractor shall be fully responsible for the setting of such materials in the forms and shall correct all such not installed in a proper location or manner at his

own expense. Contractor shall coordinate the activities of other trades for installation of these items.

B. Electric conduits shall be installed in the concrete as required by the Drawings and specified elsewhere in these Specifications. Outlet boxes and fixtures shall be located in reference to the final floor, wall or ceiling finish and shall be as secured that they will not be displaced by concrete placing.

C. Pipes or conduits for embedment, other than those merely passing through shall not be larger in outside diameter than one-third the thickness of the slab, wall, or beam in which they are embedded, unless indicated on the Drawings, nor shall they be spaced closer than three (3) diameters on center, nor so located as to unduly impair the strength of the construction. The Engineer shall approve the location of all conduits and fixtures.

D. Concrete foundations, supports and bases for all equipment and machinery shall be built to the equipment manufacturer's requirements, as approved by the Engineer, with anchor bolts installed.

END OF SECTION

SECTION 06 500 – PLASTIC & COMPOSITES

PART 1 - GENERAL

Architects Source Product Specifications for EPDM Pour-In-Place Safety Surfacing Design Criteria or approved equal:

A. The Safety Surface System shall have been marketed in the United States for at least five (5) years.

B. The installation of the Safety Surfacing specified herein and indicated on the Drawings shall be performed by firm who can furnish supporting evidence of installation experience to performed by firm who can furnish supporting evidence of installation experience to perform this work and who has regularly been engaged in this work on a full time basis for a period of not less than 5 years.

C. The installation of the Safety Surfacing shall be performed by an applicator that can furnish evidence of approval and training by the manufacturer, unless installed by the manufacturer.

D. The installation of the Safety Surface shall be overseen by a factory representative.

E. The following specifications, standards and codes shall hereby form a part of this specification.

1. American Standard for Testing and Materials (ASTM)
2. Consumer Products Safety Commission (CPSC}
3. National Bureau of Standards

F. Material must successfully pass an "ASTM sulfur pill fire testing"

G. Material shall be vandal resistant, firmly secured so that it cannot be pulled away from the playground surface.

H. Installed Safety Surface shall meet or exceed CPSC performance guidelines with respect to the Critical Heights of the proposed in-place play equipment.

I. Material is used in construction of the Safety Surface System shall be tested for conformance with requirements of ASTM F 1292.

J. Manufacturer must possess a certificate of endorsement as an active Licensed General Contractor in the State of Florida.

K. Manufacturer must be capable of material supply and completed installation within a (14) day performance window of each individual project.

L. Manufacturer must supply preventative maintenance program recommendations along with clear and definitive cleaning instructions of the product supplied.

M. Manufacturer must be capable of providing performance bond if required.

Submittals:

A. If a substitute is proposed as an "approved equal" to an item named in this Section, comply with Division 1 Subsection 6.01 and submit sufficient evidence to prove objectivity that the item conforms to this Section and is equal to the named entity.

B. General: Submit the following in accordance with Conditions of Contract.

C. Certified Test Data that Safety Surfacing meets or exceeds the following:

1. Current Consumer Product Safety Commission (CPSC) guidelines issued in "A Handbook for Public Playground Safety~ (Latest Edition) for a minimum fall height of 6 Feet.
2. Current Americans with Disabilities Act Guidelines (ADAG).
3. Current ASTM F- 1292requirements.

D. Certifications

1. State of Florida General Contractor License.

E. Samples

1. Submit Samples of the following for approval by the Engineer.
   A. 12 inch x 12 inch samples of the safety surface in thickness specified.
   B. 4" round sample of actual surfacing material, all colors available for color selection.
   C. 1 foot long pieces of the material to be used for the patterns if patterned work is to be performed.

F. Manufacturer's Review: Submit written statement, signed by safety surfacing installer stating that Drawings and Specifications have been reviewed by qualified representatives of materials manufacturer, and that they are in agreement that materials and system to be used for safety surfacing are proper and adequate for applications shown.

G. Substrate Acceptability: Submit a certified statement issued by manufacturer of Safety Surfacing materials and countersigned by applicator, attesting that areas and surfaced designated to receive safety surfacing have been inspected and found satisfactory for reception of work

covered under this Section: and are not in conflict with ~ Warranty" requirements. Application of materials will be constructed as acceptance of surfaces.

H. Statement of Supervision: Upon completion of Work, submit a written statement signed by manufacturer stating that field supervision of manufacturer's representative was sufficient to insure proper application of materials to assure that Work was installed in accordance with Contract Documents, and that installation is acceptable to manufacturer.

I. Certification: Furnish certificate-accompanying delivery of Safety Surface material indicating compliance with the Contract Documents.

Material Testing:

A. Shock Absorbency: When tested in accordance with ASTM F-1292, Test Method F355, Procedure C (Metal Headform), the surface shall not impart to the Headform upon impact, a peak deceleration exceeding 200 times the acceleration due to Gravity (200 G's). Drop heights used in this test shall be the heights relevant to the proposed play structures used in conjunction with the safety surfacing areas indicated on the Drawings.

B. Weathering: After being subjected to a freeze-thaw cycle in accordance with ASTM C 67 and after being subject 200 Degrees F for seven days in accordance with ASTM D 573, the sample shall be retested in compliance with ASTM F-1292 at 72 Degrees F only. A peak deceleration rereading not exceeding 200 G's shall be maintained.

C. Slip Resistance: Wet dynamic reading shall not be less than 40 when tested in accordance with ASTM E 303, using British Portable Skid Resistance Tester

D. Flammability: Minimum Critical radiant flux of 0.22 Watts/CM2 when tested in accordance with ASTM E 648.

Warranty:
A. Provide a written warranty stating that work executed under this Section will be free form defects of materials and workmanship for a period of two years' form date of Substantial Completion, and that material breakdown and unraveling will be remedied on written notice at no additional cost to the Owner. The Warranty shall be in writing and shall be signed by the Contractor, the Safety Surface materials manufacturer. Warranty shall include removal and replacement of materials as required to repair safety surfacing, at no cost to the Owner.

Site Conditions:
A. Conditions of substrates with respect to structural performance shall be evaluated and approved by the applicator prior to applying the safety surfacing.

B. Safety Surfacing shall not be placed when the ambient temperature is below 40 Degrees Fahrenheit, when there is frost in the base, when rain or frost is forecasted, or any other time when weather conditions are unsuitable for the type of material being placed.

C. At the time of application ambient air temperature shall be 40 Degrees Fahrenheit or greater and remain so for at least 7 days after installation is complete.

D. Adjacent Material and the Safety Surfacing shall be protected during installation, while curing and / or unattended form weather and other damage.

Delivery, Storage, and Handling:

A. All materials for the work of this Section shall be delivered, stored and handled so as to preclude damage of any sort. Materials showing evidence of damage shall not be used and shall be removed from the site.

B. Materials in manufacturer's unopened containers or bundles must be fully identified with brand, type, grade, and born on date of manufacture.

C. Store materials in original tightly sealed containers or unopened packages. Materials shall be stores out of weather, off the ground, in dry area, in compliance with manufacturer's maximum storage temperature range.

D. Materials must be delivered and off-loaded by installation personnel.

Job Conditions:

A. Maintain manufacturer's current installation instructions at the job site at all times for safety surface material to be used on the Project.

B. Maintain material storage area at minimum 60 degrees Fahrenheit, but not above 90 degrees Fahrenheit for 48 hours prior to application.

C. Proceed with work of this section only after substrate construction and penetrating work have been completed.

D. Do not proceed with work during inclement weather. Comply with manufacturer's recommendations for application and curing under specific climatic conditions.

E. Coordinate application of safety surfacing with work of other trades.

Protection:

A. Protect the safety surface from damage, resulting from spillage, dripping, and dropping of mater. Prevent materials from entering and clogging d rai ns. Repair, restore or replace work, which is soiled or damaged in connection with the performance of the work.

PART 2 - PRODUCTS:

General:
A. All materials used in the production of the safety surfacing shall be obtained from the same source.

Materials:
A. Primer: Single component moisture cured polyurethane primer.

B. Binder: An elastic polyurethane pre-polymer with minimal odor, excellent weathering and binding characteristics. The use of Stockmeier PS # 106 binder is a prerequisite.

1. 100% MDl based binder.

C. Rubber: RTH - EPOM 1 -3 mm granules.

D. Thinner: A thinner, approved by the safety surface manufacturer shall be used for cleaning tools.

E. Safety Surfacing System:
1. Shall have been tested for shock attenuation under ASTM F-1292 and HIC.
2. Shall have been tested for non-slip characteristics under ASTME-303.
3. Shall have been tested for ease of ignition under BS·5696 and ASTM 0 -2859.
4. Shall have been tested for fire resistance under UL94.
5. Shall contain no latex.

F. Authenticity of raw materials to be verified by staff upon arrival to job site area.

Mixing and Preparation:
A. Mixture of binder and Rubber will be determined by the system, which is specified. Verify with manufacturer for specific detailing.

B. Colors shall be selected by the Engineer from the manufacturer's full line.

General:
A. Safety Surfacing shall be installed in the presence of a factory trained service representative to insure the highest quality installation.

B. Installation of Safety Surfacing shall be over bituminous concrete sub-vase as per manufacturer's instructions and as detailed. The safety surfacing in itself shall not create new

hazards; hence all installations shall be done as carefully as possible in a neat and workmanlike manner.

C. Layout of areas of safety surfacing shall be reviewed by the manufacturer's representative to insure that the proper thickness of safety surface is installed. A minimum of ½" EPDM wear course is mandatory.

D. For the base, follow all manufacturer guidelines and instructions.

Inspection:

A. Examine areas and conditions where safety surfacing is to be installed and curing of the safety surfaces.

PART 3 – EXECUTION

A. Safety Surface shall be installed to thicknesses indicated on the Drawings. Minimum thicknesses indicated on the Drawings are based on the performance standards of Play Space Services *j* Rubber Designs.

1. The use of minimum base executed within Play Space Services *j* Rubber Designs playground safety surfacing system is solely for the purpose of setting a performance standard. It does not indicate a proprietary item, nor does it preclude products of other manufactures so long as the raw material requirements, tenured experience specifications, and all other applicable provisions of the contract documents are met.

2. Thicknesses of safety surfacing must meet all safety requirements and codes for fall heights of specified play equipment.

B. Primer shall be applied to the substrate at a rate of 300 square feet per gallon using a short nap roller.

1. Base mat and Top Coat.
2. Using trowel. SBR/Binder mix shall be spread in a consistent density to specified thickness. Compact and allow to dry for a minimum of24 hours (necessary time varies based on temperature and humidity).

Cleaning and Protection:

A. Clean, repair or replace work of trades soiled or damaged by safety surface installation work.

B. The General Contractor shall be responsible for protection of finished surfaces until completion of construction and sign off.

END SECTION

SECTION 32 92 00 – SODDING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. Provide sodded lawns as shown and specified. The work includes:

1. Soil preparation.
2. Sodding common areas, pavement edges, and other indicated areas.
3. Maintenance.

1.2 SUBMITTALS

A. Submit sod growers certification of grass species. Identify source location.

1.3 QUALITY ASSURANCE

A. Sod: Comply with American Sod Producers Association (ASPA) classes of sod materials.

B. Provide and pay for materials testing. Testing agency shall be acceptable to the Landscape Architect. Provide the following data:

1. Topsoil:
    a. Ph factor.
    b. Mechanical analysis.
    c. Percentage of organic content.
    d. Recommendations on type and quantity of additives required to establish satisfactory Ph factor and supply of nutrients to bring nutrients to satisfactory level for planting.

1.4 DELIVERY, STORAGE AND HANDLING

A. Cut, deliver and install sod within a 24-hour period.

1. Do not harvest or transport sod when moisture content may adversely affect sod survival.
2. Protect sod from sun, wind, and dehydration prior to installation.
3. Do not tear, stretch, or drop sod during handling and installation.

1.5 PROJECT CONDITIONS

A. Work notification: Notify Landscape Architect at least 7 working days prior to start of sodding operations.

B. Protect existing utilities, paving, and other facilities from damage caused by sodding operations.

C. Perform sodding work only after irrigation and other work affecting ground surface has been completed. The irrigation system will be installed, tested, and functional prior to sodding and sprigging. Locate, protect, and maintain the irrigation system during sodding and sprigging operations. Repair irrigation system components damaged during sodding operations at the Contractor's expense.

D. Provide hose and lawn watering equipment as required.

1.6 WARRANTY
A. Provide a uniform stand of grass by watering, mowing and maintaining lawn areas until final acceptance. Re-sod areas which fail to provide a uniform stand of grass with specified materials, until all affected areas are accepted by the Landscape Architect.

PART 2 - PRODUCTS

2.1 MATERIALS

A. Sod: Argentine Bahia

B. Provide healthy, well-rooted, material, free of diseases, nematodes and soil borne insects. Provide sod uniform in color, leaf texture, density, and free of weeds, undesirable grasses, stones, roots, thatch, and extraneous material; viable and capable of growth and development when planted. 1. Furnish sod machine stripped and of Supplier's standard width, length, and thickness: Uniformly 1- 1/2" to 2" thick with clean cut edges. Mow sod before stripping.

C. Water: Free of substance harmful to sod growth. Hoses or other methods of transportation furnished by Contractor.

PART 3 - EXECUTION

3.1 INSPECTION

A. Examine finish surfaces, grades, topsoil quality and depth. Do not start sodding work until unsatisfactory conditions are corrected.

3.2 PREPARATION

A. Limit preparation to areas that will be immediately sodded.

B. Loosen topsoil of lawn areas to minimum depth of 2". Remove stones over 1" in any dimension and sticks, roots, rubbish, and extraneous matter.

C. Grade lawn areas to smooth, free draining and even surface with a loose, uniformly fine texture. Roll and rake; remove ridges and fill depressions as required to drain. Grade immediately before sodding. Verify grading follows engineering plans. Contractor will be responsible for regarding if sod are not placed in a timely manner and wash out or other erosion causes grades to deviate from engineering plans.

D. Dampen dry soil prior to sodding.

E. Restore prepared areas to specified condition if eroded, settled, or otherwise disturbed after fine grading and prior to sodding.

3.3 INSTALLATION

A. Sodding:

1. Lay sod to form a solid mass with tightly-fitted joints. Butt ends and sides of sod strips. Do not overlay edges. Stagger strips to offset joints in adjacent courses. Remove excess sod to avoid smothering of adjacent grass. Provide sod pad top flush with adjacent curbs, sidewalks, and drains.

2. Do not lay dormant sod or install sod on saturated soil.
3. Water sod thoroughly with a fine spray immediately after laying.
4. Roll a minimum of four (4) times with a medium weight roller to ensure contact with sub grade.

B. Sod indicated areas within contract limits and areas adjoining contract limits disturbed as a result of construction operations.

3.4 MAINTENANCE

A. Maintain sodded lawn areas, including watering, spot weeding, mowing, application of herbicides, fungicides, insecticides and resodding until a full, uniform stand of grass free of weed, undesirable grass species, disease, and insects is achieved and accepted by the Landscape Architect.

1. Water sod thoroughly every day, as required to establish proper rooting. 2. Repair, rework, and resod all areas that have washed out or are eroded. Replace undesirable or dead areas with new sod.

3. Mow lawn areas as soon as lawn top growth reaches a 3" height. Cut back to 2" height. Not more than 40% of grass leaf shall be removed at any single mowing.

3.5 ACCEPTANCE

A. Inspection to determine acceptance of sodded lawns will be made by Landscape Architect, upon Contractor's request. Provide notification at least 7 working days before required inspection date.

1. Sodded areas will be acceptable provided all requirements, including maintenance, have been complied with, and a healthy, even-colored viable lawn is established, free of weeds, undesirable grass species, disease and insects.

B. Upon acceptance, the Owner will assume responsibility for lawn maintenance.

C. If not accepted at the time of the inspection, the Contractor will be required to prepare a maintenance schedule for all grassed areas for the City. The City may require this maintenance schedule if construction is delayed or for any reason the City deems necessary to ensure that the grass is well maintained.

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, debris and equipment. Repair damage resulting from sodding operations.

END OF SECTION 32 92 00

END OF SECTION

SECTION 32 93 00 – LANDSCAPING

PART 1 – GENERAL

1.1 DESCRIPTION OF WORK

A. This Section includes the following:

1. Soil Preparation
2. Trees, plants, and ground covers.
3. Planting mixes.
4. Mulch and planting accessories.
5. Maintenance.

1.2 DEFINITIONS

A. Balled and Burlapped Stock: Exterior plants dug with firm, natural balls of earth in which they are grown, with ball size not less than sizes indicated; wrapped, tied, rigidly supported, and drum-laced as recommended by ANSI Z60.1.

B. Container-Grown Stock: Healthy, vigorous, well-rooted exterior plants grown in a container with well-established root system reaching sides of container and maintaining a firm ball when removed from container. Container shall be rigid enough to hold ball shape and protect root mass during shipping and be sized according to ANSI Z60.1 for kind, type, and size of exterior plant required.

C. Finish Grade: Elevation of finished surface of planting soil.

D. Planting Soil: Native soil.

E. Subgrade: Surface or elevation of subsoil remaining after completing excavation, or top surface of a fill or backfill, before placing planting soil.

1.3 SUBMITTALS

A. Submit the following material samples:

1. Mulch
2. Planting accessories.

B. Submit certifications for the following materials:

1. Topsoil source and PH value.
2. Fertilizer

C. Material Test Reports: For existing surface soil and imported topsoil.

D. Record Drawings: Contractor responsible for providing the Owner with as-built landscape plan drawings. Legibly mark drawings to record actual construction. Indicate actual planting locations and identify any field changes to size or quantity of material.

1.4 QUALITY ASSURANCE

A. Installer Qualifications: A qualified landscape installer whose work has resulted in successful establishment of exterior plants.

1. Installer's Field Supervision: Require Installer to maintain an experienced full-time supervisor on project site when landscape installation is in progress.

B. Soil-Testing Laboratory Qualifications: An independent laboratory, recognized by the State Department of Agriculture, with the experience and capability to conduct the testing indicated and that specializes in types of tests to be performed.

C. Provide quality, size, genus, species, and variety of plants indicated, complying with applicable requirements in ANSI Z60.1, "American Standard for Nursery Stock."

D. Plant names indicated comply with “Standardized Plant Names” as adopted by the latest edition of the American Joint Committee of Horticultural Nomenclature. Names of varieties not listed conform generally with names accepted by the nursery trade. Provide stock true to botanical name and legibly tagged.

E. Plant material shall be graded Florida No. 1 or better as outlined under Grades and Standards for Nursery Plans, State Plant Board of Florida.

F. All plants shall be nursery grown under climatic conditions similar to those in the locality of the project for a minimum of two years.

G. Tree and Shrub Measurements: Measure according to ANSI Z60.1 with branches and trunks or canes in their normal position. Do not prune to obtain required sizes. Take caliper measurements 4 ½ ft. above grade for all trees. Measure main body of tree or shrub for height and spread; do not measure branches or roots tip-to-tip. Stock furnished shall be at least the minimum size indicated. Larger stock is acceptable, at no additional cost, and providing that the large plans will not be cut back to size indicated.

PART 2 – PRODUCTS

2.1 PLANT MATERIAL

A. General: Furnish nursery-grown trees, shrubs and ground cover complying with Florida “Grades and Standards for Nursery Plants”, with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock free of disease, insects, eggs, larvae, and defects such as knots, sunscald, injuries, abrasions, and disfigurement.

B. Grade: Provide trees, shrubs and ground covers of sizes and grades complying with Florida “Grades and Standards for Nursery Plants” for type of trees, shrubs and ground cover required. Trees, shrubs and ground cover of a larger size may be used if acceptable to Landscape Architect, with a proportionate increase in size of roots or balls.

C. Dig balled and burlapped plants with firm, natural balls of earth of sufficient diameter and depth to encompass the fibrous and feeding root system necessary for full recovery of the plant. Provide ball sizes complying with the latest edition of the “American Standards for Nursery Stock.” Cracked or mushroomed balls are not acceptable. Synthetic burlap is not acceptable.

D. Container-grown stock: Grown in a container for sufficient length of time for the root system to have developed to hold its soil together, firm and whole.

1. No plants shall be loose in the container.
2. Container stock shall not be pot bound

E. Provide tree species that at heights (when mature) over 25’-0” with a single main trunk. Trees that have the main trunk forming a “Y” shape are not acceptable

F. Plants planted in rows shall be matched in form.

G. The height of the trees, measured from the crown of the roots to the top of the top branch, shall not be less than the minimum size designated in the plant list.

H. No pruning wounds shall be present with a diameter of more than 1” and such wounds must show vigorous bark an all edges.

I. Shrubs and ground covers shall meet the requirements for spread and height indicated in the plant list.

1. The measurements for height shall be taken from the ground level to the average height of the top of the plant and not the longest branch.
2. Single stemmed or thin plants will not be accepted.
3. Side branches shall be generous, well twigged, and the plant as a whole well bushed to the ground.
4. Plants shall be in a moist, vigorous condition, free from dead wood, bruises or other root or branch injuries.

2.2 FERTILIZER

A. Commercial Fertilizer: Commercial-grade complete fertilizer of neutral character, consisting of fast and slow-release nitrogen, 50 percent derived from natural organic sources of urea formaldehyde, phosphorous, and potassium in the following composition:

1. Composition: 12 percent nitrogen, 10 percent phosphorous, and 12 percent pot ash, by weight. ¼ of nitrogen in the form of nitrates, ¼ in the form of ammonia salt and ½ in the form of organic nitrogen.

2.3 MULCHES

A. Organic Mulch: Free from deleterious materials and suitable as a top dressing of trees and shrubs, consisting of one of the following:

1. Type: Premium grade ‘Mini Nugget’ Pine Bark.

2.4 STAKES AND GUYS

A. Stakes for Staking: Rough-sawn, sound, new hardwood, redwood, or pressure-preservative-treated softwood, free of knots, holes, cross grain, and other defects. See construction drawings for sizes.

B. Stakes for Guying: Hardwood. See construction drawings for sizes.

C. Guy/ Staking Wire: No. 10 or 12 gauge galvanized wire.

D. Turnbuckles: Galvanized steel of size and gauge required to provide tensile strength equal to that of the wire. Turnbuckle openings shall be at least 3".

E. Staking and Guying Hose: Two-ply, reinforced garden hose not less than 1/2" inside diameter.

F. Flags: Standard surveyor's plastic flagging tape, white, 6 inches (150 mm) long.

PART 3 – EXECUTION

3.1 EXAMINATION

A. Examine areas to receive landscaping for compliance with requirements and conditions affecting installation and performance. Proceed with installation only after unsatisfactory conditions have been corrected.

3.2 PREPARATION

A. Protect structures, utilities, sidewalks, pavements, and other facilities, and lawns and existing exterior plants from damage caused by planting operations.

B. Provide erosion-control measures to prevent erosion or displacement of soils and discharge of soil bearing water runoff or airborne dust to adjacent properties and walkways.

C. Planting shall be performed only by experienced workmen familiar with planting procedures under the supervision of a qualified supervisor.

D. Locate plants as indicted or as approved in the filed by Landscape Architect after staking by the Contractor. If obstructions are encountered that are not shown on the drawings, do not proceed with planting operations until alternate plant locations have been selected. Make minor adjustments as required.

3.3 INSTALLATION

A. Planting Pits: Excavate circular plant pits with vertical sides, except for plants specifically indicated to be planted in beds. Depth of pit shall accommodate the root system. Excavate circular pits with sides sloped inward. Trim base leaving center area raised slightly to support root ball and assist in drainage. Do not further disturb base. Scarify sides of plant pit smeared or smoothed during excavation. Scarify the bottom of the pit to a depth of 4".

1. Excavate approximately three times as wide as ball diameter for balled and burlapped, container-grown or fabric bag-grown stock.
2. Excavate at least 12 inches wider than root spread and deep enough to accommodate vertical roots for bare-root stock.

B. Backfill all planting pits with excavated material only.

C. Obstructions: Notify Landscape Architect if unexpected rock or obstructions detrimental to trees or shrubs are encountered in excavations.

1. Hardpan Layer: Drill 6-inch diameter holes into free-draining strata or to a depth of 10 feet whichever is less, and backfill with free-draining material if hardpan layer is detected.

D. Drainage: Notify Architect if subsoil conditions evidence unexpected water seepage or retention in tree or shrub pits.

E. Set plant material in the planting pit to proper grade and alignment. Set plants upright, plumb, and faced to give the best appearance or relationship to each other or adjacent structure. Set plant material 2" above the finish grade. No filling will be permitted around trunks or stems. Backfill the pit with planting mixture. Do not use frozen or muddy mixtures for backfilling.

1. Space ground cover plants in accordance with indicated dimensions. Adjust spacing as necessary to evenly fill planting bed with indicated quantity of plants. Plant to within 12" of the trunks of trees and shrubs within planting bed and to within 6" of edge of bed. 2. Do not use ball and burlap planting stock if root ball is cracked or broken before or during planting operation.
3. Place planting backfill around root ball in layers, tamping to settle mix and eliminate voids and air pockets. After balled and burlapped plants are set, muddle planting backfill around bases of balls and fill all voids.
4. When pit is approximately one-half backfilled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed. Water again after placing and tamping final layer of backfill soil.

F. Mulching: Apply 3-inch average thickness of organic mulch extending 12 inches beyond edge of planting pit or trench. Mulch shrub and groundcover areas immediately after planting. Do not place mulch within 3 inches of trunks or stems. Thoroughly water mulched areas. After watering, rake mulch to provide a uniform finished surface.

3.4 GUYING AND STAKING

A. Stake/guy all trees immediately after sodding/ sprigging operations and prior to acceptance. When high winds or other conditions that may affect tree survival or appearance occur, the Landscape Architect may require immediate staking/guying.

B. Stake trees under 3" caliper.

C. Guy trees over 3" caliper.

D. All work shall be acceptable to the Landscape Architect.

3.5 MAINTENANCE

A. During exterior planting, keep adjacent paving and construction clean and work area in an orderly condition.

B. Protect exterior plants from damage due to landscape operations, operations by other contractors and trades, and others. Maintain protection during installation and maintenance periods. Treat, repair, or replace damaged exterior planting.

C. Maintain plantings until completion and acceptance of the entire project.

D. Maintenance shall include pruning, cultivating, weeding, watering, mowing sod, and application of appropriate insecticides and fungicides necessary to maintain plants free of insects and disease.

1. Re-set settled plants to proper grade and position. Restore planting saucer and adjacent material and remove dead material.
2. Tighten and repair guy wires and stakes as required.
3. Correct defective work as soon as possible after deficiencies become apparent and weather and season permit

3.6 CLEANING

A. Perform cleaning during installation of the work and upon completion of the work. Remove from site all excess materials, soil, debris, and equipment, and legally dispose of them off Owner's property. Repir damage resulting from planting operations.

3.7 ACCEPTANCE

A. Inspection to determine acceptance of planted areas will be made by the Landscape Architect, upon Contractor's request. Provide notification at least 10 working days before requested inspection date.

1. Planted areas will be accepted provided all requirements, including maintenance, have been compiled with and plant materials are alive in a healthy and vigorous condition.

B. Upon acceptance, the Owner will assume responsibility for plant maintenance.

END OF SECTION 32 93 00