PC Replacement – Okeechobee FS Area (PC13N-C41A)

Project ID 100378

Corrected Final RTA Technical Specifications 07/30/2020

Prepared by:
South Florida Water Management District
Operations Engineering & Construction Division
Engineering and Construction Bureau

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ENGINEERING DESIGN STANDARDS FOR WATER RESOURCE FACILITIES

RFB 6000001099

PC-13N on C-41A CULVERT REPLACEMENT

HIGHLANDS COUNTY, FLORIDA

PROJECT ID#: 100378

TECHNICAL SPECIFICATIONS

TABLE OF CONTENTS

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END OF DIRECTORY

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SECTION 01010 SUMMARY OF WORK

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION summarizes the WORK of the Project as covered in detail in the complete Contract Documents. This is a general summary and is not intended to be complete and all-inclusive of the required WORK items.

B. Related Work Specified Elsewhere:

1. SECTION 01310 – Cost Loaded Construction Schedule

1.02 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. CONTRACTOR shall provide Daily Reports, as required by SECTION 01300, 1.04.

1.03 PROJECT DESCRIPTION:

A. Description of Project: The Site is located at the intersection of SR-70 (County Road 721) and the C-41A Canal in Highlands County (27.233831, -81.082453). The existing structure is a 3-barrel Project Culvert, with 72-inch pipes and 96-inch risers and is to be replaced in-kind matching the diameter, length, and invert of all existing components. The replacement is to be done in dry conditions and it is anticipated that a temporary sheetpile wall downstream and an earthen berm upstream will be required to dewater the Site. The existing culvert crossing serves as the entrance to adjacent private property to the north and uninterrupted access to this property must be maintained by providing a bypass road, of the same vehicular capacity as the existing culvert crossing, across the upstream earthen berm. The CONTRACTOR must obtain all required approvals, including but not limited to FDOT approvals / permits, for the temporary new access configuration and the approved Maintenance of Traffic Plan. The CONTRACTOR shall provide the capability of a minimum bypass flow of 80 cfs at all times during construction. Bypass piping shall be installed so as not to interfere with use of access roads and/or temporary access roads. Adjacent landowner does have cattle on pastures North and East of the project site, the contractor shall be aware of this condition and keep all gates closed at all times.

1.04 RELATED CONTRACT ACTIVITIES:

A. The CONTRACTOR shall provide adequate bank protection and/or stabilization to protect the general public as well as the Site. The CONTRACTOR shall revegetate embankments after grading. Revegetation shall not be greater than 24 hours behind the grading. The CONTRACTOR shall submit an embankment protection plan for DISTRICT approval.

B. Maximum and minimum surface water elevations are shown below. Note that water elevations are approximate and provided for reference only. Source of data is the District's DBHYDRO database for the period of record available at the time of research and based on the daily averages. The DISTRICT operates the existing canal to maintain, in as much as practical, the following canal elevations:

Location	Operating Elevation (feet NAVD)		
	Minimum	Normal	Maximum
Canal C41A Headwater	20.5	23.1	25.3
Canal C41A Tailwater	20.5	23.1	25.3

C. All approvals for the temporary driveway, including but not limited to an FDOT Temporary Driveway Permit and an FDOT approved Maintenance of Traffic (MOT) Plan, are to be obtained by the CONTRACTOR prior to mobilization.

D. Coordinating construction activities with the adjacent landowner during construction will be required. CONTRACTOR to coordinate activities through the District Project Manager.

1.05 WORK PERFORMED BY OTHERS:

A. N/A

1.06 CONTRACTOR'S USE OF PREMISES:

A. See General Terms & Conditions Article 6.11.

B. During construction activities, the CONTRACTOR shall be responsible for maintaining all access roads in good condition, including grading and drainage. See Section 00700 - General Terms & Conditions.

C. Site Construction requiring by-pass shall be accomplished during the dry-season (December 1 – April 30).

1.07 DISTRICT'S USE OF PREMISES:

A. Partial DISTRICT Occupancy: The DISTRICT reserves the right to occupy and to place and install equipment in areas of the Project, prior to Substantial Completion provided that such occupancy does not interfere with completion of the WORK. Such placing of equipment and partial occupancy shall not constitute acceptance of the WORK.

1.08 WORK SEQUENCE, COORDINATION ACTIVITIES AND SCHEDULED DATES:

A. General: The CONTRACTOR shall coordinate its WORK with other adjacent contractors, landowners and DISTRICT activities, with specific attention to access and staging areas.

1. Lykes Bros, Inc.

B. Suggested Construction Sequence: A suggested sequence of construction has been prepared by the Design Engineer and is presented below**.** The CONTRACTOR may suggest modifications to the sequence provided the access and operation requirements are satisfied and compliance with the overall contract period is achieved.

1. NTP
2. Obtain all required approvals for the temporary driveway
3. Mobilize
4. Construct earthen berm and set-up temporary driveway
5. Drive sheetpile
6. Install and begin continuous dewatering operation
7. Remove existing structure
8. Drive piles
9. Install new structure
10. Backfill
11. Remove and discontinue dewatering operation
12. Install riprap, sod, guardrail, walkway, and all appurtenances
13. Remove earthen berm, bypass pumping, and temporary driveway
14. Demobilize

C. Bypass Flows: The CONTRACTOR shall provide bypass flow in accordance with the requirements set forth in SECTION 02402.

1.09 COPIES OF DOCUMENTS:

A. See Section 00700 - General Terms & Conditions Article 2.02.

1.10 LIST OF DRAWINGS:

A. Drawings:

1. RFB 6000001099, PC Replacement – Okeechobee Field Station Area (PC13N-C41A), Sheets 1-16, inclusive

B. Reference Materials:

1. The following reference materials are included as part of this solicitation. These materials are for reference only, are provided as-is, are not contractual documents, and do not replace the CONTRACTOR's due diligence in bid preparation.

   a. GFA International Geotechnical Exploration Report titled Culvert Replacement Construction Project Phase II, dated April 1, 2019.

   b. Biscayne Engineering Topographic Survey OKEE titled C-41A Canal, PC13N Site, dated January 25, 2019.

   c. U. S. Army Corps of Engineers (USACE) A-Built drawings OKEE for the C41A canal, dated July 15, 1960.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable**)**

END OF SECTION

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SECTION 01015 DEFINITIONS AND STANDARDS

PART 1 - GENERAL

1.01 SCOPE:

A. Definitions:

1. A substantial amount of the Technical Specification (specification) language constitutes definitions for terms found in other areas of the Contract Documents including the Drawings, which must be recognized as diagrammatic in nature and not completely descriptive of all requirements necessary.

2. Certain terms used in the Contract Documents are defined in the General Terms & Conditions. Definitions and explanations are not necessarily either complete or exclusive but are general for the WORK.

3. The term “DISTRICT”, as defined in the General Terms & Conditions and used in these specifications, is further defined as the District or District’s authorized representative, which may include, but is not limited to, the Design Engineer, Project Manager or Construction Manager.

B. General Requirements: General requirements are the provisions or requirements of Division 1 SECTIONs which apply to the entire WORK of the Contract.

1.02 FORMAT AND SPECIFICATION EXPLANATIONS:

A. Format Explanation: The format of principal portions of these specifications can be described as follows, although other portions may not fully comply and no particular significance will be attached to such compliance or noncompliance.

1. SECTIONs and DIVISIONs: For convenience, the basic unit of the specification text is a "SECTION", each unit of which is named and numbered. These are organized into related families of sections, and various families of sections are organized into "DIVISIONs", which are recognized as the present industry consensus on uniform organization and sequencing of specifications. The SECTION title is not intended to limit meaning or content of SECTION, nor to be fully descriptive of requirements specified therein, nor to be an integral part of the text.

2. SECTION Numbering: Used for identification and to facilitate cross-references in theContract Documents. SECTIONs are placed in numeric sequence; however, the numbering is not sequential, and listing of SECTIONs in Table of Contents at the beginning of the Technical Specifications must be consulted to determine numbers and names of specification SECTIONs in these Contract Documents.

3. Page Numbering: Numbered independently for each SECTION. The SECTION number is shown with the page number at bottom of each page to facilitate location of the text.

4. Parts: Each SECTION of these specifications generally has been subdivided into three (3) basic parts for uniformity and convenience (Part 1 "General", Part 2 "Products", and Part 3 "Execution"). These parts do not limit the meaning of the text within. Some SECTIONs may not contain all three parts when not applicable, or may contain more than three parts to add clarity to organization of the SECTION.

5. Imperative Language: Used generally in specifications. Except as otherwise indicated, requirements expressed imperatively are to be performed by the CONTRACTOR. For clarity of reading, at certain locations contrasting subjective language is used to describe responsibilities which must be fulfilled by the CONTRACTOR or, when so noted, by others.

6. Specialists Assignments: In certain instances, specification text requires that specific work be assigned to specialists or expert entities who must be engaged for performance of those units of work. These must be recognized as special requirements over which the CONTRACTOR has no choice or option. These assignments must not be confused with, and are not intended to interfere with, normal application of regulations, union jurisdictions and similar conventions. Nevertheless final responsibility for fulfillment of the entire set of requirements remains with the CONTRACTOR.

7. Trades: Except as otherwise specified or indicated, the use of titles such as "carpentry" in specification text, implies neither that the work must be performed by an accredited or unionized tradesperson of corresponding generic name (such as "carpenter"), nor that the specified requirements apply exclusively to work by tradespersons of that corresponding generic name.

B. Specification Content: Because of methods by which this Project specification has been produced, certain general characteristics of contents and conventions in use of language are explained as follows:

1. Specifying Methods: The techniques or methods of specifying requirements varies throughout the text, and may include "prescriptive", "compliance with standards", "performance", "proprietary", or a combination of these. The method used for specifying one unit of work has no bearing on requirements for another unit of work.

2. Overlapping and Conflicting Requirements: Where compliance with two (2) or more industry standards or sets of requirements is specified, and overlapping of those different standards or requirements establishes different or conflicting minimums or levels of quality, notify the DISTRICT for a decision, as specified in the General Terms & Conditions.

3. Abbreviations: Throughout the Contract Documents are abbreviations implying words and meanings which will be appropriately interpreted. Specific abbreviations have been established, principally for lengthy technical terminology, and in conjunction with coordination of specification requirements, with notations on the Drawings and in schedules. These are normally defined at first instance of use. Organizational and association names and titles of general standards are also abbreviated.

1.03 DRAWING SYMBOLS:

A. Except as otherwise indicated, graphic symbols used on the Drawings are those symbols generally recognized in the construction industry for the purposes indicated. Refer instances of uncertainty to the DISTRICT for clarification.

1.04 INDUSTRY STANDARDS - APPLICABILITY:

A. Applicable standards of the construction industry have the same force and effect, and are made a part of the Contract Documents by reference, as if copied directly into the Contract Documents, or as if published copies were bound herewith. Referenced standards referenced directly in the Contract Documents or by governing regulations have precedence over non-referenced standards which are recognized in industry for applicability to work.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

SECTION 01020 MEASUREMENT AND PAYMENT

PART 1 - GENERAL

1.01 SCOPE:

A. LUMP SUM CONTRACT: Unless indicated on the Contract Documents, all work indicated on the Contract Drawings and specified in the Bid Documents and Contract shall be included in the Contract Sum indicated on the Bid Form. The following is a description of the WORK listed in the Bid Form and is not intended to be complete and all-inclusive of the required work items. The WORK shall include all miscellaneous and ancillary items necessary to construct a complete and functional Project.

1. Bid Item A. PC Replacement - Okeechobee Field Station Area (PC13N-C41A), excluding Pumped Bypass (Lump Sum, Total Project):

2. Bid Item B. Pumped Bypass:

B.1. Subsequent fuel deliveries to site for pump operation, applicable only if Pumped Bypass is used (Unit Cost per Gallon):

B.2. Pumped bypass operation outside regular working hours, applicable only if Pumped Bypass is used (Unit Cost per Occurrence):

1.02 BASIS FOR PAYMENTS:

A. The above descriptions generally outline the scope of work required for those elements of the WORK to be paid for under each lump sum item listed in the Bid Form. Those lump sum amounts shall be further distributed in accordance with subvalues identified in the approved Cost Loaded Schedule specified in SECTION 01310 and the GENERAL TERMS & CONDITIONS.

1.03 PAYMENTS:

A. Payments shall be in accordance with the provisions of the GENERAL TERMS & CONDITIONS, Article 14.

END OF SECTION

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SECTION 01045 CUTTING AND PATCHING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: "Cutting and patching" includes cutting into existing construction to provide for the installation or performance of other work and all subsequent fitting and patching required to restore surfaces to their original condition.

1. Cutting and patching is performed for coordination of the WORK, to uncover work for access or inspection, to obtain samples for testing, to permit alterations to be performed or for other similar purposes.

2. Cutting and patching performed during the manufacture of products, or during the initial fabrication, erection or installation processes is not considered to be "cutting and patching" under this SECTION. Drilling of holes to install fasteners and similar operations are also not considered to be "cutting and patching".

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

1.02 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Procedural Proposal for Cutting and Patching: Where prior approval of cutting and patching is required, submit proposed procedures for this WORK well in advance of the time the WORK will be performed and request approval to proceed. Include the following information, as applicable, in the submittal:

1. Describe nature of the cutting and patching and how it is to be performed, indicating why cutting and patching cannot be avoided.

2. Describe the anticipated results of the cutting and patching in terms of changes to existing work, including structural, operational and visual changes as well as other significant elements.

3. List products to be used and firms that will perform the cutting and patching.

4. Give dates when the cutting and patching is expected to be performed.

5. List utilities that will be disturbed or otherwise be affected by the cutting and patching, including those that will be relocated and those that will be out-of-service temporarily.

a. Indicate how long utility service will be disrupted.

6. Where cutting and patching of structural work involves the addition of reinforcement, submit details and calculations, prepared by a Professional Engineer licensed in the State of Florida, to show how that reinforcement is integrated with the original structure to satisfy all applicable requirements.

C. Approval by the DISTRICT to proceed with cutting and patching work does not waive the DISTRICT's right to later require complete removal and replacement of work found to be cut and patched in an unsatisfactory manner.

1.03 QUALITY ASSURANCE:

A. Requirements for Structural Work: Do not cut and patch structural work in a manner that would result in a reduction of the load-carrying capacity or load-deflection ratio.

B. Operational and Safety Limitations: Do not cut and patch operational elements or safety related components in a manner that would result in a reduction of their capacity to perform in the manner intended, including energy performance, or that would result in increased maintenance, or decreased operational life or decreased safety.

C. Visual Requirements: Do not cut and patch work exposed on the building's exterior or in its occupied spaces, in a manner that would, in the DISTRICT's opinion, result in lessening the building's aesthetic qualities.

1. Do not cut and patch work in a manner that would result in substantial visual evidence of cut and patch work.

2. Remove and replace work judged by the DISTRICT to be cut and patched in a visually unsatisfactory manner.

3. Retain the original installer or fabricator if possible, or another recognized experienced and specialized firm for cutting and patching.

PART 2 - PRODUCTS

2.01 MATERIALS:

A. General: Except as otherwise indicated, or as directed by the DISTRICT, use materials for cutting and patching that are identical to the existing materials.

B. If identical materials are not available or cannot be used, use materials that match existing adjacent surfaces to the fullest extent possible with regard to visual effect.

C. Use materials for cutting and patching that will result in equal-or-better performance characteristics.

PART 3 - EXECUTION

3.01 INSPECTION:

A. Before cutting, examine the surfaces to be cut and patched and the conditions under which the cutting and patching is to be performed. If unsafe or otherwise unsatisfactory conditions are encountered, take corrective action before proceeding with the cutting and patching.

B. Coordinate layout of the cutting and patching and resolve potential conflicts before proceeding with the cutting and patching.

3.02 PREPARATION:

A. Temporary Support: To prevent failure, provide temporary support of work to be cut.

B. Protection: Protect other work during cutting and patching to prevent damage. Provide protection from adverse weather conditions for that part of the Project that may be exposed during cutting and patching operations.

1. Avoid interference with use of adjacent facilities or interruption of free passage to adjacent facilities.

2. Take precautions not to cut existing pipes, conduits or ducts currently in service, but scheduled to be relocated until provisions have been made to by-pass them. Coordinate with the DISTRICT.

3.03 PERFORMANCE:

A. General: Employ skilled workmen to perform cutting and patching work.

B. Cutting: Perform the cutting using methods that are least likely to damage work to be retained or adjoining work. Where possible, review proposed procedures with the original installer; comply with the original installer's recommendations.

1. General: Use hand or small power tools designed for sawing or grinding, not hammering and chopping, where cutting is required. Use of gasoline-powered tools will not be permitted in enclosed spaces.

2. Cut through concrete and masonry using a cutting machine such as a carborundum saw or core drill to insure a neat hole.

3. Cut holes and slots neatly to size required with minimum disturbance of adjacent work.

4. Cut or drill from the exposed or finished side into concealed surfaces to avoid marring existing finished surfaces.

5. Temporarily cover openings when not in use.

C. By-pass utility services such as pipe and conduit, before cutting, where such utility services are shown or required to be removed, relocated or abandoned.

D. Cut off conduit and pipe in walls or partitions to be removed. After by-pass and cutting, cap, valve or plug and seal tight the remaining portion of pipe and conduit to prevent entrance of moisture or other foreign matter.

E. Patching: Patch with seams which are durable and as invisible as possible. Comply with specified tolerances for the WORK.

1. Inspect and test patched areas to demonstrate the integrity of the WORK.

2. Restore exposed finishes of patched areas and where necessary extend finish restoration into retained adjoining work in a manner which will eliminate evidence of patching and refinishing.

3. Patch and repair floor and wall surfaces to provide an even surface of uniform color and appearance where removal of walls or partitions extends from one finished area into another finished area.

4. If necessary to achieve uniform color and appearance, remove existing floor and wall coverings and replace with new materials.

5. Extend the final paint coat over the entire unbroken surface containing the patch, after the patched area has received prime and base coats where the patch occurs in a smooth painted surface.

6. Patch, repair or re-hang existing ceilings as necessary to provide an even plane surface of uniform appearance.

3.04 CLEANING:

A. Thoroughly clean areas and spaces where work is performed or used as access to work. Remove completely all excess paint, mortar, oils, putty and items of similar nature.

B. Thoroughly clean piping, conduit and similar features before painting or other finishing is applied.

C. Restore damaged pipe covering to its original condition.

END OF SECTION

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SECTION 01050 FIELD ENGINEERING AND SURVEYING

PART 1 - GENERAL (See General Terms & Conditions Article 4.05 "Reference Points.")

1.01 SCOPE:

A. Summary of Work:

1. The CONTRACTOR shall engage a Professional Engineer of the discipline required, registered in the State of Florida, to perform engineering services for temporary facilities including the design of shoring systems, shores, earth and water retaining systems, forms, temporary erection supports, and similar items provided by the CONTRACTOR as part of its means and methods of construction.

2. The CONTRACTOR shall engage a Professional Surveyor and Mapper licensed in the State of Florida to perform all necessary construction layout surveys, horizontal and vertical control, As-Built (Record) Surveys, and Topographic Surveys in accordance with Chapter 472.027 of the Florida Statues and Chapter 5J-17 Florida Administrative Code (FAC) and these specifications.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 01700 – Contract Closeout
3. SECTION 02200 – Earthwork

1.02 SUBMITTALS:

A. Submit in accordance with SECTION 01300.

PART 2 - CONTRACTOR CONSTRUCTION LAYOUT SURVEY

2.01 DESCRIPTION: In connection with this WORK, the CONTRACTOR shall be responsible for:

A. Performing all construction layout survey tasks as necessary for construction and satisfactory completion of the WORK.

B. Verifying benchmark elevations by running a level loop between a minimum of two (2) Project vertical control points prior to the construction layout survey or establishing Project elevation data and/or new benchmarks where necessary.

C. Completing all leveling under the supervision of a Florida licensed Professional Surveyor and Mapper. The level run shall close to within 0.03 feet √miles (0.03 feet times the square root of the distance in miles).

D. Performing at a minimum two (2) daily check measurements with RTK Global Positioning System (GPS) on a minimum of two (2) different Project control monuments in two (2) different satellite geometric layouts.

E. Performing a peg test as necessary on all level equipment with needed adjustments to maintain the accuracy of the instruments.

F. Keeping a record of all survey work in a survey field book in a clear, orderly, and neat manner consistent with standard surveying practices.

2.02 CONSTRUCTION REQUIREMENTS:

A. The CONTRACTOR’s personnel performing the construction layout survey shall work under the direct supervision of a Florida licensed Professional Surveyor and Mapper. Submit the name(s) and address(s) of the survey firms(s) responsible for the Project surveying requirements to the DISTRICT prior to start of survey activities.

B. The CONTRACTOR shall be solely and completely responsible for the accuracy of the line and grade of all features of the WORK. Any errors or apparent discrepancies found in previous surveys,

Drawings, or specifications shall be called to the attention of the DISTRICT by the CONTRACTOR for correction or interpretation prior to proceeding with the WORK.

C. The CONTRACTOR shall be responsible for the placement, referencing, and preservation of all survey control points, whether set or found on the Project. All boundary corners (i.e. section corners, fractional section corners, similar Project survey monumentation) that may be lost, destroyed or disturbed during construction shall be carefully replaced and referenced by a Florida licensed Professional Surveyor and Mapper.

D. The supervision of the CONTRACTOR's construction surveying personnel shall be the responsibility of the CONTRACTOR; any deficient surveying layout or construction WORK which may be the result of inaccuracies in construction layout survey operations or failure to report inaccuracies found in WORK shall be corrected at the expense of the CONTRACTOR.

E. Station Identification: On linear elements of construction (such as levees, canals, and similar items) the CONTRACTOR shall place temporary identifying signs at intervals no greater than 500 feet using four (4) foot sections of one (1) inch by four (4) inches lumber driven into the ground. The signs shall identify the station at that location.

F. In order to expedite the commencement of construction operations, the construction layout survey operation may commence prior to the issuance of the Notice to Proceed. The CONTRACTOR shall obtain written approval of the DISTRICT prior to commencing construction layout survey.

2.03 SURVEY STANDARDS: If the vertical and horizontal data needs to be established at the Project Site, the CONTRACTOR shall follow the following standards:

A. Vertical Data:

1. All vertical data shall be collected and displayed in North American Vertical Datum 88 (NAVD 88). All Vertical elevation control level runs shall start and end on National Geodetic Survey (NGS) Second Order or higher DISTRICT approved vertical control monuments. The CONTRACTOR shall use a minimum of two (2) different NGS Second Order or DISTRICT approved published benchmarks that are a minimum of one-half mile apart. The level run(s) between monuments must close on each other. If the monuments do not close on each other the surveyor shall re-do the level runs or use another NGS monument until the two (2) monuments used in the level run close. The level run shall close to within 0.03 feet √miles (0.03 feet times the square root of the distance in miles).

B. All Vertical elevation control level runs shall start and end on National Geodetic Survey (NGS) Second Order or higher DISTRICT approved vertical control monuments.

1. All new Water Control Structures shall require at a minimum one (1) new Site benchmark to be set if one does not exist. A survey disk (supplied by the DISTRICT) stamped with the Site designation or DISTRICT approved alternative shall be permanently grouted into the water control structure provided it is on a portion of the structure that does not have an expansion joint. The marker for the benchmark can be obtained from the DISTRICT Project Manager (PM). The CONTRACTOR shall only stamp or engrave the benchmark identification and not the elevation. If a NGS Class "B" mark is set, the survey disk is not required and the designation shall be stamped on the benchmark cap.

2. If elevations need to be converted to NGVD 29, use the CORPSCON 6.0.1 with the Corps of Engineers, South Atlantic Division's "vertcon 05.txt" file added.

C. A DISTRICT benchmark description sheet shall be completed for each benchmark established (set) for use in the Project. A DISTRICT benchmark description sheet shall be requested; if applicable, from the DISTRICT PM at the pre-construction meeting.

D. Horizontal Data (State Plane Coordinates):

1. All horizontal data shall be collected in and based on the North American Datum (NAD 1983/2007) adjustment or higher. Horizontal coordinate control shall be established from existing NGS or DISTRICT approved Second Order control or higher in the area by using a minimum of conventional NGS Third Order field observation procedures. All horizontal work

shall be done in the same horizontal adjustment (no mixing of the adjustments). Once the horizontal datum has been established it shall not change for the life of the project.

E. Cross-Sections: Provide a certified copy, in accordance with 2.04 below, of field measured cross-sections of the final culvert inverts, lengths, top of risers and record as built drawings of all pertinent land features and changes in elevation. prepared by a Professional Surveyor and Mapper licensed in the State of Florida for payment and record purposes, measured at the same stations as the detailed cross-sections shown on the Survey, and at the same interval spacing as shown on the Survey. A tolerance of 0.1 foot on the top of the levee and 0.1 foot on the sides of the levee is permitted. The top of the levee shall have a 2% slope to the interior or as specified by the DISTRICT.

2.04 RECORDS AND SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Provide DISTRICT a copy of the designs described in Paragraph 1.01 signed and sealed by the Florida registered Professional Engineer in charge of the Project.

C. Provide DISTRICT one (1) copy of the Preliminary Surveyor's Report (MS Word 2007), and two (2) copies of the final signed, sealed and certified Surveyor's Report to the DISTRICT.

1. At a minimum, the report shall include: an overall Project description, location sketches, field notes, equipment used, photographs and a horizontal data (NAD 1983/2007 state plane coordinate (RTK)) on each new bench mark (if applicable).

2. A CD containing: Surveyor's firm name and logo, Surveyor's Report, digital photographs, benchmark description sheets and any other associated data.

D. Records/As-builts:

1. The CONTRACTOR shall provide one (1) set of conventional certified As-Built Survey overlaid on the Drawings.

2. The CONTRACTOR shall provide a single PDF file with all data attached to that file and bookmark the As-Built.

3. The CONTRACTOR shall provide single AutoCAD (version 2010 or later) digital files for each of the certified hard copies.

END OF SECTION

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SECTION 01065 PERMITS AND FEES

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work:

1. Unless otherwise specified, the CONTRACTOR shall obtain and pay for all permits and licenses related to the WORK as provided for in the General Terms & Conditions.

2. The CONTRACTOR will be issued copies of all permits obtained by the DISTRICT at the pre-construction conference. A copy of the permits shall be posted at the Site at all times during construction. The CONTRACTOR shall be responsible for familiarizing himself with the permits and shall abide by the permit conditions at all times. Refer to Article 6.08 of the Supplemental Conditions for the list of permits that DISTRICT has obtained or is in the process of obtaining.

3. The WORK shall be conducted, and shall result in construction of the improvements of the Project, in full accordance with the conditions of the permits granted for the Project.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01071 STANDARD REFERENCES

Wherever used in the project manual, the following abbreviations will have the meanings listed:

AA	Aluminum Association Incorporated 818 Connecticut Avenue, NW Washington, DC 20006
AABC	Associated Air Balance Council 1518 K Street NW Washington, DC 20005
AAMA	American Architectural Manufacturers Association 2700 River Road, Suite 118 Des Plaines, IL 60018
AASHTO	American Association of State Highway and Transportation Officials 444 North Capitol Street, NW, Suite 225 Washington, DC 20001
ABMA	American Bearing Manufacturers Association 2025 M Street, NW Suite 800 Washington, DC 20036
ACI	American Concrete Institute 38800 Country Club Drive Farmington Hills, MI, 48331
AEIC	Association of Edison Illuminating Companies 600 18th Street N Birmingham, Al 35203
AFBMA	Anti-Friction Bearing Manufacturers Association
AGA	American Gas Association 400 N. Capital Street, NW Suite 450 Washington, DC 20001
AGMA	American Gear Manufacturer's Association 500 Montgomery Street, Suite 350 Alexandria, VA 22314
AHA	American Hardboard Association 1210 West Northwest Hwy Palatine, IL 60067
AISC	American Institute of Steel Construction One East Wacker Drive, suite 700 Chicago, IL 60601
AISI	American Iron and Steel Institute 1000 16th Street, NW Washington, DC 20036

AITC	American Institute of Timber Construction 333 West Hampden Avenue Englewood, CO 80110
ALSC	American Lumber Standards Committee P. O. Box 210 Germantown, MD 20874
AMCA	Air Movement and Control Association, Inc. 30 West University Drive Arlington Heights, IL 60004
ANSI	American National Standards Institute, Inc. 25 West 43rd Street New York NY 10036
APA	American Plywood Association P.O. Box 11700 Tacoma, WA 98411
API	American Petroleum Institute 1220 L Street, NW Washington, DC 20005
AHRI	Air-Conditioning Heating and Refrigeration Institute 1814 North Fort Myer Drive Arlington, VA 22209
ASCE	American Society of Civil Engineers 345 East 47th Street New York, NY 10017
ASCII	American Standard Code for Information Interchange United States of America Standards Institute 10 East 40th Street New York, NY 10016
ASE	American Standard Safety Code for Elevators, Dumbwaiter and Escalators American National Standards Institute/ASME A17.1/CSA B44 1430 Broadway New York, NY 10018
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers United Engineering Center 1791 Tullie Circle, N.E. Atlanta, GA 30329
ASME	American Society of Mechanical Engineers Three Park Avenue New York, NY 10016
ASTM	American Society for Testing and Materials 1916 Race Street Philadelphia, PA 19103

AWPA	American Wood Preservers Association P.O. Box 361784 Birmingham, AL 35236
AWPB	American Wood Preservers Bureau 7962 Conell Court P. O. Box 5283 Lorton, VA 22079
AWPI	American Wood Preservers Institute 1945 Old Gallows Road, Suite 150 Vienna, VA 22182
AWI	Architectural Woodwork Institute 46179 Westlake Drive, Suite 120 Potomac Falls, VA 20165
AWS	American Welding Society 550 NW Lejune Road Miami, FL 33126
AWWA	American Water Works Association 6666 West Quincy Avenue Denver, CO 80235
BHMA	Builders Hardware Manufacturers Association 355 Lexington Avenue, 17th Floor New York, NY 10017
BOCA	Building Officials and Code Administrators 17926 Halstead Homewood, IL 60430
CBMA	Certified Ballast Manufacturers Association 2120 Keith Building Cleveland, OH 44115
CMAA	Crane Manufacturers Association of America (Formerly called: Overhead Electrical Crane Institute) (OECI) 8720 Reds Oak Bloulevard, Suite 201 Charlotte, NC 28217
CRSI	Concrete Reinforcing Steel Institute 933 North Plum Grove Road Schaumburg, IL 60173
CSA	Canadian Standards Association 155 Queen Street, Suite 1300 Ottawa, Ontario, CA K1P6L1
DEMA	Diesel Engine Manufacturer's Association 122 East 42nd Street New York, NY 10017

DHI	Door Hardware Institute 14150 Newbrook Drive, Suite 200 Chantilly, VA 20151
DIS	Division of Industrial Safety California Department of Industrial Relations 2422 Arden Way Sacramento, CA 95825
EEI	Edison Electric Institute 701 Pennsylvania Avenue, NW Washington, DC 20004
EIA	Electronic Industries Alliance 2001 Eye Street, NW Washington, DC 20006
EJMA	Expansion Joint Manufacturer's Association 25 North Broadway Tarrytown, NY 10591
EPA	Environmental Protection Agency Region 4 Sam Nunn Atlanta Federal Center 61 Forsyth Street, SW Atlanta, GA 30303-3104
ESO	Electrical Safety Order, California Administrative Code, Title 8, Chap. 4, Subarticle 5 Office of Procurement, Publications Section P. O. Box 20191 8141 Elder Creek Road Sacramento, CA 95820
FAC	Florida Administrative Code
FEDSPEC	Federal Specifications General Services Administration Specification and Consumer Information Distribution Branch Washington Navy Yard, Bldg. 197 Washington, DC 20407
FEDSTDS	Federal Standards (see FEDSPECS)
FM	Factory Mutual Research 1151 Boston-Providence Turnpike Norwood, MA 02062
GANA	Glass Association of North America 800 SW Jackson Street, Suite 1500 Topeka, Kansas 66612
HEI	Heat Exchange Institute 1300 Summer Avenue Cleveland, OH 44115

HI	Hydraulic Institute 1230 Keith Building Cleveland, OH 44115
HPVA	Hardwood Plywood and Veneer Association 1825 Michael Faraday Drive Reston, VA 20190
IAPMO	International Association of Plumbing and Mechanical Officials 5001 E. Philadelphia Street Ontario, CA 91761
ICBO	International Conference of Building Officials 5360 South Workman Mill Road Whittier, CA 90601
ICEA	Insulated Cable Engineers Association P. O. Box P South Yarmouth, MA 02664
ICRI	International Concrete Repair Institute 10600 West Higgins Road, Suite 607 Rosemont, IL 60018
IEEE	Institute of Electrical and Electronics Engineers, Inc. 3 Park Avenue, 17th Floor New York, NY 10016-5997
IES	Illuminating Engineering Society c/o United Engineering Center 120 Wall Street Floor 17 New York, NY 10005
ISA	Instrument Society of America 67 Alexander Drive Research triangle Park, NC 27709
ISO	International Organization for Standardization 1, ru de Varembé, Case Postale 56 CH-1211 Genna 20, Switzerland
JIC	Joint Industrial Council 7901 Westpark Drive McLean, VA 22101
MFMA	Metal Framing Manufacturers Association 401 Michigan Avenue Chicago, IL 60611
MILSPEC	Military Specifications Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120

MSS	Manufacturers Standardization Society of the Valve and Fittings Industry, Inc. 127 Park Avenue, N.E. Vienna, VA 22180
NAAMM	National Association of Architectural Metal Manufacturers 800 Roosevelt rd bldg C, Suite 312 Glen Ellyn, IL 60137
NACE	National Association of Corrosion Engineers P. O. Box 986 Katy, TX 77450
NEC	National Electrical Code National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
NECA	National Electrical Contractors Association 3 Bethesda Metro Center, Suite 1100 Bethesda, MD 20814
NELMA	Northeastern Lumber Manufacturers Association, Inc. 272 Turtle Road P. O. Box 87A Cumberland Center, ME 04021
NEMA	National Electrical Manufacturer's Association 1300 N. 17th Street, Suite 1752 Rosslyn, VA 22209
NESC	National Electric Safety Code American National Standards Institute 1430 Broadway New York, NY 10018
NETA	InterNational Electrical Testing Association 3050 Old Centre Avenue, Suite 102 Portage, MI 49024
NFP	National Forest Products Association (Formerly National Lumber Manufacturer's Association) 1619 Massachusetts Avenue Washington, DC 20036
NFPA	National Fire Protection Association Batterymarch Park Quincy, MA 02269
NHLA	National Hardwood Lumber Association P. O. Box 34518 Memphis, TN 38184-0518
NIST	National Institute of Standards and Technology 100 Bureau Drive, Suite 1070 Gaithersburg, MD 20899-1070

NSF	National Sanitation Foundation P.O. Box 130140 789 N. Dixoboro Road Ann Arbor, MI 48113
OSHA	Occupational Safety and Health Act U.S. Department of Labor Occupational and Health Administration San Francisco Regional Office 200 Constitution Avenue Washington, DC 20210
PCI	Prestressed Concrete Institute 200 W. Adams Street, Suite 2100 Chicago, IL 60606
PPIC	The Plumbing & Piping Industry Council, Inc. 135 Calle Catalina Place Houston, TX 77007
RIS	Redwood Inspection Service California Redwood Association 818 Grayson Road, Suite 201 Pleasant Hill, CA 94523
RLM	Reflector and Lamp Manufacturers Standard Institute
RMA	Rubber Manufacturers Association 1400 K Street Washington, DC 20005
SAE	Society of Automotive Engineers 400 Commonwealth Drive Warrendale, PA 15096
SBC	Standard Building Code Published by SBCCI
SMC	Standard Mechanical Code Published by SBCCI
SBCCI	Southern Building Code Congress International 1116 Brown-Marx Building Birmingham, AL 35203
SCMA	Southern Cypress Manufacturers Association 805 Sterick Bldg. Memphis, TN 38103

SDI	Steel Door Institute 30200 Detroit road Westlake, OH 44145
SMACNA	Sheet Metal and Air Conditioning Contractors National Association, Inc. 4201 Lafayette Center Drive Chantilly, VA 20151
SPC	Society for Protective Coatings 40 24th Street, 6th Floor Pittsburgh, PA 15222
SPI	Society of the Plastics Industry, Inc. 1667 K Street, NW Suite 1000 Washington, DC 20006
SPIB	Southern Pine Inspection Bureau P.O. Box 10915 Pensacola, Fl 32524
SSPC	The Society for Protective Coatings (formerly called: Steel Structures Painting Council) 40 24th Street, 6th Floor Pittsburgh, PA 15222-4656
SSPWC	Standard Specifications for Public Works Construction Building News, Inc. 3055 Overland Avenue Los Angeles, CA 90034
TEMA	Tubular Exchanger Manufacturer's Association 3251 Corte Malpaso, Suite 507 Camarillo, CA 93012
UL	Underwriters Laboratories Inc. 2600 NW Lake Road Camas, WA 98607
USBR	Bureau of Reclamation U.S. Department of Interior Engineering and Research Center Denver Federal Center, Building 67 Denver, CO 80225
USACE	United States Army Corps of Engineers Jacksonville District P. O. Box 4970 Jacksonville, FL 32232-0019
WCLIB	West Coast Lumber Inspection Bureau 6980 SW Varns Street P. O. Box 23145 Tigard, OR 97223

WWPA Western Wood Products Association
(Formerly called: West Coast Lumbermen's Association (WCLA))
522 SW 5th Avenue, Suite 500
Portland, OR 97204

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SECTION 01200 PROJECT MEETINGS AND REPORTS

PART 1 - GENERAL

1.01 SCOPE

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

1. Project Meetings:

a. Preconstruction conference

b. Progress meetings

2. Schedules and Reports:

a. Initial coordination submittals

b. Construction Schedules (See SECTION 01310)

c. Special reports

B. Related Work Specified Elsewhere:

1. SECTION 01300 Submittals

2. SECTION 01310 Cost Loaded Construction Schedule

1.02 SUBMITTALS:

A. All submittals shall be made in accordance with SECTION 01300.

1.03 PROJECT MEETINGS:

A. Pre-Construction Conference

1. The DISTRICT will administer a pre-construction conference within ten (10) days after the Effective Date of the Agreement, to review items stated in the following agenda and to establish a working understanding between the parties as to their relationships during conduct of the WORK.

2. The Preconstruction conference shall be attended by:

a. The CONTRACTOR and his Project Superintendent

b. Representatives of principal Subcontractors and Suppliers

c. Engineer and his Resident Project Representative if any

d. The DISTRICT or its representative

e. Other affected parties determined by the DISTRICT

3. Agenda:

a. Projected Construction Schedules

b. Critical Work sequencing

c. Designation of responsible personnel

d. Project coordination

e. Procedures and Processing of:

i. Field decisions

ii. Substitutions

iii. Submittals

iv. Change Orders

v. Applications for payment

f. Procedures for testing

g. Procedures for maintaining record documents

h. Use of Premises:

i. Office, work and storage areas

ii. The DISTRICT's requirements

i. Construction facilities, controls, and construction aids

j. Temporary utilities

k. Safety and first aid

l. Security

m. Requirements of any permits obtained by the DISTRICT and/or the CONTRACTOR

4. Location of Meeting: Okeechobee Field Station Conference Room 1000 N.E. 40th Avenue Okeechobee, FL 34972, unless otherwise directed by District Project Manager.

B. Progress Meetings:

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

2. The CONTRACTOR and each Subcontractor shall be prepared to report on and discuss the current construction progress, any anticipated future changes to the Construction Schedule, and advise if their current progress, and anticipated future schedules are compatible with the WORK.

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

4. Agenda:

a. Review of construction progress since previous meeting

b. Field observations, interface requirements, conflicts

c. Issues which may impede the Construction Schedule

d. Off-site fabrication

e. Delivery schedules

f. Submittal schedules and status

g. Site utilization

h. Temporary facilities and services

i. Hours of Work

j. Hazards and risks

k. Housekeeping

l. Quality and Work standards

m. Change orders

n. Documentation of information for payment request

o. Corrective measures and procedures to regain projected schedule, if necessary

p. Revisions to the Construction Schedule

q. Progress and schedule during the succeeding WORK period

r. Review proposed changes for:

i. Effect on the Construction Schedule and on the Completion Date

ii. Effect on the other contracts of the Project

s. Other business

5. Location of Meetings: On-Site, unless otherwise directed by District Project Manager.

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

C. Special Reports:

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

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01300 SUBMITTALS

PART 1 - **GENERAL**

1.01 SCOPE:

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

B. Related Work Specified Elsewhere:

1. SECTION 01310 - Cost Loaded Construction Schedule

2. SECTION 01700 - Contract Closeout

1.02 GENERAL INFORMATION:

A. Definitions:

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

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

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

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

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

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

b. Application for Payment as per SECTION 01310.

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

d. Administrative Submittals are those submittals required by the Contract Documents or deemed necessary for administrative records. These submittals include, but are not limited to, maintenance agreements, workmanship bonds, Project photographs, physical work records, statements of applicability, copies of industry standards, as-constructed data, security/protection/safety data, and similar type submittals also listed in SECTION 01700 and elsewhere in the Contract Documents.

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

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

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

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

C. Language and Dimensions:

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

2. International System of Units dimensional unit equivalents may be stated in addition to the United States customary units.

D. Submittal Completeness:

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

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

3. Reproduction or copies of Drawings or portions thereof will not be accepted as complete fabrication or erection drawings. The CONTRACTOR may use a reproduction of the DISTRICT-prepared Drawings for erection drawings such as to indicate information on erection or to identify detail drawing references. Where the Drawings are revised to show this additional CONTRACTOR information, the DISTRICT's title block shall be replaced with a CONTRACTOR's title block and the DISTRICT's professional seal (e.g.: Professional Engineer, Registered Architect, Licensed Surveyor, or other design professional seals) shall be removed from the Drawing. The CONTRACTOR shall revise these erection drawings for subsequent DISTRICT revisions to the Drawings.

1.03 COMPLIANCE SUBMITTALS:

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

1. MANUFACTURER's specifications

2. Catalogs, or parts thereof, of manufactured equipment

3. Shop fabrication and erection drawings

4. General outline drawings of equipment showing overall dimensions, location of major components, weights, and location of required building openings and floor plates

5. Detailed equipment installation drawings, showing foundation details, anchor bolt sizes and locations, baseplate sizes, location of DISTRICT's connections, and all clearances required for erection, operation, and disassembly for maintenance

6. Schematic diagrams for electrical items, showing external connections, terminal block numbers, internal wiring diagrams, and one-line diagrams

7. Bills of material and spare parts list

8. Instruction books and operating manuals

9. Material lists or schedules

10. Performance tests on equipment by MANUFACTURERs

11. Concrete mix design information

12. Samples and color charts

13. All drawings, calculations, catalogs or parts thereof, MANUFACTURER's specifications and data, samples, instructions, and other information specified or necessary:

    a. For DISTRICT to determine that the Equipment and Materials conform with the design concept and comply with the intent of the Contract Documents.

    b. For the proper erection, installation, operation and maintenance of the Equipment and Materials which the DISTRICT will review for general content but not for substance.

    c. For the DISTRICT to determine what supports, anchorages, structural details, connections, and services are required for the Equipment and Materials, and the effects on contiguous or related structures and Equipment and Materials.

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

1. "ACCEPTED AS SUBMITTED": Signifies Equipment or Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the WORK. CONTRACTOR is to proceed with fabrication or procurement of the items and with related WORK.

2. "ACCEPTED AS NOTED": Signifies Equipment and Material represented by the Submittal conforms with the design concept and complies with the intent of the Contract Documents and is acceptable for incorporation in the WORK subject to the condition that as constructed it shall be in accordance with all notations and/or corrections indicated. CONTRACTOR is to proceed with fabrication or procurement of the items and with related WORK in accordance with DISTRICT's notations.

3. "RETURNED FOR REVISION": Means that deviations from the requirements of the Contract Documents exist in the Submittal. CONTRACTOR is to resubmit revised information responsive to DISTRICT's annotations on the returned Submittal or written in the letter of transmittal. Fabrication or procurement of items represented by the Submittal and related WORK is not to proceed until the Submittal is approved.

4. "NOT ACCEPTABLE (SUBMIT ANEW)": Signifies Equipment and Material represented by the Submittal does not conform with the design concept or comply with the intent of the Contract Documents and is disapproved for use in the WORK. CONTRACTOR is to resubmit Compliance Submittals responsive to the Contract Documents.

5. "PRELIMINARY SUBMITTAL": Signifies Submittals of such preliminary nature that a determination of conformance with the design concept or compliance with the intent of the Contract Documents must be deferred until additional information is furnished. CONTRACTOR is to submit such additional information to permit layout and related activities to proceed.

6. "FOR REFERENCE ONLY": Signifies Submittals which are for supplementary information only; pamphlets, general information sheets, catalog cuts, standard sheets, bulletins and similar data, all of which are useful to the DISTRICT in design, operation, or maintenance, but which by their nature do not constitute a basis for determining that items represented thereby conform with the design concept or comply with the intent of the Contract Documents. The DISTRICT reviews such Submittals for general content but not for substance.

7. Resubmit Compliance Submittals the number of times required for DISTRICT's "ACCEPTED AS SUBMITTED," or "FOR REFERENCE ONLY". However, any need for more resubmittals than the number set forth in the accepted schedule, or any other delay in obtaining acceptance of Submittals, will not be grounds for extension of the Contract Time, provided the DISTRICT completes its reviews within the times stated above. See 1.03 D. below for additional requirements.

C. Schedule and Log of Compliance Submittals:

1. Prepare for the DISTRICT, a schedule and log for submission of all Compliance Submittals specified or necessary for DISTRICT's review of the use of Equipment and Materials proposed for incorporation in the WORK or needed for proper installation, operation or maintenance. Submit the schedule and log with the procurement schedule and WORK progress schedule. Schedule submission of all Compliance Submittals to permit review, fabrication, and delivery in time to not cause a delay in the WORK of CONTRACTOR or his Subcontractors or any other contractors as described herein.

2. In establishing schedule for Compliance Submittals, allow fifteen working days in DISTRICT's office for reviewing original Submittals that have been deemed complete and ten (10) working days for reviewing resubmittals of previously reviewed submittals.

3. The schedule shall indicate the anticipated dates of original submission, and shall be prepared in accordance with SECTION 01310 and submitted in accordance with this SECTION.

4. Schedule as required to achieve full compliance of all Compliance Submittals required prior to fabrication or manufacture for submission within 90 days of the Notice to Proceed. Schedule Compliance Submittals pertaining to storage, installation and operation at the Site for DISTRICT's acceptance prior to delivery of the Equipment and Materials.

D. Transmittal of Compliance Submittals:

1. All Compliance Submittals of Equipment and Materials furnished by Subcontractors, MANUFACTURERs, and Suppliers shall be submitted to the DISTRICT by CONTRACTOR in electronic PDF format as indicated below and via the Web Based Project Construction Document Management tool (Construction Document Management tool). After checking and verifying all field measurements, transmit all Compliance Submittals to the DISTRICT for acceptance as follows:

a. Check and certify Compliance Submittals of Subcontractors, Suppliers, and MANUFACTURERS with CONTRACTOR's approval prior to transmitting them to the DISTRICT. CONTRACTOR's certification of approval shall constitute a representation to the DISTRICT that CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers, and similar data, or they assume full responsibility for doing so, and that they have coordinated each Compliance Submittal with the requirements of the WORK and the Contract Documents.

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

c. Provide all Submittals in electronic format, compatible with Adobe Professional, Version 8 (or higher), and submitted as a single file, using PDF bookmarks and/or chapters to identify divisions within the Submittal package ("PDF File Format"). At the DISTRICT's request, and/or with the DISTRICT's prior approval, the CONTRACTOR shall submit

native format files when, in the opinion of the DISTRICT, doing so will facilitate the DISTRICT's review of the Submittal information.

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

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

f. WORK requiring a Compliance Submittal shall not be commenced or shipped until the Submittal has been designated "ACCEPTED AS SUBMITTED," "ACCEPTED AS NOTED," or "FOR REFERENCE ONLY" by the DISTRICT.

2. Copies of the equipment CONTRACTOR's erection drawings and other Compliance Submittals required for the installation of equipment furnished by others under separate Contract for installation under this Contract will be transmitted to CONTRACTOR by the DISTRICT in the final distribution of such Submittals.

E. DISTRICT's Review:

1. The DISTRICT will review and return Compliance Submittals to CONTRACTOR with appropriate notations. Instruction books and similar Submittals will be reviewed by the DISTRICT for general content but not for substance.

2. The DISTRICT's acceptance of Compliance Submittals will not relieve CONTRACTOR from his responsibility as stated in the Section 00700 – General Terms and Conditions.

F. Instruction Books / Operation & Maintenance Manuals:

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

a. Index and tabs

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

c. Applicable drawings

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

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

f. All additional data specified

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

a. Instruction Books/Operation & Maintenance Manuals shall contain the following:

i. Equipment name

ii. MANUFACTURER's name

iii. Project name

iv. Contract number

v. Reference to applicable Drawing No. & Technical Specifications Section

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

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

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

2. Full range of color, texture, and pattern

1.04 MISCELLANEOUS SUBMITTALS:

A. Miscellaneous Submittals are comprised of Daily Reports, technical reports, administrative Submittals, and warranties which relate to the WORK, but do not require DISTRICT's approval prior to proceeding with the WORK. Miscellaneous Submittals may include but are not limited to (at DISTRICT's discretion):

1. Daily Reports: CONTRACTOR shall be responsible for entering Daily Reports in the Construction Document Management tool for review and acceptance by the DISTRICT. Daily Reports shall be entered within twenty-four hours of the date of the Daily Report. Daily Reports shall include, but need not be limited to (a) Date, (b) Weather conditions and any impact weather conditions caused to CONTRACTOR's ability to work, (c) Jobsite physical conditions, (d) Available or not-available resources, (e) Work performed and status, (f) Disruptions and delays, (g) Inventory changes including major material delivered or delayed (h) Potential risks and concerns of future delays, (i) Incidents that occurred, (j) Notes or comments of other relevant information related to the Project.

2. Welder qualification tests

3. Welding procedure qualification tests

4. X-ray and radiographic reports

5. Field test reports

6. Concrete cylinder test reports

7. Certification on Materials:

a. Steel mill tests

b. Paint lab tests

c. Cement tests

8. Soil test reports

9. Temperature records
10. Shipping or packing lists
11. Job progress schedules
12. Equipment and Material delivery schedules
13. Progress photographs
14. Warranties
15. Fire protection and hydraulic calculations
16. Surveying field notes, preliminary and final Surveyor's Reports
17. Pump tests
18. Traffic control plan
19. Technical Reports
20. Written Certificates and Warranties

B. Transmittal of Miscellaneous Submittals:

1. All Miscellaneous Submittals furnished by Subcontractors, MANUFACTURERS, and Suppliers shall be submitted to DISTRICT by CONTRACTOR in an electronic PDF File Format, unless otherwise specified.

   a. CONTRACTOR shall complete all information fields of the Construction Document Management tool and otherwise clearly and correctly identify each miscellaneous Submittal. The specification section and article number must be correctly listed. Unidentifiable, incomplete, and/or incorrect Submittals may be returned for correction without review.

   b. Check and certify Miscellaneous Submittals of Subcontractors, Suppliers, and MANUFACTURERS with CONTRACTOR's approval prior to transmitting them to the DISTRICT. CONTRACTOR's certification of approval shall constitute a representation to the DISTRICT that CONTRACTOR has either determined and verified all information, or they assume full responsibility for doing so, and that they haves coordinated Miscellaneous Submittal with the requirements of the WORK and the Contract Documents.

   c. At the time of each submission, call to the attention of the DISTRICT in the CONTRACTOR's Letter of Transmittal any deviations from the requirements of the Contract Documents.

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

2. Test Reports: Responsibilities of CONTRACTOR and DISTRICT regarding tests and inspections of Equipment and Materials and completed WORK are set forth elsewhere in these Contract Documents.

C. DISTRICT'S Review:

1. DISTRICT will review Miscellaneous Submittals for indications of WORK or material deficiencies within fifteen working days in DISTRICT's office for original Submittals and ten (10) working days for reviewing resubmittals.

2. DISTRICT will respond to CONTRACTOR on those Miscellaneous Submittals which indicate WORK or material deficiency.

1.05 WEB BASED CONSTRUCTION DOCUMENT MANAGEMENT:

A. The DISTRICT, Engineers of Record, Construction Management Firms, and CONTRACTOR shall use the internet Web Based Project Construction Document Management tool (the Construction Document Management tool), e-Builder® ASP software, and protocols included in that software during this Project for submission of all documents specified in this SECTION and elsewhere in the Contract Documents. The use of Construction Document Management as herein described does not replace or change any contractual responsibilities of the CONTRACTOR.

B. An intent of using the Construction Document Management tool (i.e. e-Builder®) is to facilitate the Project work efforts by promoting timely communications and responses. This will also reduce the number of paper documents while providing improved record keeping by creation of electronic document files.

C. The Construction Document Management tool is available through e-Builder® in the form and manner required by the DISTRICT.

D. The Construction Document Management tool is on-line and fully functional. User registration, electronic and computer equipment, and Internet connections are the responsibility of DISTRICT, Engineer of Record and CONTRACTOR.

E. CONTRACTOR's Responsibility:

1. CONTRACTOR shall be responsible for the validity of information it places in Construction Document Management tool and for the abilities of its personnel.

2. Entry of information exchanged and transferred between the CONTRACTOR and its Subcontractors and suppliers on Construction Document Management tool shall be the responsibility of the CONTRACTOR.

3. Users shall be knowledgeable in the use of computers, including Internet Browsers, email programs, and Portable Document Format (PDF) software.

4. CONTRACTOR shall utilize the existing forms in Construction Document Management tool (i.e. e-Builder®) to the maximum extent possible. If a form does not exist in Construction Document Management tool, the CONTRACTOR must include a form of its own (subject to review and acceptance by DISTRICT) or provided by DISTRICT as an attachment to a submittal.

5. PDF documents shall be created through electronic conversion to be searchable, rather than optically scanned, whenever possible. Optically scanned documents shall be converted to searchable documents using Optical Character Recognition. CONTRACTOR is responsible for the training of its personnel in the use of the Construction Document Management tool (outside training that is provided by DISTRICT) and the other programs indicated above as needed.

6. User Access Limitations:

   a. Provide a list of CONTRACTOR's key Construction Document Management tool personnel for the DISTRICT's acceptance. The DISTRICT reserves the right to perform a security check on all potential users, and to rescind user authorization at any time. The CONTRACTOR may request to add additional CONTRACTOR's key Construction Document Management tool personnel, subject to the DISTRICT's acceptance, as the Project progresses.

   b. The DISTRICT will grant initial access to the Construction Document Management tool by creating user profiles to accepted CONTRACTOR personnel.

F. Authorized Users: The CONTRACTOR shall:

1. Request the User Application form from the DISTRICT Project Manager.

2. Submit completed User Application Form to the DISTRICT's Construction Document Management tool (i.e. e-Builder®) Administrator.

3. Requested users that are authorized by the DISTRICT's Administrator will be notified and provided a username and password. The CONTRACTOR may request to add additional CONTRACTOR's key Construction Document Management tool personnel, subject to the DISTRICT's acceptance, as the Project progresses.

4. Authorized users shall be responsible for the proper use of their passwords and access to data as agents of the company in which they are employed.

5. Sharing usernames and passwords are strictly prohibited.

G. Training: Group training sessions will be scheduled by the DISTRICT on as needed basis as determined by the DISTRICT. Users are required to attend the scheduled training sessions they are assigned to.

H. Support: e-Builder® will provide on-going support through online help files. The second level of help will be to contact the DISTRICT Construction Document Management tool Administrator with the help of DISTRICT Project Manager.

I. Copyrights and Ownership: Nothing in this Specification or the subsequent communications supersedes the CONTRACTOR's obligations and rights for copyright or document ownership as established by the Contract Documents. The use of CAD files, processes or design information distributed in this system is intended only for the Project specified herein.

J. Communications functions are as follows:

1. Document Integrity and Revisions:

a. Documents, comments, drawings and other records posted on the Construction Document Management tool will remain for the Project record. The authorship time and date will be recorded for each document submitted to the system. Submitting a new document or record with a unique ID, authorship, and time stamp will be the method used to make modifications or corrections.

b. The Construction Document Management tool is intended to facilitate identification of documents versions; revised or superseded documents as well as their predecessors.

2. Document Security: The Construction Document Management tool will provide a method for communication of documents. Users shall not post private and/or company confidential items in the database. All information on the Construction Document Management tool is considered a public record and subject to public disclosure, absent an applicable statutory exemption.

3. Notifications and Distribution:

a. Document distribution to Project members shall be accomplished both within the Construction Document Management tool and via email as appropriate. Project document distribution to parties outside of the Construction Document Management tool shall be accomplished by secure email of outgoing documents and attachments, readable by a standard email client.

b. Minimum Computing Requirements

i. Internet Connection: DSL, local cable company's Internet connection, or T1 connection is required.

ii. Operating Systems: Windows 7 or later & OS X v10.8 or later

iii. Supported Internet Browsers: Internet Explorer™ 11.0 or later, Google Chrome™ v 29.0.1 or later; Mozilla Firefox™ 35.0.1 or later, Safari™ 6.0.4 or later, Safari for iOS™ mobile v6.1 or later.

iv. Screen Resolution: The recommended screen resolution is 1280 x 1024 or higher. The minimum screen resolution required to support all e-Builder® features is 1024 x 768.

v. Verify the following internet browser settings: (1) Administrator Status; (2) Add e-Builder's websites as trusted sites; (3) Disable Pop-up Blocker(s); (4) ActiveX plugins must be installed (on the downloads page) to achieve full functionality in e-Builder and all ActiveX controls set to Enable or Prompt; (5) Download Plugins.

vi. See www.e-builder.net/support/optimization for additional information.

4. Automated System Notification and Audit Log Tracking:

a. Review comments made (or lack thereof) by DISTRICT on CONTRACTOR submitted documentation shall not relieve CONTRACTOR from compliance with requirements of the Contract Documents.

b. CONTRACTOR is responsible for managing, tracking, and documenting the WORK to comply with the requirements of the Contract Documents. DISTRICT's acceptance via the Construction Document Management tool notifications or audit logs extends only to the face value of the submitted documentation and does not constitute validation of the CONTRACTOR's submitted information.

PART 2 - **PRODUCTS (Not Applicable)**

PART 3 - **EXECUTION**

3.01 SUBMITTAL LOG: CONTRACTOR shall maintain an accurate Submittal Log and a Distribution List for the duration of the WORK, showing current status of all Submittals required for the complete Project and Distributees at all times in a form acceptable to the DISTRICT. CONTRACTOR shall make the Submittal Log available to the DISTRICT for its review on request, and shall bring a copy of the Submittal Log to all Progress Meetings.

END OF SECTION

SECTION 01310 COST LOADED CONSTRUCTION SCHEDULES

PART 1 - GENERAL

1.01 SCOPE:

A. COST LOADED CONSTRUCTION SCHEDULE (Construction Schedule): The WORK under this Contract shall be planned, scheduled, executed, and reported by the CONTRACTOR. The CONTRACTOR shall adhere to established technical standards for CPM (Critical Path Method) scheduling unless otherwise directed by the DISTRICT. The CONTRACTOR is required to provide all Construction Schedules in electronic format.

B. The CONTRACTOR shall submit a detailed Cost Loaded Schedule showing all WORK required under the Contract and scheduled within the time constraints set forth under the Contract. The DISTRICT will review and comment on the Schedule submittal as per 2.03. Upon acceptance, the submitted detailed Cost Loaded Schedule becomes the Baseline Schedule. The CONTRACTOR shall not change the accepted Baseline Schedule, without prior concurrence of the DISTRICT. The Baseline Schedule, shall be updated to show actual progress.

C. The CONTRACTOR shall be responsible for coordinating its own schedules (including subcontractors) as well as the construction activities of others as required to fully execute the WORK.

1.02 SOFTWARE/INTERFACE REQUIREMENTS:

A. The CONTRACTOR shall use the latest version of Oracle/Primavera P6 Professional Project Management (P6) for creating and updating all Construction Schedules and reports. No other scheduling software programs will be accepted.

B. To ensure compatibility for DISTRICT asset accounting, the DISTRICT will provide Activity Codes for all Asset and Non-asset Activities, and assist the CONTRACTOR in developing a Work Breakdown Structure (WBS) to be entered into the scheduling software as referenced in Section 2.02. The Construction Schedule (i.e. all Schedule Updates shall be used as the basis for payment.

1.03 QUALITY ASSURANCE:

A. The CONTRACTOR shall perform the WORK covered by this SECTION with personnel having substantial experience in the use of the latest version of P6 scheduling software on construction projects which required the development and maintenance of the schedule throughout the Project duration.

B. It is the responsibility of the CONTRACTOR to work with each subcontractor and supplier to obtain information pertinent to the planning and updating of their respective activities in the overall Project Construction schedule.

C. It is the responsibility of the CONTRACTOR to work with the DISTRICT's scheduler to resolve any related scheduling issues such as storing period performance, making sure the Primavera file (.xer) gets imported correctly, etc.

1.04 DEALING WITH SUBSTITUTES:

A. All versions of the CONTRACTOR's Construction Schedule shall be based solely on the WORK as awarded, and shall exclude any substitute proposals, even if the CONTRACTOR pursues a substitution in accordance with the provisions of the Contract.

B. The DISTRICT's final determination on any proposed substitutions may not be made until after the CONTRACTOR's Construction Schedule is prepared and accepted. Accepted proposed substitutions shall be identified in the schedule as Change Orders.

1.05 USE OF FLOAT:

A. Total Float is the amount of time a scheduled activity can be delayed without delaying the completion of the WORK beyond the contractually required end date. Contract Float is the number of days

between the CONTRACTOR's anticipated date for early completion of the WORK, or specified part, and the corresponding Contract Time. Total Float and Contract Float belong to the Project and are not for the exclusive benefit of any party. Contract Float and Total Float shall be available to the DISTRICT, consultants, or the CONTRACTOR to accommodate changes in the WORK or to mitigate the effect of events which may delay performance or completion. The DISTRICT will monitor and optimize the use of float for the benefit of the Project.

B. The CONTRACTOR shall adjust or remove any float suppression techniques (e.g., preferential sequencing, out-of-sequence activity relationships, crew movements, equipment use, form reuse, extended durations, imposed dates, lags, etc.) as a prerequisite to a request for an increase in Contract Price and/or Contract Time. Use of constraints or lags should be minimized and require approval by the DISTRICT. The accepted Baseline Schedule must have a single longest path with zero Total Float. Multiple longest paths are not acceptable.

1.06 EARLY COMPLETION: An early completion schedule is one which anticipates completion of all or a specified part of the WORK ahead of the corresponding Contract Time. Since Contract and Total Floats belong to the Project, the CONTRACTOR shall not be entitled to any extension in Contract Time or recovery for any delay incurred because of extensions in an early completion date until all Contract Float is used or consumed and performance or completion of the WORK extends beyond the Contract Time.

1.07 NON-COMPLIANCE: The DISTRICT may refuse to recommend/authorize a progress payment in the event of the CONTRACTOR's failure, refusal or neglect to provide the required schedule information, since this will preclude the proper evaluation of the CONTRACTOR's progress. Remedies for the CONTRACTOR's failure, neglect or refusal to comply with the requirements of this SECTION are in addition, and not limited to, those provided under other sections of the Contract.

PART 2 - PRODUCTS

2.01 GENERAL CRITERIA:

A. All Construction Schedules shall be prepared by the CONTRACTOR and reflect the CONTRACTOR's plans, means and methods, techniques and sequences for performing of the WORK.

B. The Construction Schedules shall break down the WORK into distinct activities with interdependencies to the extent required to clearly depict the planned approach for completion of the WORK and to effectively manage the execution of the WORK.

1. The Construction Schedules shall divide the WORK into manageable and logical segments and specify the progression from the Notice to Proceed (NTP) to Substantial Completion (SC) to Final Completion (FC) within Contract Time. SC and FC need to have the same total float.
2. The Construction Schedule is to include, at minimum, appropriate time allowances for submittals, procurement, coordination with others, construction, start-up/check-out (if applicable), operational and performance testing (if applicable), commissioning (if applicable), and Contract Close-Out.
3. Site-related activities shall not reflect a combination of work located in separate structures, work corresponding to different divisions of the specifications, work performed by first and second tier subcontractors or rough-in and finish work of the same trade.
4. The NTP activity shall be the first activity in the schedule and shall be a Start Milestone, with an assigned 7-day, no holiday calendar. The SC and FC activities shall be Finish Milestones, with assigned "Finish on or Before" constraints, with the Contract SC and FC dates assigned to the constraints, with a 7-day, no holiday calendar.
5. Primavera Settings:
    a. Constraints – Mandatory Starts or Finishes, Start On or Finish On and As Late as Possible constraints cannot be used in the Construction Schedules.
    b. Calculation Settings – Default settings must be used, except that Critical activities must be defined as Longest Path activities.

c. Activity Types – Resource Dependent, WBS Summary & Level of Effort activity types cannot be used except as directed by the DISTRICT. Activity types will be set to Task Dependent.

d. Percent (%) Complete Type must be set to Duration.

e. Duration Type must be set to Fixed Duration & Units.

f. No Curve may be applied to an activity or its resources.

g. Late finish dates for milestones need to be the same as contractual dates. Contractual dates need to be incorporated into the corresponding activity name.

6. The CONTRACTOR's Construction Schedule shall include preparation, review and acceptance of Shop Drawings, material fabrication and material deliveries. The first submittal review and acceptance activity durations shall be fifteen (15) working days. Resubmittal review and acceptance cycles shall have activity durations of ten (10) working days. The CONTRACTOR shall include only the first submittal review and acceptance cycle for each submittal in the Construction schedule. If more than one cycle for a submittal occurs, the CONTRACTOR shall add that cycle to the schedule at the time it occurs. Additional submittal, review and acceptance cycles will require a revision to the Schedule.

C. The CONTRACTOR shall schedule any requirements (such as submittal reviews) of the DISTRICT, the DESIGN CONSULTANT and others (performing WORK for the DISTRICT) indicated in, or required by the Contract Documents. The Construction Schedule shall incorporate appropriate activities and WORK sequences based upon the Contract Documents.

2.02 RESOURCE AND COST LOADING:

A. Each activity in the Contract Schedule shall be assigned a dollar value in accordance with the physical value of that work in relationship to the Activity Codes/WBS. The total budget value of all activities shall equal the Contract Price. The CONTRACTOR shall also indicate the planned duration for each construction activity.

B. The Major Categories for the WORK being performed shall be broken down by the following activity codes.

1. General (including mobilization, demobilization, bonds, insurance, survey, as builts)

2. Submittals

3. Submittals Review & Acceptance

4. Fabrication & Delivery

a. Culverts (Non-Gated)

C. The WBS for the logical construction sequencing, at a minimum shall consist of the following:

1. General (e.g., NTP, SC, FC, General Conditions, Bonds, Insurance, Punchlist)

2. Submittal Preparation

3. Submittal Review and Acceptance – If there are engineering costs associated with a submittal, those costs must be approved by the DISTRICT before they can be cost loaded in the Construction Schedule. No payment will be made for submittals until the review and acceptance process has been completed for that submittal.

4. Fabrication & Delivery - If there are costs associated with the Fabrication and Delivery, then a separate cost loaded Delivery Activity must be added with one (1) day duration, and assigned to its appropriate Activity Code/WBS. The DISTRICT will only pay for materials once delivered and stored in a manner that complies with all the Contract Documents.

5. The WBS for the remaining construction related work shall be broken down in sufficient detail for conveying the sequence at which the CONTRACTOR intends to construct the Project.

D. Schedules where activities are not assigned both an Activity Code and WBS will not be accepted.

E. Cost Resource Loading:

1. A single unique resource for the cost loading of all activities shall be created in the resource dictionary.
2. The resource type for costs shall be “Nonlabor”.
3. Cost loading of activities shall be lump sum loading of the Budgeted Cost field and Budgeted Units. Budgeted Cost needs to be same as Budgeted Unit.
4. All costs must be displayed to two (2) decimal places.
5. The Costs for Mobilization and Demobilization activities must be equal.

F. Financial Periods and Stored Period Performance:

1. The Financial Periods must be set for the duration of the Project and start on the first day of the month and finish on the last day of the month.
2. “Stored Period Performance” must be used on a monthly basis in order for the “Actual This Period Nonlabor Cost” to be displayed correctly in the reports. Please refer to Appendix A for details.

G. Stored Material - For those Construction Schedule activities of WORK that will use Stored Materials, the material or equipment delivery activities related to the WORK will be cost loaded with enough money to cover the stored material. The cost loading of activities related to the work-in-place will be reduced by the amount of the stored material costs loaded into the delivery activities. The CONTRACTOR must provide a list of materials and/or equipment that will be paid for under Stored Materials prior to acceptance of the Baseline Schedule so that the DISTRICT can check for proper cost loading.

H. If the WORK includes items covered by allowances, the CONTRACTOR shall ensure that WORK is completed within the limits of the Contract Time. The Construction Schedule shall incorporate the CONTRACTOR’s best estimate of the activities and logic associated with the allowances.

I. CONTRACTOR’s P6 Settings need to be same as the DISTRICT settings. Please refer to Appendix B for details.

2.03 COST LOADED CONSTRUCTION SCHEDULE SUBMITTAL:

A. The Construction Schedule submittal, which refers to both the Baseline Schedule and all Schedule Updates, are to consist of the following items:

1. An electronic file containing PDF formats of all required reports and graphics, including a written narrative.
2. An electronic backup of the Construction Schedule in Primavera P6 XER format.
3. For Schedule Updates, a copy of the payment application is required. The Period Ending date in the DISTRICT Application for Payment must match the Data Date of the corresponding Schedule Update.

B. The Schedule Narrative Report for the Update Schedule shall consist of a written description of how the WORK will be accomplished in accordance with the accepted Baseline Schedule. The Schedule Narrative accompanying each Schedule Update shall, at a minimum, compare current progress and cost performance to the last update for all milestones and activities, including longest path activities. If there are potential or actual delays, the narrative shall state the cause of the delay and impact to the Construction Schedule and define steps that have been taken or intend to be taken to mitigate delay impacts. The CONTRACTOR shall list any changes in activities ‘duration and logic. The narrative shall provide sufficient detail to allow the DISTRICT to verify the progress of the WORK, compare actual versus planned activities, and identify assumptions made in scheduling work, including Change Order work. The CONTRACTOR shall direct specific attention, in writing, to adjustments or corrections made, either in response to the DISTRICT’s comments on the previous submittal or otherwise. A Schedule Narrative Report must be provided for all Baseline Schedules and Construction Schedule Updates.

1. Schedule Narrative Report (Baseline)

a. The Schedule Narrative Report shall show the following sub-headings with detailed comments:
    i. Project Scope of Work
    ii. Assumptions and Exceptions
    iii. Proposed Work Sequence and Longest Path
    iv. Milestones
b. It shall be an electronic color PDF – 8 ½" x 11" portrait format file.

2. Schedule Narrative Report (Construction Updates)
a. The Schedule Narrative Report shall show the following sub-headings with detailed comments:
    i. Progress, issues, delays, and claims
    ii. Delay reasons and at-fault party
    iii. Proposed recovery plan for next update
    iv. Schedule changes, including out-of-sequence work
    v. Milestones
    vi. Critical submittals and Procurement items
    vii. Response to DISTRICT Review comments from previous submittal on an item by item basis.

C. It shall be an electronic color PDF – 8 ½ x 11 portrait format file. Required Schedule Reports and Graphics - Bar Chart reports/P6 (plf) layouts will be provided by the DISTRICT and imported for use by the CONTRACTOR.

1. Schedule/Leveling Report (Schedlog)
a. The report shall indicate software settings and calculations generated by Primavera software.
b. Shall be an electronic color PDF - 8 ½ x 11 portrait format file.

2. WBS with Cash Flow Diagram (Grouped by WBS)
a. Bar Chart shall indicate all activities grouped by WBS and sorted by Early Start, Early Finish and Total Float.
b. Cash Flow Diagram shall be shown at the end of the Bar Chart, which shows budget and actual monthly bars, and cumulative curves.
c. Shall be an electronic color PDF - 11 x 17 landscape format file.

3. Longest Path Bar Chart (No Grouping)
a. Bar Chart shall indicate all longest path activities without grouping and sorted by Early Start, Early Finish and Total Float.
b. Bar Chart shall be an electronic color PDF - 11 x 17 landscape format file.

4. Pay App - Expanded (Grouped by Activity Codes)
a. Bar Chart shall indicate all activities grouped by Activity Codes and sorted by Activity ID.
b. Bar Chart shall be an electronic color PDF - 11 x 17 landscape format file.

5. Pay App - Rollup (Grouped by Activity Codes)
a. Bar Chart shall indicate all activities grouped by Activity Codes rolled up per each Activity Code. The application for payment line items must match this layout.
b. Bar Chart shall be an electronic color PDF - 11 x 17 landscape format file.

6. Earned Value Report
a. The report shall show Earned Value information comparison between the accepted Baseline and the Current Schedule Update.
b. The report shall be an electronic color PDF - 11 x 17 landscape format file.

D. Draft Schedule Reports – The following reports are to be provided prior to the formal submission of the Schedule Update and application for payment for the purpose of agreeing upon the Duration % Complete and Cost % Complete of each activity.

1. WBS with Cash Flow Diagram
2. Pay App - Expanded
3. Longest Path

E. One (1) week prior to each Schedule Update submittal, the DISTRICT and the CONTRACTOR will agree upon the physical progress of the WORK (Duration % Complete of each activity), and the value (Cost % Complete) of the scheduled work in place. The Duration % Complete must match the Cost % Complete, or a specific reason must be given in the Schedule Narrative Report.

F. All documents shall show the Project ID and Name. The DISTRICT's review shall not extend to the CONTRACTOR's means, methods, or techniques, the correctness of which shall remain the sole responsibility of the CONTRACTOR.

G. All schedules shall be in accordance with the Contract Time requirements of the Contract. Neither the DISTRICT's review of the Construction Schedule, nor the DISTRICT's statement of "Accepted As Submitted", will relieve the CONTRACTOR from responsibility for complying with Contract Time requirements, adhering to those sequences of work indicated in or required by the Contract Documents, or from completing any omitted WORK within the Contract Time.

H. Acceptance by the DISTRICT of the Baseline Schedule and Schedule Updates shall be a CONDITION PRECEDENT to the processing of Applications for Payment.

2.04 COST LOADED BASELINE SCHEDULE UPDATES:

A. The CONTRACTOR shall submit their Initial Cost Loaded Construction Schedule to the DISTRICT for review and acceptance not more than 30 calendar days after Contract Execution and prior to NTP. It will be reviewed for conformance to the requirements of the Contract Documents. If the schedule is not accepted and requires revisions, the CONTRACTOR will revise this Construction Schedule and resubmit it for review and acceptance within ten (10) calendar days of the rejection notice

B. Schedule Naming Structure: Once the Construction Schedule is accepted, it becomes the CONTRACTOR's Baseline Schedule Update 0 and is the basis for monitoring the CONTRACTOR's progress against milestones, Contract Time, and the evaluation and reconciliation of extensions in Contract Time. From then on, all activities, original durations, and their relationships may not be changed, added, or deleted without the prior approval of the DISTRICT. Contract Time (including all contracted milestones) cannot be changed without a formal Change Order approved by the DISTRICT.

Project Name – R0A-U0	1st Submission of Baseline Schedule.
Project Name – R0B-U0	2nd Submission of Baseline Schedule, which is accepted and designated as the Baseline Schedule
Project Name – R0B-U1A	1st Submission of Update 1.
Project Name – R0B-U1B	2nd submission of Update 1, which is accepted.

C. Schedule updates shall accurately reflect all approved Change Orders including the exact duration and cost. They will be reviewed for conformance to the requirements of the Contract Documents as amended by Change Orders.

D. Schedule Activity ID's must not be changed or deleted.

2.05 CHANGE ORDERS

A. Upon execution of a Change Order, a new Activity Code and WBS for that Change Order must be created. All activities associated with that Change Order will be assigned to the new WBS and the new Activity Code will be assigned to those activities. Both the Application for Payment and the layout report, Pay App - Rollup, will have a line item indicating the new Change Order.

B. If a particular Scope of Work (SOW) has been deleted in a Change Order, the original activities associated with that SOW must remain. A new set of identical activities will be created under a new WBS and a new activity code (e.g. CO#1) with equivalent but negative value dollars.

C. If a new activity is added because of an executed Change Order both the Activity ID and the Activity Name must reflect the associated Change Order. (e.g. CO#01-A, Additional Silt Fence ***CO#01 Item A).

D. An executed Change Order may require multiple activities broken down in sufficient detail to convey the new SOW.

E. All activities related with change orders must have predecessors and successors and must tie back to the original scope's activity network logic.

F. Executed change orders can be reflected in the next schedule update.

PART 3 - EXECUTION

3.01 MONTHLY UPDATE CYCLE:

A. Schedule Update Submittals are due every month and are to be attached to each Application for Payment. The Schedule Update Total Actual Cost to Date must match the Application for Payment WORK Completed and Stored to Date amount. The DISTRICT will advise the CONTRACTOR of any change to the due dates.

B. See Paragraph 2.03.D for the Draft Schedule Reports that are to be provided prior to the formal submission of the Schedule Update and application for payment.

C. The CONTRACTOR should include a two-week look ahead report from Primavera for each bi-weekly construction meeting. District will provide a primavera layout for this report. The report needs to be produced from the layout.

3.02 CHANGES:

A. If the monthly update is behind schedule, the CONTRACTOR shall include details in the update narrative that identify the cause of the delay, at- fault parties and any actions required by the CONTRACTOR to recover the schedule and complete the project within Contract Time. The CONTRACTOR shall promptly undertake appropriate action, at no additional cost to the DISTRICT, to recover the schedule whenever the current schedule shows that the CONTRACTOR did not or cannot achieve a milestone established in the Contract.

B. Appropriate recovery actions include, but are not limited to, assignment of additional labor, subcontractors, equipment, shift or overtime work, expediting of submittal or deliveries, or any combination of thereof. Overlapping of activities or sequencing changes shall be deemed appropriate only if properly substantiated in the submittal. Recovery plans that are accepted by the DISTRICT that add, delete, or change activities, activity relationships, durations or constraints and cost or resource loading must be submitted in the next schedule update.

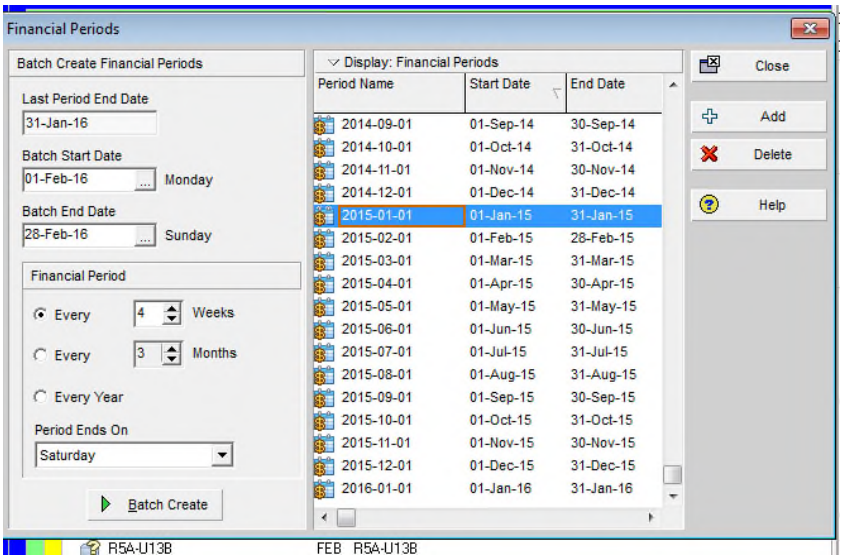
C. The CONTRACTOR's refusal, failure or neglect to take appropriate recovery action or to submit a written recovery plan shall constitute reasonable evidence that the CONTRACTOR is not prosecuting the WORK, or separable part, with the diligence that will ensure its completion within the Contract Time. Such lack of action shall constitute sufficient basis for the DISTRICT to recommend the withholding of some or all of any payment due and/or shall be considered grounds for termination of the Contract by the DISTRICT in accordance with Article 15 of the General Terms & Conditions.

END OF SECTION

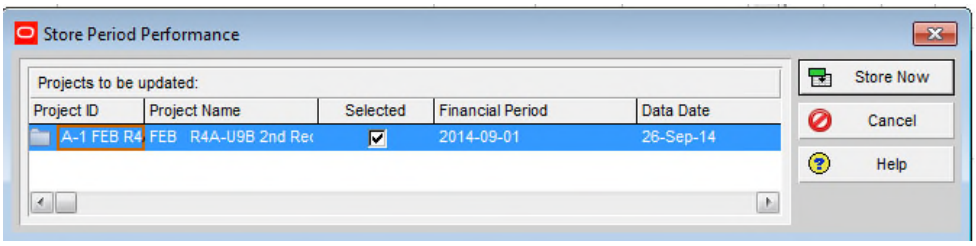
Appendix A: Monthly Updates After Pay App #1

After Pay App #1, the following steps need to be followed in order to let "This Period" show current month $ instead of up-to-date $. If these steps are not followed, "This Period" may not match your monthly invoice $ and may result the rejection of your pay app.

Step 1. Check Financial Period Settings. Go to Admin>Financial Period and make sure there are monthly periods that cover the duration of the project. Each period should start on the 1st day of the month and end on the last day of the month.



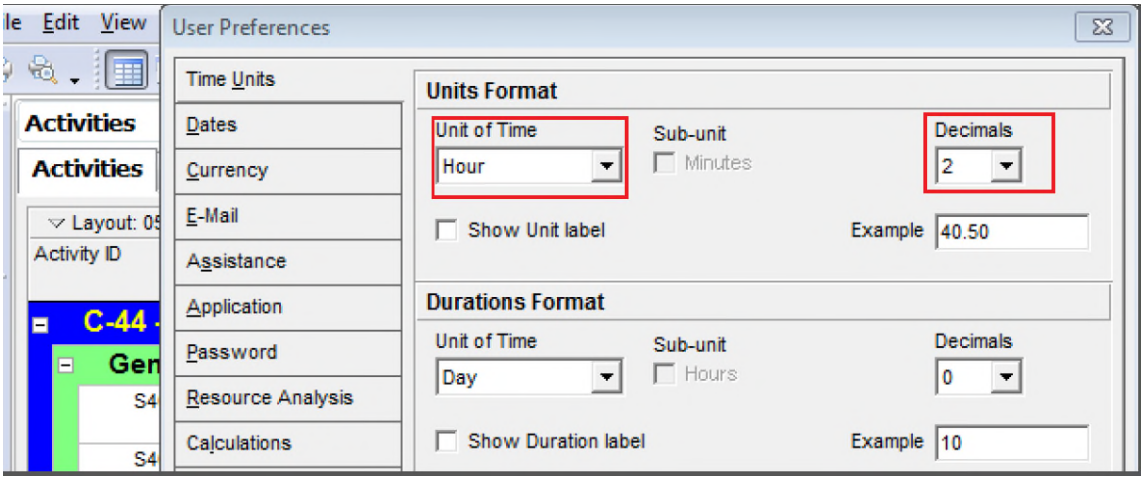
Step 2. Save Financial Period Performance. Make a copy of the P6 file of Pay App 1 and rename it "Pay App 2". Open the Pay App 2 file and before you do anything, go to Tools>Store Period Performance and choose the Financial Period that is the same month of the data date. Click "Store Now". This will clear the "This Period" column and get your file ready for updates.



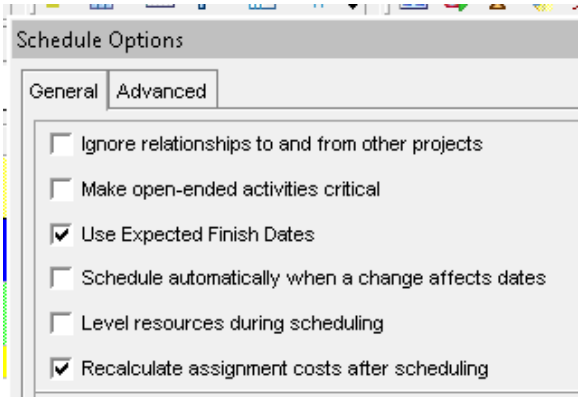
Step 3. Input updates. Type in your updates for Pay App #2, advance the data date, and generate reports. DO NOT CLICK "STORE NOW" until you are ready to make a copy of Pay App 2 to create Pay App 3. Repeat steps 2 & 3 for future updates.

APPENDIX B: Matching your P6 settings with SFWMD P6 settings

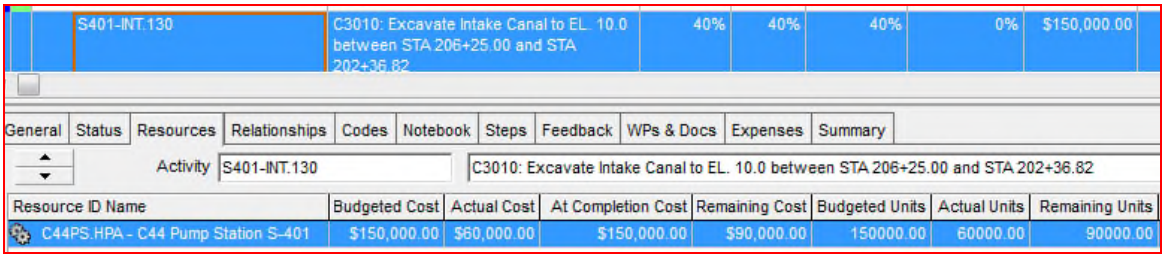
1. Go to the menu bar, click “Edit”, then “User Preferences”. In the pop-up window, choose “Unit of Time”. Make sure the unit of time is “Hour”. See the screenshot below.



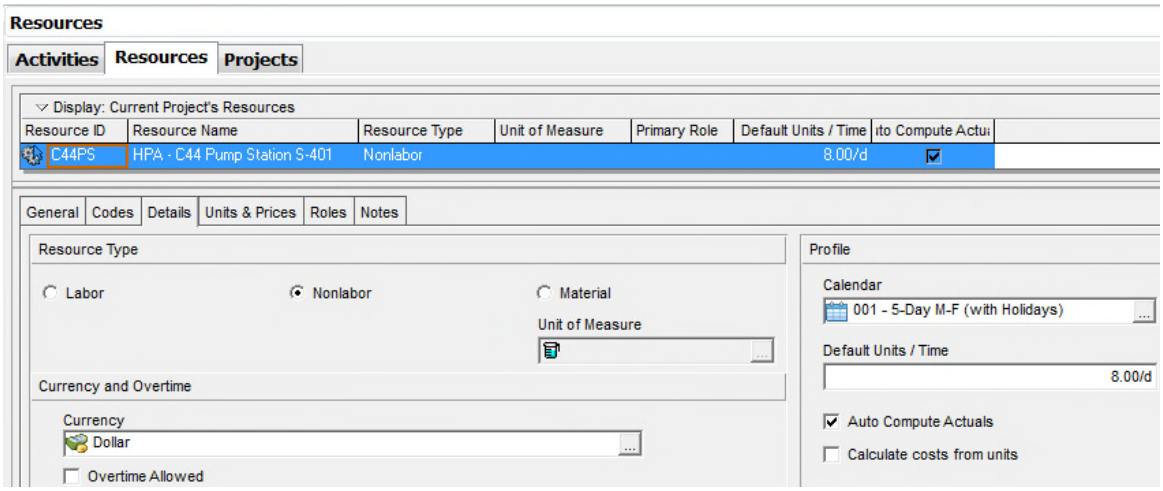
2. Click “F9”, choose “Schedule Options” and make sure your options match the selections shown below.

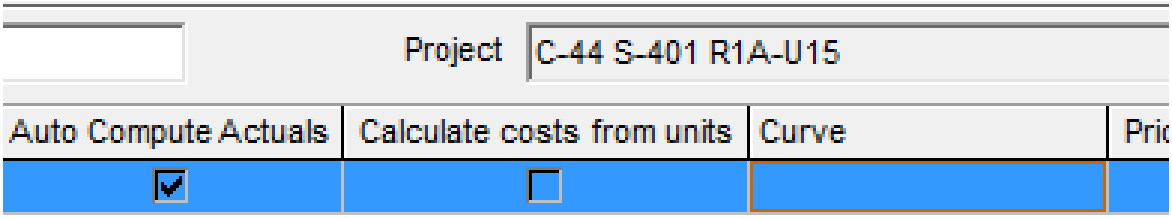


3. Go through each activity with $ (you can do this in the cash flow diagram layout) and make sure the “Budgeted Cost”, “At Completion Cost” and “Budgeted Units” have the same number. See the screenshot below. You need to click “F9” or “schedule” the project to see if the number you entered will stay or not. If the number you entered disappears after clicking “F9”, please follow step 4.



4. Go to the “Resources” tab and uncheck “Calculate costs from units”. Make sure the “Curve” field is empty. See the screenshot below.





SECTION 01320 CONSTRUCTION VIDEO AND PHOTOGRAPHS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION specifies administrative and procedural requirements for construction photographs.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 SUBMITTALS: Submit photographs electronically as specified in SECTION 01300 and in PART 3, this SECTION.

1.03 QUALITY ASSURANCE: Photographs and video shall be clear and sufficient to show significant detail, not blurred, or taken in shadow, nor too distant. The DISTRICT may require that the photographs or video be retaken should the quality be insufficient. Costs for such re-takes are the CONTRACTOR's responsibility at no extra cost to the DISTRICT.

PART 2 - PRODUCTS

2.01 PHOTOGRAPHIC REQUIREMENTS: Specified in PART 3, this SECTION.

PART 3 - EXECUTION

3.01 COLOR AUDIO VIDEO TAPING OF CONSTRUCTION AREA:

A. Prior to beginning any construction, the CONTRACTOR shall prepare a color audio video recording of all the areas to be affected by construction.

B. The audio video recording shall be done within the two-week period prior to placement of materials or equipment on the construction area and furnished one week prior to the start of construction. The audio video recording shall be done with a DISTRICT Representative present.

C. To preclude the possibility of tampering or editing in any manner, all video recordings shall, by electronic means, generate and display continuously and simultaneously on the screen digital information to include the date and time of recording. The time information shall consist of hours, minutes and seconds, separated by colons (i.e., 10:35:18).

D. The audio video recording shall consist of one video and one audio track which shall be recorded simultaneously. All tracks shall consist of original live recordings and thus shall not be copies of other audio and video recordings. The audio track shall contain the narrative commentary.

E. The rate of speed in the general direction of travel of the conveyance used during recording shall be controlled to provide a usable image. Panning rates and zoom-in, zoom-out rates shall be controlled sufficiently such that playback will produce clarity of the object viewed.

F. All recording shall be done during times of good visibility. No recording shall be done during periods of visible precipitation, unless otherwise authorized by the DISTRICT.

G. The DISTRICT shall have the authority to designate what areas may be omitted or added for audio video coverage.

H. When conventional wheeled vehicles are used, the distance from the camera lens to the ground shall not be less than eight feet to insure perspective.

I. In some instances, audio video coverage will be required in areas not accessible by conventional wheeled vehicles. Such coverage shall be obtained by walking or special conveyance by the DISTRICT.

J. Areas covered shall include offsite roadways that will be subjected to heavy usage such as for haul routes or delivery of heavy components or equipment.

3.02 PROGRESS SITE PHOTOGRAPHS:

A. The CONTRACTOR shall be responsible for photographs of the Site to show the existing and general progress of the WORK. The DISTRICT will advise as to which views are of interest. Photographs shall be taken of the following areas and at the following times.

1. Existing Site conditions before Site WORK is started. Number of views shall be adequate to cover the Site.

2. Progress of the WORK from beginning and throughout construction. Progress photos must be provided with each pay request. Pay requests will not be considered acceptable until photographs are provided. Number of views shall be adequate to cover the Site.

3. Finished Project after completion of WORK. Number of views shall be adequate to show the finished WORK.

4. If Project is not completed during the Contract Time, or authorized extensions, photographs shall continue to be taken at no increase in Contract Price.

B. Photographs shall be taken with three (3) megapixel minimum resolution.

C. Monthly progress photographs shall be taken from an aerial perspective on all Projects, except for indoor Projects.

D. Provide a CD containing all photographic images in JPG format. Label CD with the name and Contract number of Project, name of CONTRACTOR, description of view, and date photograph was taken.

E. Deliver CD to DISTRICT with pay applications.

3.03 ADDITIONAL PHOTOGRAPHS: From time to time the DISTRICT 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 Price or an Allowance.

A. The DISTRICT will give the photographer three (3) days' advance notice, where feasible.

B. In emergency situations, the photographer shall take additional photographs within 24 hours of the DISTRICT'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. DISTRICT's request for special publicity photographs.

3. Special events planned at Project Site.

4. Immediate follow-up when on-site events result in construction damage or losses.

5. Photographs to be taken at fabrication locations away from Project Site.

6. Extra record photographs at time of final acceptance.

END OF SECTION

SECTION 01410 TESTING AND QUALITY CONTROL

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work:

1. The CONTRACTOR shall provide and maintain an effective Quality Control Program that fulfills the requirements of Article 13 *"Warranty and Guarantee, Tests and Inspections, Correction, Removal or Acceptance of Defective Work"* of the GENERAL TERMS & CONDITIONS.

2. The CONTRACTOR shall establish and implement a Quality Control Plan to perform sufficient inspection of all items of the WORK, including that of Subcontractors, to insure conformance to the Technical Specifications and the Drawings with respect to the materials, workmanship, construction, equipment performance, and identification.

3. The CONTRACTOR's job supervisory staff may be used for quality control, supplemented as necessary by additional personnel for surveillance or special technicians to provide capability for the controls required by the Technical Specifications. The CONTRACTOR's Quality Control Plan must clearly identify the quality control leader and personnel organizational system. The leader must have the authority to direct the removal and replacement of defective work.

4. After the Contract is awarded and before the construction begins, the CONTRACTOR shall meet with the DISTRICT or its representative to discuss quality control requirements. The meeting shall develop mutual understanding relative to the details of the Quality Control Plan, including the appropriate forms to be used for recording the quality control operations, inspections, administration of the Quality Control Plan, and the interrelationship of the CONTRACTOR and the DISTRICT inspection.

5. The CONTRACTOR shall submit his written Quality Control Plan for review, describing the activities and listing those inspection and testing activities that the CONTRACTOR will perform prior to beginning the WORK. The CONTRACTOR’s Quality Control Plan shall describe how he will communicate timely notification to allow for testing and inspection activities performed by the DISTRICT, or its representatives, for on and off-site construction activities

6. All compliance inspections shall be recorded on the appropriate forms, including but not limited to the specific items required in each SECTION of the Technical Specifications. The completed forms, including record of corrective actions taken, shall be furnished to the DISTRICT. The DISTRICT's quality control representative will maintain a list of all deficiencies which are not corrected the same day as they are discovered.

7. Should recurring deficiencies in an item or items indicate that the Quality Control Plan is not adequate, the CONTRACTOR shall take corrective actions as directed by the DISTRICT to update the Quality Control Plan, to satisfactorily address and resolve any reoccurring deficiencies.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

1.02 TESTING LABORATORY SERVICES:

A. All tests which require the services of a laboratory to determine compliance with the Contract Documents shall be performed by an independent commercial testing laboratory acceptable to the DISTRICT. The laboratory shall be staffed with experienced technicians, and shall be properly

equipped, ACI certified, and fully qualified to perform the tests in accordance with the specified standards.

1.03 TESTING LABORATORY SERVICES FURNISHED BY CONTRACTOR:

A. The testing that the DISTRICT will coordinate and pay for is described in paragraph 1.04 below. All other testing required in connection with the performance of the WORK (which are identified as the CONTRACTOR's responsibility in the Contract Documents) shall be performed and paid for by the CONTRACTOR, and a certified copy of the results will be furnished to the DISTRICT within five (5) days of the test.

B. The CONTRACTOR is also responsible for all testing and inspection services required to achieve an effective Quality Control Program, to assure that the WORK strictly complies with the Contract requirements. The CONTRACTOR shall pay all costs for such services. The CONTRACTOR shall also pay for any tests performed by the DISTRICT which do not meet the requirements of the Technical Specifications and as described below.

1.04 TESTING LABORATORY SERVICES FURNISHED BY DISTRICT:

A. The DISTRICT will secure the services of a materials testing company, for field and laboratory tests, for certain items of the WORK. The DISTRICT will pay all charges for services on: cast-in-place concrete, moisture density (Proctor) and relative density tests on embankment, fill and backfill materials, in-place field density tests on embankments and fills, and the tests required for the Grouting Beneath Structures. The field sampling and testing will be performed in the general manner indicated in the Technical Specifications, with minimal interference to the construction operations.

While the CONTRACTOR may request testing in order to proceed to a following construction stage, the DISTRICT will determine the exact time and location of the field sampling and testing, and may require additional sampling and/or testing as necessary to determine that the materials and equipment conform with the CONTRACTOR-submitted data and with the Contract Documents.

1. The DISTRICT shall be reimbursed by the CONTRACTOR for the cost of any CONTRACTOR-requested tests or inspections, or tests on an item purported to be ready, which fail to meet the Technical Specification requirements. The DISTRICT may withhold such amounts from payments otherwise due to the CONTRACTOR.

B. Arrangements for the delivery of samples and test specimens to the testing laboratory under this paragraph will be made by the DISTRICT. The testing laboratory shall perform all laboratory tests within a reasonable time consistent with the specified standards and shall furnish a written report of each test.

C. The CONTRACTOR shall furnish all sample materials and cooperate in the sampling and field testing activities, interrupting the WORK when necessary.

D. When sampling or testing activities are performed in the field by testing laboratory personnel, the CONTRACTOR shall furnish personnel and facilities to assist in the activities.

E. The Testing Laboratory contracted by the DISTRICT will not be authorized to:

1. Release, revoke, alter or enlarge on requirements of the Contract Documents.

2. Approve or accept any portion of the WORK.

3. Perform any duties of the CONTRACTOR.

4. The CONTRACTOR shall provide at least 48 hours advance notice of any work for which he may desire required testing for compliance by the DISTRICT.

1.05 TRANSMITTAL OF TEST REPORTS:

A. Written reports of test and engineering data furnished by the CONTRACTOR shall be submitted as specified in SECTION 01300.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION (Not Applicable)

END OF SECTION

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SECTION 01510 TEMPORARY UTILITIES AND FACILITIES

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION includes requirements of a temporary nature not normally incorporated into final WORK. It includes the following:

1. Utility services
2. Construction and support facilities
3. Construction aids
4. Fire protection
5. Bypass flow

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 01530 - Temporary Barriers and Controls
3. SECTION 01590 - Field Offices and Sheds
4. SECTION 02402 - Bypass

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American National Standards Association (ANSI):
    a. A10 Series - Safety Requirements for Construction and Demolition
    b. ANSI/ASME PTC 19.1 Test Uncertainty, Instrument and Apparatus
2. Florida Department of Transportation (FDOT)
    a. Standard Specifications for Road and Bridge Construction
3. Florida Trench Safety Act (90-96, Laws of Florida)
4. National Electrical Contractors Association (NECA):
    a. Electrical Design Library - Temporary Electrical Facilities
5. National Fire Protection Association (NFPA):
    a. NFPA 10 - Standard for Portable Fire Extinguishers
    b. NFPA 70 - National Electrical Code
    c. NFPA 241 - Standard for Safeguarding Construction, Alteration, and Demolition Operations
6. National Electrical Manufacturers Association (NEMA)
7. Underwriters Laboratories (UL)

1.03 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Site Plan: Submit to the DISTRICT a Site Plan indicating CONTRACTOR's facilities including:

1. Trailers
2. Equipment Yard
3. Parking
4. Traffic Control
5. Bypass flow

1.04 QUALITY ASSURANCE:

A. Regulations: Comply with industry standards and applicable laws and regulations of authorities having jurisdiction, including but not limited to:

1. Building Code requirements
2. Utility company regulations
3. Police, Fire Department, and rescue squad rules
4. Environmental protection regulations

B. Standards:

1. Comply with NFPA 10 and 241, and ANSI A10 Series standards "Temporary Electrical Facilities."
2. Comply with NEMA, NECA, and UL standards and regulations for temporary electric service. Install service in compliance with NFPA 70.

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

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

A. Provide new materials and equipment. If acceptable to the DISTRICT, undamaged previously used materials and equipment in serviceable condition may be used. Provide materials and equipment suitable for the use intended, of capacity for required usage, and meeting applicable codes and standards. Comply with requirements of DIVISIONS 2 through 16.

B. Water: Provide potable water approved by local health authorities.

C. Electrical Outlets: Provide properly configured, NEMA-polarized outlets to prevent insertion of 110- to 120V plugs into higher voltage outlets. Provide receptacle outlets equipped with ground-fault circuit interrupters, reset button, 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 waterproof connectors to connect separate lengths of electric cords if single lengths will not reach areas where construction activities are in progress. Do not exceed safe length-voltage ratio.

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. 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 NFPA-recommended classes for the exposures. Comply with NFPA 10 and NFPA 241 for classification, extinguishing agent, and size required by location and class of fire exposure.

G. The CONTRACTOR shall provide bypass flow system as specified in SECTION 02402.

PART 3 - EXECUTION

3.01 TEMPORARY UTILITIES:

A. General:

1. Engage the appropriate local utility company to extend temporary electric and phone service to the Project area from nearby existing utilities. Where utility company provides only part of the service, provide the remainder with matching, compatible materials and equipment. Comply with utility company recommendations.

2. Provide adequate utility capacity at each stage of construction. Prior to availability of temporary utilities at the Site, or in remote areas without services, provide trucked-in services as required for start-up and construction operations.

3. Furnish, install and maintain temporary utilities required for adequate construction, safety and security. Modify, relocate and extend systems as WORK progresses. Repair damage caused by installation or use of temporary facilities. Grade the areas of Site affected by temporary installations to required elevations and grades, and clean the area. Remove on completion of WORK or until service or facilities are no longer needed or are replaced by authorized use of completed permanent facilities.

4. The types of temporary construction utilities and facilities required include, but are not limited to, potable drinking water, wastewater, drainage, dewatering equipment, enclosure of WORK, ventilation, electrical power, lighting, hoisting facilities, stairs, ladders, and roads.

5. Inspect and test each service before placing temporary utilities in use. Arrange for required inspections and tests by governing authorities, and obtain required certifications and permits for use.

6. Materials used for temporary service shall not be used in the permanent system unless so specified or acceptable to the DISTRICT.

3.02 TEMPORARY ELECTRICITY AND LIGHTING:

A. New Service:

1. Arrange with utility company to extend existing electric service to temporary office trailers.

2. Connect temporary service in a manner directed by utility company officials. Provide separate meter for metering of power used by all entities authorized to be at or perform WORK at the Project Site.

3. The electric service shall be of sufficient capacity and characteristics for the various construction tools, machinery, lights, heating and air conditioning, pumps, and other tools required by CONTRACTOR and his Subcontractors. In areas of the Project where permanent or temporary power service from the local utility is not available, the CONTRACTOR shall supply and maintain engine-driven, power-generator sets.

4. Provide weatherproof, grounded, power distribution system sufficient to accommodate construction operations requiring power, use of power tools, electrical heating and lighting.

Provide overload protection. Supply power for electric welding, if any, from engine-driven, power-generator sets.

5. Provide adequate artificial lighting for all areas of WORK when natural light is not adequate for WORK.

6. Sufficient light shall be provided for general construction areas, with additional sufficient lighting for specific tasks and to meet safety requirements.

B. Use of Permanent System:

1. Prior to use of permanent system to be installed by the power company for construction purposes, obtain written permission of the DISTRICT.

2. Maintain permanent system as specified for temporary facilities.

C. Costs of Installation and Operation:

1. Pay fees and charges for permits and applications.

2. Pay costs of installation, maintenance, removal of temporary services, and restoration of any permanent facilities used.

3. Pay costs of electrical power used (if applicable).

4. Pay costs of furnishing, operating, and maintaining engine-driven power-generator sets, where applicable.

3.03 TEMPORARY HEAT AND VENTILATION:

A. General:

1. Provide temporary heat, ventilation and cooling as required to maintain adequate environmental conditions in temporary office trailers and storage sheds and to facilitate progress of the WORK, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage. Protect from adverse effects of low temperatures or high humidity, and to prevent hazardous accumulations of dust, fumes, vapors, or gases.

2. Methods of heating and fuel shall be suitable for particular purposes. Portable heaters shall be standard approved units with controls.

B. Costs of Installation and Operation:

1. Pay fees and charges for applications, permits, and inspections.

2. Pay costs of installation, operation, maintenance, removal of equipment, and restoration of existing or permanent facilities if used.

3. Pay cost of power and fuel used.

3.04 TEMPORARY TELEPHONE SERVICE:

A. General:

1. Arrange with local telephone service company to extend existing direct line telephone service to the CONTRACTOR’s and DISTRICT's field office site for the use of the DISTRICT and construction personnel and employees.

2. Telephone Service: Local Provider.

3. Minimum Service Required: Direct lines for voice and data communication for the DISTRICT's field office as specified in SECTION 01590.

a. One direct line instrument in superintendent's field office.

b. Adequate number of service lines and instruments for needs of trades.

c. Other instruments and pay telephone station(s) at the option of the CONTRACTOR, or as required by regulations.

d. Provide a dedicated telephone line for a fax machine in the Superintendent's field office.

4. CONTRACTOR shall arrange with local cellular/mobile telephone service company to provide mobile telephone service for use by CONTRACTOR and so CONTRACTOR can be reached throughout the entire Project area during normal working hours.

B. Costs of Installation and Operation: Pay all costs for installation, maintenance and removal, and service charges for local calls. Toll charges shall be paid by the party who places the call.

3.05 TEMPORARY SANITARY FACILITIES:

A. CONTRACTOR-Furnished Facilities:

1. Furnish, install and maintain temporary sanitary facilities for use through construction period. Remove on completion of WORK.

2. Provide for all construction workers under this Contract and representatives at the Site.

3. Toilet facilities shall be of the chemical-aerated recirculation or combustion type, properly vented and fully enclosed with a glass- fiber-reinforced polyester shell or similar nonabsorbent material.

3.06 TEMPORARY CONSTRUCTION AIDS:

A. General:

1. Provide construction aids and equipment required by personnel, available for DISTRICT observers' use, and to facilitate the execution of the WORK; scaffolds, staging, ladders, stairs, ramps, runways, platforms, railings, hoists, cranes, chutes, and other such facilities and equipment.

2. Materials may be new or used, must be suitable for the intended purpose and meet the requirements of applicable codes, regulations and standards.

3. When platform stair framing is in place, provide temporary treads, platforms, and railings for use by construction personnel.

3.07 TEMPORARY BYPASS FLOW: The CONTRACTOR shall furnish a bypass system as specified in specification SECTION 02402.

3.08 INSTALLATION AND REMOVAL:

A. Relocation: Relocate construction aids as required by progress of construction, by storage or WORK requirements, and to accommodate requirements of DISTRICT and other CONTRACTOR's at the Site.

B. Removal: Remove temporary materials, equipment and services when construction needs can be met and allowed by use of permanent construction, or at completion of the Project.

C. Repair: Clean and repair damage caused by installation or by use of temporary facilities.

1. Remove foundations and underground installations for construction aids.

2. Grade the areas of the Site affected by temporary installations to required elevations and clean the area.

END OF SECTION

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SECTION 01519 TEMPORARY CONSTRUCTION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The WORK specified in this SECTION consists of maintaining traffic within the limits of the Project for the duration of the construction period. It shall include the construction and maintenance of the detour road as shown on the Drawings, furnishing, installing, and maintaining of traffic control and safety devices during construction, the control of dust, and any other special requirements for safe and expeditious movement of traffic as may be called for on the Drawings or as directed by the DISTRICT.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 02100 – Site Preparation
3. SECTION 02220 – Excavation and Backfill
4. SECTION 02233 – Shellrock Base
5. SECTION 02920 – Sodding

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

B. Florida Department of Transportation Standard Specifications for Road and Bridge Construction, latest edition, (FDOT)

1. Specification Section 102 – Maintenance of Traffic
2. Manual of Traffic Control and Safe Practices for Street and Highway Construction

1.03 TESTS:

A. The CONTRACTOR shall perform all required density tests specified by the referenced sections below.

PART 2 - PRODUCTS

2.01 EMBANKMENT MATERIALS:

A. Embankment materials shall conform to SECTION 02220.

2.02 SHELL BASE:

A. The roadway base shall conform to SECTION 02233.

2.03 GUARDRAIL:

A. All guardrail shall conform to the required FDOT Index..

2.04 TEMPORARY TRAFFIC MARKINGS:

A. All temporary striping shall be white or yellow degradable reflective tape with non-metallic backing, pre-coated with a pressure sensitive adhesive, and conforming to the requirements of FDOT Standard Specification Section 102-10.

PART 3 - EXECUTION

3.01 SITE PREPARATION:

A. All Site preparation shall conform to SECTION 02100.

3.02 EMBANKMENT CONSTRUCTION:

A. The embankments required for the detour roads shall be constructed to the lines and grades shown on the Drawings and conform to SECTION 02220. The CONTRACTOR shall provide adequate drainage for all temporary construction as directed by the DISTRICT.

3.03 ROADWAY BASE CONSTRUCTION:

A. The base shall be constructed to the lines and grades shown on the Drawings and conform to SECTION 02233.

3.04 ASPHALT CONCRETE PAVEMENT:

A. All pavement for the detour roads shall be constructed as shown on the Drawings and conform to SECTION 02513.

3.05 TEMPORARY TRAFFIC MARKINGS:

A. Pavement markings shall conform to the requirements of FDOT Standard Specification Section 102-10 and the Manual of Traffic Control and Safe Practices for Street and Highway Construction.

3.06 MAINTENANCE OF TRAFFIC:

A. All lanes that are being used for the maintenance of traffic shall be adequately maintained in accordance with FDOT Standard Specification Section 102.

3.07 TRAFFIC CONTROL:

A. The CONTRACTOR shall provide, install, and maintain adequate traffic control devices, warning devices, and barriers in accordance with FDOT Standard Specification Section 102-5, Traffic Control, and applicable sections of the Manual of Traffic Control and Safe Practices for Street and Highway Construction.

3.08 REMOVAL:

A. The roadway base, surface, and embankments shall be removed to the original grades and lines or those required on the Drawings. Embankment fill and base materials shall be disposed of in the required levees and berms or as directed by the DISTRICT. The asphalt pavement shall be disposed of off-site. All disturbed areas shall be sodded in accordance with SECTION 02920. All existing pavement, shoulders, drainage, and other appurtenances shall be restored to the condition prior to the start of construction.

END OF SECTION

SECTION 01530 TEMPORARY BARRIERS AND CONTROLS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION includes General Requirements for:

1. Protection of the WORK
2. Protection of existing property
3. Barriers
4. Security
5. Environmental controls
6. Access roads and parking areas
7. Traffic control and use of roadways

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 01590 – Field Offices and Sheds
3. SECTION 01700 - Contract Closeout
4. SECTION 02435 - Turbidity Control and Monitoring

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 SAFETY AND PROTECTION OF WORK AND PROPERTY:

A. General:

1. The CONTRACTOR shall provide for the protection of the WORK as set forth in the GENERAL TERMS & CONDITIONS. Provide protection at all times against rain, wind, storms, frost, freezing, condensation, or heat so as to maintain all WORK and Equipment and Materials free from injury or damage. At the end of each day all new WORK likely to be damaged shall be appropriately protected.
2. The CONTRACTOR shall notify the DISTRICT immediately if at any time, operations are stopped due to conditions which make it impossible to continue or to obtain proper results.
3. The CONTRACTOR shall construct and maintain all necessary temporary drainage and do all pumping necessary to keep excavations, pits, and trenches dewatered sufficiently to permit continuous construction.

4. The CONTRACTOR shall protect floors from damage by proper covering and care when handling heavy equipment, painting, or handling mortar or other such materials. Use proper cribbing and shoring to prevent overloading of floors while moving heavy equipment. Provide metal pans under pipe-threading machines and other machines that may leak oil and clean such pans daily, keeping oil off of the floors. Restore floors to former condition where damaged or stained.

5. The CONTRACTOR shall not load concrete floors less than 28-days old without the written permission from the DISTRICT.

6. The CONTRACTOR shall restrict access to roofs except as required by the WORK. Where access is required, provide protection with plywood, boards, or other suitable materials.

B. Property Other than DISTRICT's:

1. The CONTRACTOR shall provide for the protection of property as set forth in the GENERAL TERMS & CONDITIONS. Report immediately to the owners thereof and promptly repair damage to existing facilities resulting from construction operations.

2. Names and telephone numbers of representatives of the power company having jurisdiction over power lines in the WORK area can be obtained from the DISTRICT. The CONTRACTOR shall contact the power company a minimum of seven (7) calendar days prior to performing WORK within 500' of power transmission line property, right-of-way or easement lines.

3. The applicable requirements specified for protection of the WORK shall also apply to the protection of existing property of others.

4. The CONTRACTOR shall restore all property affected by the CONTRACTOR's operations to the original or better condition, to the satisfaction of the DISTRICT.

3.02 BARRIERS:

A. General:

1. The CONTRACTOR shall furnish, install, and maintain suitable barriers as required to prevent public entry, protect the public, and to protect the WORK, existing facilities, trees, and plants from construction operations. Remove the barriers when no longer needed or at completion of the WORK.

2. The CONTRACTOR may use new or used materials, suitable for the intended purpose, but must not violate requirements of applicable codes and standards or of regulatory agencies.

3. Barriers shall be of a neat and reasonably uniform appearance, structurally adequate for the required purposes.

4. The CONTRACTOR shall maintain barriers in good repair and a clean condition for adequate visibility.

5. The CONTRACTOR shall relocate barriers as required by progress of the WORK.

6. The CONTRACTOR shall repair damage caused by the installation of barriers and restore damaged areas to original or better condition, to the satisfaction of the DISTRICT.

3.03 ENVIRONMENTAL CONTROLS:

A. Dust Control:

1. If appropriate and at the discretion of the DISTRICT, the CONTRACTOR shall provide and apply methods of positive dust control to minimize raising dust from construction operations.

2. The CONTRACTOR shall clean interior spaces and surfaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.

3. The CONTRACTOR shall schedule operations so that dust and other contaminants will not fall on wet or newly-coated surfaces.

4. The CONTRACTOR shall cover materials transported to and from Site as necessary to prevent depositing material on offsite roadways or creating dust.

B. Water and Erosion Control:

1. The CONTRACTOR shall provide methods necessary to control surface water to prevent damage to the WORK, the Site, or adjoining properties as specified in SECTION 02435.

2. The CONTRACTOR shall control fill, grading, and ditching to direct surface water away from excavations and other construction areas, and to direct surface water to proper storage and/or conveyance facilities.

3. The CONTRACTOR shall control surface water and ground water as necessary to prevent flooding, erosion, or other damage to any portion of the Site and/or to adjoining areas.

C. Debris Control and Clean-Up:

1. The CONTRACTOR shall keep the premises free at all times from accumulations of debris, waste materials, and rubbish. The CONTRACTOR's responsibilities shall include, but not be limited to the following:

a. Adequate trash receptacles at the Site, emptied promptly when filled.

b. Periodic cleanup to avoid hazards or interference with operations at the Site and to maintain the Site in a reasonably neat condition.

c. The keeping of construction materials such as forms and scaffolding neatly stacked.

d. Immediate cleanup to protect the WORK by removing splattered concrete, oil, paint, corrosive liquids, and cleaning solutions from walls, floors, and other surfaces before the surfaces are marred.

2. The CONTRACTOR shall prohibit overloading of trucks to prevent spillages on access and haul routes. Provide periodic inspection of traffic areas to enforce requirements.

3. Final cleanup is specified in SECTION 01700.

D. Pollution Control:

1. The CONTRACTOR shall provide methods, means, and facilities required to prevent contamination of soil, water, or atmosphere by the discharge of hazardous or toxic substances from construction operations.

2. The CONTRACTOR shall provide equipment and personnel and perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids. Excavate and dispose of any contaminated earth off-site in approved locations, and replace with suitable compacted fill and topsoil.

3. The CONTRACTOR shall take special measures to prevent harmful substances from entering public waters, sanitary sewers, or storm sewers.

4. If hazardous materials are discharged, report to authorities as required by applicable law or regulations and notify the DISTRICT, immediately.

3.04 TRAFFIC CONTROL AND USE OF ROADWAYS:

A. Traffic Control:

1. The CONTRACTOR shall provide, operate, and maintain equipment, services, and personnel, with traffic control and protective devices, as required to expedite safe vehicular traffic flow on haul routes, at Site entrances, onsite access roads, and parking areas. This includes barricades

and other devices or personnel as necessary to adequately protect the public. Prepare and submit a Traffic Control Plan to DISTRICT for review.

2. The CONTRACTOR shall remove temporary equipment and facilities when no longer required. Restore grounds to original, better, or specified conditions.

3. The CONTRACTOR shall provide and maintain suitable detours or other temporary expedients if necessary.

4. Bridge over open trenches where necessary to maintain traffic.

5. The CONTRACTOR shall consult with applicable governing authorities to establish public thoroughfares which will be used for Site access. All operations shall meet the approval of owners or agencies having jurisdiction.

B. Maintenance of Roadways:

1. The CONTRACTOR shall repair off-site roads, water control and DISTRICT structures and levees damaged by operations. Keep traffic areas as free as possible of excavated materials and maintain in a manner to eliminate dust, mud, and hazardous conditions.

2. All operations and repairs shall meet the approval of owners or agencies having jurisdiction.

3.05 SECURITY:

A. The CONTRACTOR is solely responsible for initiating and maintaining security at the construction Site. CONTRACTOR shall take all necessary precautions for the security of, and shall provide the necessary protection to:

1. Materials and equipment incorporated into the WORK, or stored on-site prior to incorporation into the WORK.

2. Temporary field offices and sheds, and their contents including those listed in SECTION 01590.

3. Plant and equipment including any equipment furnished for use by the DISTRICT.

B. The CONTRACTOR shall replace, in kind, any materials or equipment lost, damaged or destroyed at no cost to the DISTRICT.

END OF SECTION

SECTION 01570 TRAFFIC CONTROL

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work:

1. The WORK of this SECTION shall consist of furnishing all labor, material, and equipment and performing all operations in connection with traffic control in accordance with the Drawings and applicable codes and as specified herein.

2. The CONTRACTOR shall provide Maintenance of Traffic (MOT) in accordance with the Florida Department of Transportation (FDOT) Standard Specifications for Road and Bridge Construction Section 102 and FDOT Standard Index No. 600.

B. Related Work Specified Elsewhere:

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. The Florida Department of Transportation (FDOT)

a. Standard Specifications for Road and Bridge Construction

i. Section 102 – Maintenance of Traffic

ii. Section 700 – Highway Signing

iii. Section 706 – Raised Retro-Reflective Pavement Markers and Bituminous Adhesive

iv. Section 710 – Painted Pavement Markings

v. Section 711 – Thermoplastic Traffic Stripes and Markings

b. Design Standards

i. Index 600 Series – Traffic Control through Work Zones

2. American Association of State Highway and Transportation Officials (AASHTO)

3. American Society for Testing and Materials (ASTM)

4. County Codes

5. U. S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices" (FHWA)

1.03 SUBMITTALS: Submittals shall be in accordance with SECTION 01300.

A. The CONTRACTOR shall submit a Maintenance of Traffic (MOT) Plan meeting the requirement of the FDOT Index No. 600 Series.

B. If required by jurisdictional authority for the roadway impacted by the WORK/access, the CONTRACTOR shall hire Florida Registered Professional Engineer registered in the State of Florida with current FDOT Advanced MOT Certification to design the temporary traffic control plan(s). Plan(s) must address all phases of the WORK.

PART 2 - PRODUCTS

2.01 GENERAL: Coordinate with the Drawings to verify which of the following products is used in the WORK.

2.02 HIGHWAY SIGNING: Erecting aluminum or steel roadway signs with supporting posts, at the locations shown on the plans. The roadway signs and material shall conform to the requirements on FDOT Standard Specifications: Section 700.

2.03 RAISED RETRO-REFLECTIVE PAVEMENT MARKERS: Installing raised retro-reflective pavement markers and removing pavement markers within the Project limits as designated in the plans. The reflectorized pavement markers and materials shall conform to the requirements of FDOT Standard Specifications: Section 706.

2.04 PAINTING TRAFFIC STRIPES: Painting reflectorized traffic stripes, including edge stripes and traffic guide. The painting and materials shall conform to the requirements of FDOT Standard Specifications: Section 710.

2.05 THERMOPLASTIC TRAFFIC STRIPES AND MARKINGS: Placing and materials shall conform to the requirements of FDOT Standard Specifications: Section 711.

PART 3 - EXECUTION

3.01 SIGNS, MARKERS, PAINTING:

A. Erection of signs and sign supports shall be in accordance with Section 700 of the FDOT Specifications.

B. Placement of the markers shall be in accordance with Section 706 of the FDOT Specifications.

C. Thermoplastic markings shall be in accordance with Section 711 of the FDOT Specifications.

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION AND INFORMATIONAL SIGNS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION includes basic requirements for temporary Project Identification and Informational signs required during construction.

B. Related Work Specified Elsewhere:

1. SECTION 1300 Submittals

1.02 SUBMITTALS:

A. Submit as specified in SECTION 01300.

B. Includes, but not limited to, the following:

1. Shop Drawings, sign materials, sign proofs and product data as applicable.

2. Show content, layout, lettering, colors, and structure.

PART 2 - PRODUCTS

2.01 DESIGN REQURIEMENTS: The CONTRACTOR shall design sign(s) and structure(s) to withstand wind and environmental conditions in accordance with all applicable laws and regulations. Provide with a finish adequate to withstand weathering, fading, chipping, and peeling for duration of construction.

2.02 IDENTIFICATION SIGNS:

A. Project Identification:

1. The CONTRACTOR shall construct sign mounting structure(s) and framing of wood or metal, structurally adequate to meet the requirements of Paragraph 2.01 above and/or as shown on the Contract Documents.

2. The Project Identification sign panel shall be constructed of minimum 3/4-inch thickness B/C exterior grade plywood. Panels shall be one sheet with an overall size of 48 inches by 96 inches. Fonts to be 3 inches high.

3. Rough hardware shall be galvanized steel or aluminum.

4. Coating: Paint shall be suitable for outdoor applications and shall be resistant to weathering, peeling, chipping and fading. Sign colors shall be approved by the DISTRICT.

5. Information Content:

a. Project title/name, location, DISTRICT logo and name as shown on the Contract Documents

b. Names and titles of authorities (i.e. Governing Board Members, etc.)

c. SFWMD Engineering & Construction Bureau

d. Name of prime CONTRACTOR and major Subcontractors

B. CONTRACTOR Identification: If not a part of the Project identification sign, provide and install the CONTRACTOR's standard sign.

2.03 INFORMATIONAL SIGNS:

A. Construction:

1. This includes signs for traffic, construction workers, and general public in regards to directions, warnings, hazards, locations of areas, facilities, equipment, and others of a similar nature.

2. The CONTRACTOR shall provide signs of design, size, color, and lettering as required by regulatory agencies and/or as shown on the Contract Documents. Signs shall be painted metal, plastic, or fiberglass. Materials shall be suitable for the conditions in which signs are to be placed, such as weathering and fading.

3. The CONTRACTOR shall construct sign mounting structure(s) and framing of wood or metal, structurally adequate to meet the requirements of Paragraph 2.01 above and/or as shown on the Contract Documents.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Project and Contractor Identification Signs: The CONTRACTOR shall

1. Install all required signs in locations acceptable to the DISTRICT. Install so as not to obstruct traffic or construction operations.

2. Erect on framing or foundation, and rigidly brace.

3. Maintain signs in good repair, in a neat, clean and readable condition.

4. Remove all signs, framing, supports, and foundations upon completion of the Project.

B. Informational Signs: The CONTRACTOR shall

1. Install at appropriate locations and in sufficient quantities to assure visibility. Relocate as required by progress of the WORK.

2. Maintain signs in good repair, in a neat, clean, and readable condition.

3. Remove all signs, framing, supports, and foundations upon completion of the Project.

END OF SECTION

SECTION 01590 FIELD OFFICES AND SHEDS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary: This SECTION includes requirements for temporary field offices and other structures for office and storage space required by CONTRACTOR and the DISTRICT.

B. Related Work Specified Elsewhere:

C. SECTION 01510 - Temporary Utilities and Facilities

D. SECTION 01600 - Equipment and Materials

E. Use of Existing Facilities: Existing facilities at the Site shall not be used for field offices.

F. Use of Permanent Facilities: Permanent facilities, when substantially completed, shall not be used for field offices or for storage.

PART 2 - PRODUCTS

2.01 FIELD OFFICES:

A. General:

1. Provide trailers, mobile buildings, or buildings constructed with floors raised aboveground, with steps and landings at entrance doors.
2. Buildings shall be structurally sound, secure, and weathertight.
3. Provide four (4) appropriate portable type fire extinguishers at each office and storage area.
4. Maintain offices for duration of Contract.
5. Install office spaces ready for occupancy within 60 days of the Notice to Proceed.
6. Obtain any required building permits for installation of temporary field offices and sheds.

B. CONTRACTOR's Office:

1. Provide a field office for CONTRACTOR's superintendent on the Site.
2. Field office shall be of size required for general use, with lights, heat and air conditioning, furnishings, telephone service, and other necessary facilities and utilities required by CONTRACTOR's operations.

C. DISTRICT Office:

1. Provide a field office for DISTRICT use in a location near the Site with parking space for Five (5) vehicles. The parking area shall have at least a shell rock surface.
2. Provide the following minimum requirements:
    a. 160 square foot minimum, 8-foot by 20-foot trailer
    b. Secure entrance doors - three (3) sets of keys
    c. Windows with operable sash and insect screens
    d. Lockable storage closet, minimum area of 20 square feet
    e. Resilient floor covering
    f. Minimum of one (1) individual office
    g. Furnishings:
        i. One (1) standard size desks with three (3) drawers, swivel desk chair with arms, and side chairs
        ii. Six (6) folding chairs
        iii. One (1) wastebasket per desk and table
        iv. One (1) tackboard, 36 inches x 30 inches

v. One (1) white boards 28 inches x 28 inches

vi. One (1) first aid kit and identifying sign

vii. Fire extinguishers per 2.01.A

h. Services:

i. Lighting Interior: 50 foot-candles at desktop height; Exterior lighting at entrance door

ii. Heating and air conditioning

iii. Electrical Service: Minimum of four circuits, 110V, 60 hertz; Minimum of (16) 110V duplex convenience outlets

2.02 STORAGE SHEDS AND TRAILERS:

A. On-Site:

1. The CONTRACTOR shall provide temporary buildings or trailers needed for storage of Equipment and Materials installed under this Contract (and those furnished by DISTRICT or others under separate Contract).

2. Provide ventilation and heating as required by Equipment and Material stored or as per MANUFACTURER's requirements.

3. The CONTRACTOR shall be solely responsible for temporary buildings and trailers located on site.

B. Off-Site:

1. The CONTRACTOR shall advise the DISTRICT of any arrangements made for storage of Equipment and Materials in a place other than DISTRICT's Site. The CONTRACTOR shall furnish evidence of insurance coverage with Application for Payment in conformance with the Section 00700 - General Terms & Conditions.

PART 3 - EXECUTION

3.01 LOCATION, INSTALLATION AND MAINTENANCE:

A. General:

1. Place temporary buildings, trailers, and stored materials in locations acceptable to DISTRICT.

2. Installed field offices and sheds to resist winds and elements of the locality where installed.

3. Remove when no longer needed at the Site or when WORK is completed.

4. Keep approach walks free of leaves, mud, water, or ice.

5. At completion of WORK, remove temporary buildings and trailers, foundations (if any), utility services, and debris.

6. Prepare ground or paved areas as specified in applicable SECTIONs.

END OF SECTION

SECTION 01600 EQUIPMENT AND MATERIALS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION includes general requirements for transportation, handling, delivery, storage, and protection of CONTRACTOR and DISTRICT - furnished Equipment and Materials.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

2. SECTION 01630 - Product Options and Substitutions

1.02 DEFINITIONS: Definitions used in this Paragraph are not intended to negate the meaning of other terms used in the Contract Documents, including such terms as "systems," "structure," "finishes," "accessories," "furnishings," "special construction," and similar terms. Such terms are self-explanatory and have recognized meanings in the construction industry.

A. Products: Items purchased for incorporation in the WORK, regardless of whether they were specifically purchased for the Project or taken from the previously purchased stock. The term "product" includes the terms "material," "equipment," "system," and other terms of similar intent.

B. Equipment: A product with operational or non-operational parts, regardless of whether motorized, manually operated, or fixed. Equipment may require service connections such as wiring or piping.

C. Materials: Products that must be substantially cut, shaped, worked, mixed, finished, refined or otherwise fabricated, processed, or installed to form part of the WORK.

1.03 QUALITY CONTROL:

A. Equipment and Material Incorporated into the WORK: Provide products that comply with the requirements of the Contract Documents, are undamaged, and unless otherwise indicated, are unused at the time of installation. The CONTRACTOR shall provide products that are 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.

B. Standard Products: Where they are available and comply with the Technical Specifications, provide standard products of types that have been produced and used successfully in similar situations on other projects.

C. Continued Availability: Where, because of the nature of its application, the DISTRICT is likely to need replacement parts or additional amounts of a product at a later date, either for maintenance and repair or replacement, provide standard products for which the MANUFACTURER has published assurances that the products and its parts are likely to be available to the DISTRICT at a later date.

1. Conform to applicable Technical Specifications, codes, standards, and regulatory agency requirements.

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

3. Manufactured and Fabricated Products:

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

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

c. Equipment and Materials shall be suitable for service conditions intended.

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

e. Provide labels and nameplates where required by regulatory agencies or to state identification and essential operating data.

f. Two (2) or more items of the same kind shall be identical, supplied by the same MANUFACTURER.

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

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

E. Identification: Each item of equipment shall have permanently affixed to it a label or tag with its equipment number designated in this Contract. The label or tag shall be stainless steel and shall be located so as to be easily visible.

1.04 TRANSPORTATION AND SHIPMENT:

A. Shipment Preparation: The CONTRACTOR shall require MANUFACTURERs and suppliers to prepare Equipment and Materials for shipment in a manner to facilitate unloading and handling, and to protect against damage or unnecessary exposure in transit and storage, for CONTRACTOR supplied equipment. Provisions for protection shall include the following:

1. Crates or other suitable packaging materials

2. Covers and other means to prevent corrosion, moisture damage, mechanical injury, and accumulation of dirt in motors, electrical equipment, and machinery

3. Suitable rust-preventive compound on exposed machined surfaces and unpainted iron and steel

4. Grease packing or oil lubrication in all bearings and similar items

5. Precast concrete components shall be transported, lifted and stored as specified by the precast supplier. Precast supplier shall provide written instructions to the CONTRACTOR as to the above. The CONTRACTOR shall provide a copy to the DISTRICT.

B. Marking: Each item of Equipment and Material shall be tagged or marked as identified in the delivery schedule or on Submittals, submitted in accordance with SECTION 01300. Complete packing lists and bills of material shall be included with each shipment. Each piece of every item need not be marked separately, provided that all pieces of each item are packed or bundled together and the packages or bundles are properly tagged or marked.

1.05 DELIVERY, STORAGE AND HANDLING:

A. Delivery – The CONTRACTOR shall:

1. Arrange deliveries of Equipment and Materials in accordance with cost loaded construction schedules, in ample time to facilitate inspection prior to installation, and to avoid delay of the WORK.

2. Deliver, store and handle Equipment and Materials in accordance with the MANUFACTURER's recommendations using means and methods that will prevent damage, deterioration, and loss, including theft.

3. Control delivery schedules to minimize long term storage at the Site and to prevent overcrowding of construction areas. In particular, coordinate delivery and installation to ensure minimum holding or storage times for items known or recognized to be flammable, hazardous, easily damaged, or sensitive to deterioration, theft, and other sources of loss.

4. Avoid conflict with Work of DISTRICT or other contractors.

5. Deliver Equipment and Materials to the Site in MANUFACTURER's sealed containers or other packaging system with identifying labels and instructions for handling, storing, unpacking, protecting, and installing.

6. Mark deliveries of component parts of equipment to identify the equipment, to permit easy accumulation of parts, and to facilitate inspection and measurement of quantity or counting of units.

7. Immediately upon delivery, inspect shipment to assure:

    a. That each product complies with requirements of Contract Documents and reviewed Submittals.

    b. Quantities are correct.

    c. Containers and packages are intact, labels are legible.

    d. Equipment and Materials are properly protected and undamaged.

B. Storage – The CONTRACTOR shall:

1. Store Equipment and Materials immediately after delivery, and protect it as necessary until completion of the WORK. Store in accordance with MANUFACTURER's instructions with seals and labels intact and legible.

2. Store Equipment and Materials in a manner that will not endanger the supporting construction and/or existing structures and facilities.

3. Store Equipment and Materials that are subject to damage by elements in weathertight enclosures.

4. Maintain temperature and humidity within ranges required by the MANUFACTURER.

5. Protect motors, electrical equipment, plumbing fixtures, and machinery of all kinds against corrosion, moisture deteriorations, mechanical injury, and accumulation of dirt or other foreign matter.

6. Protect exposed-machined surfaces and unpainted iron and steel as necessary with suitable rust-preventive compounds.

7. Protect bearings and similar items with grease packing or oil lubrication.

8. Handle and store steel plate, sheet metal, and similar items in a manner to prevent deformation.

9. Exterior Storage – The CONTRACTOR shall:

    a. Provide platforms, blocking, or skids to support fabricated products aboveground; and to prevent soiling, staining and damage. Cover products subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.

    b. Store loose granular materials on solid surface areas to prevent mixing with foreign matter.

    c. Provide surface drainage to prevent flow or ponding of rainwater.

10. Equipment and Materials shall not show any pitting, rust, decay, or other deleterious effects of storage prior to final acceptance of WORK.

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

C. Handling – The CONTRACTOR shall:

1. Provide equipment and personnel necessary, to properly unload and handle Equipment and Materials, by methods to prevent damage, soiling and /or staining of the Equipment and Materials, or packaging.

2. Handle by methods to prevent bending or overstressing. Where lifting points are designated, lift components only at those points.

3. Provide additional protection to surrounding surfaces as necessary to prevent damage.

D. Maintenance of Storage – The CONTRACTOR shall:

1. Inspect stored Equipment and Materials on a regularly scheduled basis.

2. Verify that storage facilities comply with the MANUFACTURER's product storage requirements, including environmental conditions continually maintained.

3. Verify that surfaces of products exposed to elements are not adversely affected; that any weathering of finishes is acceptable under requirements of Contract Documents.

4. For mechanical and electrical equipment in long-term storage, provide the MANUFACTURER's service instructions to accompany each item, with notice of enclosed instructions on the exterior of the package. Service the Equipment, as necessary on a regularly scheduled basis.

E. Protection after installation – The CONTRACTOR shall:

1. Provide substantial coverings as necessary to protect all installed Equipment and Materials from damage from subsequent construction operations. Remove the protective coverings when no longer needed or as specified.

1.06 EXISTING EQUIPMENT AND MATERIALS:

A. Equipment and Materials to be reused:

1. For Equipment and Materials specifically indicated or specified to be reused in the WORK, use special care in removal, handling, storage, and reinstallation to assure proper function in the completed WORK.

2. Arrange for transportation, storage and handling of products which require off-site storage, restoration, or renovation and pay all costs for such work.

3. The CONTRACTOR may at his option, furnish and install new items in lieu of those specified to be reused.

4. Remove, relocate and reinstall the following Equipment and Materials:

a. None

B. Equipment and Materials not to be reused:

1. The following Equipment and Materials to be removed shall remain DISTRICT's property and are not to be reused in the WORK. The CONTRACTOR shall Remove from its location, prepare for handling and storage, and deliver to DISTRICT.

a. None

C. Equipment and Materials designated to be removed but not reused or delivered to DISTRICT, shall become the property of the CONTRACTOR and shall be removed from the Site.

PART 2 - PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS:

A. Specified in each applicable SECTION of the Technical Specifications and/or Drawings.

2.02 PRODUCT SELECTION AND SUBSTITUTIONS:

A. Specified in the Instructions to Bidders and General Terms & Conditions

PART 3 - EXECUTION

3.01 MANUFACTURER'S INSTRUCTIONS:

A. Installation:

1. When Contract Documents require that installation of WORK shall comply with MANUFACTURER's printed instructions, the CONTRACTOR shall:

a. Obtain and distribute copies of such instructions if not a part of Submittals, containers, or packaging to all parties involved in the installation, including a copy to the DISTRICT.

b. Maintain one complete set of instructions at the Site during installation and until Final Acceptance.

c. Handle, install, connect, clean, condition, and adjust all products in accordance with such instructions and in conformance with the specified requirements. Should job conditions or specified requirements conflict with the MANUFACTURER's instructions, consult with the DISTRICT for further instructions.

d. Not omit any preparatory step or installation procedure unless specifically modified or exempted by the Contract Documents, or approved in writing by the MANUFACTURER and the DISTRICT.

e. Accurately locate and align with other work, and anchor all Equipment and Materials securely in place except as required for proper movement and performance.

f. Clean and protect all exposed surfaces as necessary to ensure freedom from damage and deterioration until Final Acceptance.

END OF SECTION

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SECTION 01630 PRODUCT OPTIONS AND SUBSTITUTIONS

PART 1 - GENERAL

1.01 SCOPE:

A. This SECTION covers the DISTRICT's review procedures for CONTRACTOR's requests of acceptable substitute items of material and equipment. All requests for substitution shall be made no earlier than the Effective Date of the Contract. See Article 22 of the Instructions to the Bidders of this Contract Document. A determination of acceptability or rejection of the substitution request will be made in accordance with paragraph 6.05 of Section 00700 - General Terms and Conditions.

B. Requests received prior to the date established above will not be considered.

C. Substitutions may be approved at the DISTRICT's sole discretion where one or more of the following conditions apply:

1. The substitution must be required for compliance with final interpretation of code requirements or regulations.
2. The substitution must be due to the unavailability of the specified products, through no fault of the CONTRACTOR.
3. The substitution may be requested when subsequent information discloses the inability of the specified products to perform properly or to fit in the designated space.
4. The substitution may be requested when in the judgment of the DISTRICT a substitution would be substantially to the DISTRICT's best interests in terms of cost, time or other considerations.

D. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

1.02 SUBSTITUTION REQUEST:

A. Submit as required in SECTION 01300:

1. Complete data substantiating compliance of the proposed substitution with the Contract Document
   a. Product identification including MANUFACTURER's name and address
   b. MANUFACTURER's literature including product description, performance and test data, and reference standards
   c. Name and address of similar projects on which product was used and dates of installation
2. Itemized comparison of proposed substitution with product or method specified
3. Data relating to changes in the construction schedule
4. Accurate cost data on proposed substitution in comparison with product or method specified

B. In submitting the request for substitution, the CONTRACTOR makes the following representations:

1. The CONTRACTOR has investigated the proposed product and has determined that it is equal or superior in all respects to that specified.
2. The CONTRACTOR will provide the same warranty or guarantee for the substitution as for the product specified.
3. The CONTRACTOR will coordinate installation of the accepted substitution into the WORK, making such changes as may be required for the WORK to be completed in all respects.
4. The CONTRACTOR waives all claims for additional costs related to substitution that subsequently becomes apparent.
5. Cost data is complete and includes all related costs under the Contract.

1.03 DISTRICT ENGINEER'S REVIEW:

A. The DISTRICT, in evaluating the request for substitution, will consider all variations of the proposed substitute from that specified to determine the acceptability of the proposal. The DISTRICT may require the CONTRACTOR to furnish additional data about the proposed substitute necessary to make such a determination. The DISTRICT will be the sole judge of acceptability, and no substitute will be ordered or installed without the DISTRICT's prior written acceptance. The DISTRICT may require the CONTRACTOR to furnish, at the CONTRACTOR's expense, a special performance guarantee or other surety with respect to any substitute. Substitutions will not be considered if:

1. Substitutions are indicated or implied on Shop Drawings or product data submittals without a request submitted in accordance with this SECTION.
2. Acceptance will require substantial revision to the Contract Documents.

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: This SECTION includes administrative and procedural requirements for Contract Closeout including, but not limited to, the following:

1. Inspection procedures
2. Project record document submittal
3. Operation and maintenance manual submittal
4. Submittal of warranties
5. Final cleaning
6. CONTRACTOR's Certification

B. Closeout requirements for specific construction activities are included in the appropriate SECTIONs in DIVISIONS 1 through 16.

C. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 01050 - Field Engineering and Surveying
3. SECTION 01530 - Temporary Barriers and Controls

1.02 SUBSTANTIAL COMPLETION:

A. Preliminary Procedures: Before requesting inspection for certification of Substantial Completion, the CONTRACTOR shall satisfy the following:

1. Submit specific warranties, workmanship bonds, maintenance agreements, final certifications, and similar documents. Submit in accordance with SECTION 01300.
2. Obtain and submit releases enabling the DISTRICT unrestricted use of the WORK and access to services and utilities. Include Certificates of Occupancy (C.O.), operating certificates, and similar releases, as required.
3. Submit Record Documents, including but not limited to, maintenance manuals, Project photographs, damage or settlement surveys, Boundary surveys, all As- Built and Topographic Surveys as per SECTION 01050 and similar record information as specified in Paragraph 1.04. All drawings shall be scanned and submitted in accordance with SECTION 01300, and in hard copy form, 24 inch by 36 inch plan size. All other documents shall also be scanned and submitted in accordance with SECTION 01300.
4. Complete final cleanup requirements, including touch up painting.
5. Touch up and otherwise repair and restore marred, exposed finishes.

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

1. The DISTRICT will reschedule the inspection when in its opinion, the WORK is substantially complete.

1.03 FINAL ACCEPTANCE:

A. Preliminary Procedures: Submit certification by CONTRACTOR that WORK has been completed in accordance with the Contract Documents to the knowledge of the CONTRACTOR. Before requesting final inspection, complete the following:

1. Submit the final payment request with releases and supporting documentation. Include insurance certificates for products and completed operations where required.
2. Submit a letter certifying that all items listed as part of the Certification of Substantial Completion have been completed or corrected.
3. Submit consent of surety to final payment.
4. Submit evidence of final, continuing insurance coverage complying with insurance requirements.
5. Submit Release of Liens (from the Prime, and all Subcontractors, Vendors and Suppliers).
6. The above shall be submitted in accordance with SECTION 01300.

B. Reinspection Procedure: The DISTRICT will reinspect the WORK upon receipt of notice that the WORK, including inspection list items from earlier inspections, has been completed.
1. Upon completion of reinspection, the DISTRICT will advise the CONTRACTOR of WORK that is incomplete or of obligations that have not been fulfilled but are required for final acceptance.
2. If necessary, the reinspection will be repeated.

C. Return all keys furnished by the DISTRICT. The CONTRACTOR shall forfeit his key deposit for keys that are not returned.

1.04 RECORD DOCUMENT SUBMITTALS:

A. General: Do not use record documents for construction purposes. Protect record documents from deterioration and loss in a secure location. Provide access to record documents for the DISTRICT's reference during normal working hours.

B. As-Built Drawings: Maintain a clean, undamaged set of blue or black line white-prints of Drawings and Shop Drawings. Bind sets with durable-paper cover sheets; print suitable titles, dates, and other identification on the cover of each set. Mark the set to show the actual installation where the installation varies substantially from the WORK as originally shown. Mark which 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 Drawings. Give particular attention to concealed elements that would be difficult to measure and record at a later date. Call attention to each entry by drawing a "cloud" around the areas affected.

C. The DISTRICT will make electronic copies of whatever electronic versions of the Drawings exist, available to the CONTRACTOR for As-Built purposes. The CONTRACTOR must obtain concurrence from the DISTRICT as to form and content of record information provided in electronic format prior to proceeding, but in general, information similar to that noted below needs to be provided.
1. Record information concurrently with construction progress.
2. Mark record sets with red erasable pencil. Mark each document "AS-BUILT DRAWINGS" in neat, large, printed letters.
3. Mark As-Built invert elevations for all water control structures, culverts, etc. Refer to SECTION 01050 for structures which require a permanent benchmark.
4. Mark new information that is important to the DISTRICT that is not shown on Drawings or Shop Drawings.
5. Note related Change-Order numbers where applicable.
6. Include the following:
    a. Where Submittals (like Shop Drawings) are used for mark-up, record a cross-reference at corresponding location on Drawings.
    b. Field changes of dimension and detail.
    c. Changes made by Change Order or other Modifications.
    d. Details not on original Drawings.

e. As-Builts shall also include a plot of the actual excavation cross-sections plotted at the same station as overlayed on top of the design cross-sections.

f. As-Builts shall include a plot of the actual levee and embankment cross-sections plotted at the same station as overlayed on top of the design cross-sections. Refer to SECTION 01050.

g. Give particular attention to concealed elements that would be difficult or expensive to locate at a later date.

h. GPS (global positioning system) coordinates of major structures using the format lat/long DD (decimal/degree) NAD83/2007 (North American Datum).

7. Record Specifications: Maintain one (1) complete copy of the Contract Documents including addenda. Include with the Contract Documents one (1) copy of other written construction documents, such as Requests for Information (RFIs), Change Orders and modifications issued in printed form during construction.

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

9. Give particular attention to substitutions and selection of options and information on concealed construction that cannot otherwise be readily discerned later by direct observation.

10. Note related As-Built information and Product Data.

11. Upon completion of the WORK, submit Record Specifications to the DISTRICT for the DISTRICT's records on CD in PDF format.

12. Include the following:

a. MANUFACTURER, trade name, catalog number, and Supplier of each product and item of equipment actually installed, including optional and substitute items

b. Changes made by Addendum, Change Order, or other Modifications

c. Related Submittals

13. Affix the CONTRACTOR’s corporate seal on the cover sheet indicating the documents within are representative of the as-built condition of the Project. The seal shall be signed by an officer of the company.

D. Record Product Data: Provide one (1) copy of each Product Data submittal. Note related Change Orders and markup of Record Documents.

1. Mark these documents to show significant variations in actual WORK performed in comparison with information submitted. Include variations in products delivered to the Site and from the MANUFACTURER’s installation instructions and recommendations.

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

E. Record Sample Submitted: Immediately prior to Substantial Completion, the CONTRACTOR shall meet with the DISTRICT's personnel at the Project Site to determine which Samples are to be transmitted to the DISTRICT for record purposes. Comply with the DISTRICT's instructions regarding packaging, identification, and delivery to the DISTRICT.

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 (unless otherwise specified), complete miscellaneous records and place in good order. Identify miscellaneous records properly, bind or file, and submit to the DISTRICT for the DISTRICT's records.

G. Warranties and Bonds: Submit original documents as specified in Section 00700 - General Terms & Conditions, Supplemental Conditions, SECTION 01300, and technical specifications.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 FINAL CLEANING:

A. General: The General Terms & Conditions require general cleaning during construction. Regular Site cleaning is included in SECTION 01530.

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 MANUFACTURER's instructions.

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

a. Clean the Site of rubbish, litter, and other foreign substances. Rake grounds that are neither paved nor planted to a smooth, even-textured surface.

b. Remove temporary structures, tools, equipment, supplies, and surplus materials.

c. Remove temporary protection devices and facilities which were installed to protect previously completed WORK.

C. Removal of Protection: Remove temporary protection and facilities installed for protection of the WORK during construction.

D. 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 DISTRICT's property. Do not discharge volatile, harmful, or dangerous materials into drainage systems, surface waters or wetlands. Remove waste materials from the Site and dispose of lawfully.

1. Where extra materials of value remain after completion of associated WORK, they become the DISTRICT's property. Dispose of materials of no value to the DISTRICT as directed by the DISTRICT.

E. Repairs:

1. Repair damaged protective coated surfaces.

2. Repair roads and other items damaged or deteriorated because of construction operations, including those which have been damaged, but are not located within the Project limits.

3. Restore all ground areas affected by construction operations.

END OF SECTION

SECTION 02050 DEMOLITION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall include the removal of existing construction to limits indicated on drawings where earthwork or other construction operations are to be performed as specified herein. The DISTRICT shall not be responsible for the condition of any items to be removed or salvaged.

1.02 APPLICABLE PUBLICATIONS: (Not Used)

1.03 DEFINITIONS: (Not Used)

1.04 SUBMITTALS:

A. Schedule of Demolition:

1. Submit proposed methods and operations of demolition for review and approval by the DISTRICT prior to the start of WORK.

B. Permits:

1. The CONTRACTOR shall be responsible for acquiring appropriate necessary permits for the work. Copies of the permits shall be submitted to the DISTRICT prior to commencement of demolition.

1.05 RESPONSIBILITIES:

A. The CONTRACTOR shall not commence demolition of structure(s) prior to written permission of the DISTRICT.

B. Condition of structures to be demolished:

1. The DISTRICT assumes no responsibility for actual condition of structures to be demolished.

2. Conditions existing at time of inspection for bidding purposes will be maintained by DISTRICT insofar as practicable.

C. The CONTRACTOR shall remove all such foundations to one foot below the proposed sub-grades.

D. Explosives: The use of explosives will not be permitted. The CONTRACTOR may use a non-explosive, expanding agent in drilled holes for the demolition of concrete, and shall conform to all manufacturers' recommendations, including safety precautions for mixing and placing the agent.

E. The CONTRACTOR shall ensure the safe passage of persons around the area of demolition and clearing. The CONTRACTOR shall conduct operations to prevent injury to adjacent structures, other facilities, and any persons.

1. The CONTRACTOR shall protect existing finish work that is to remain in place from damage due to demolition operations.

F. Traffic:

1. The CONTRACTOR shall conduct operations and the removal of debris to ensure minimum interference with existing access roads and other adjacent, occupied or used facilities.

2. Do not close, block or otherwise obstruct access roads or other occupied or used facilities without permission from the DISTRICT.

G. The CONTRACTOR shall promptly repair damages caused to adjacent facilities by demolition operations at no cost to the DISTRICT.

H. Utilities Disconnection:

1. The CONTRACTOR shall perform all necessary coordination to locate, disconnect, relocate, and/or protect as needed all existing underground, aboveground, and overhead utilities within the limits of demolition prior to commencement of demolition operations. All expenses incurred for the coordination with utility companies and agencies, shall be at no cost to the DISTRICT.

2. The CONTRACTOR shall promptly repair damages to existing utilities that are to remain, at no cost to the DISTRICT.

1.06 CERTIFICATIONS AND TESTING: (Not Used)

1.07 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.08 WARRANTY: (Not Used)

PART 2 - PRODUCTS

2.01 SALVAGE MATERIALS:

A. The CONTRACTOR shall salvage and store the following material for the DISTRICT's use:

1. None

B. Road and building rubble free of contaminants and rebar, and no greater than 12" in any direction may be used to fill existing canals up to an elevation matching adjacent grades. The DISTRICT is to review and approve the material being used prior to placement in existing canals.

PART 3 - EXECUTION

3.01 DEMOLITION:

A. The CONTRACTOR shall provide services for effective air and water pollution controls as required by local authorities having jurisdiction.

B. If hazardous materials are found, the CONTRACTOR shall notify the DISTRICT immediately.

C. The CONTRACTOR shall completely backfill below-grade areas and voids resulting from demolition work. The CONTRACTOR shall provide fill consisting of approved soil, gravel or sand (free of trash and debris) and compact fill to approximate density of surrounding native soil.

3.02 DISPOSAL OF DEMOLISHED MATERIALS:

A. The CONTRACTOR shall remove debris, rubbish, and other materials resulting from demolition operations within 30 days of demolition.

B. If hazardous materials are encountered during demolition operations, the CONTRACTOR shall comply with all applicable regulations, laws, and ordinances concerning removal, handling, and protection against exposure or environmental pollution.

C. The CONTRACTOR shall transport materials removed from demolished structures and properly dispose of them at an approved site according to the State, Federal, and local regulations.

3.03 CONNECTIONS TO EXISTING CONSTRUCTION:

A. The CONTRACTOR shall cut and remove portions of existing construction as required to allow proper installation of new construction.

B. The CONTRACTOR shall shore, brace and maintain existing structure(s) in a safe condition until permanent supports are completed.

C. The CONTRACTOR shall repair all damage as a result of installation of shoring and bracing.

3.04 CLEANUP AND REPAIR:

A. Upon completion of demolition work, the CONTRACTOR shall remove all tools, equipment, and demolished materials from site; see SECTION 1.01 and SECTION 3.02 of this specification.

B. The CONTRACTOR shall repair demolition performed in excess of that required and return structures and surfaces to conditions existing prior to commencement of demolition work. The CONTRACTOR shall repair adjacent construction or surfaces soiled or damaged by demolition work to the satisfaction of the DISTRICT.

C. The CONTRACTOR may NOT burn combustible products of the demolition operation on site.

D. The CONTRACTOR shall remove or modify as indicated all existing construction within the construction limits to the extent necessary to permit construction of the work. The CONTRACTOR shall properly dispose of the material at an approved site according to the State, Federal, and local regulations.

END OF SECTION

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SECTION 02100 SITE PREPARATION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, materials, and equipment necessary for complete and proper Site preparation within the areas shown on the Drawings and specified herein and observe permit conditions.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail:

1. Florida Department of Transportation (FDOT)

a. Standard Specifications for Road and Bridge Construction, Latest Edition

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Submittals shall be in accordance with SECTION 01300.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

A. The CONTRACTOR shall make all excavations for piping and appurtenant structures in any material encountered to the depth and grades required, shall backfill such excavations and dispose of excess or unsuitable materials from excavation, and shall provide and place necessary borrow material to properly backfill excavations, all as indicated on the Drawings, specified herein, or as directed by the DISTRICT.

B. Excavation, dewatering, sheeting and bracing required shall be carried out so as to prevent any possibility of undermining or disturbing the foundations of any existing structure or WORK, and so that all WORK may be accomplished and inspected in the dry, except as directed by the DISTRICT. Aqueous construction may be performed only with prior approval of the DISTRICT.

1.07 CERTIFICATIONS AND TESTINGS: (Not Applicable)

1.08 INSPECTION COORDINATION: (Not Applicable)

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 TRAFFIC CONTROL: The CONTRACTOR shall provide proper warning devices and barriers for protection of the public and workmen in accordance with FDOT Specification Section 102-3 Traffic Control and local regulations.

3.02 STANDARD CLEARING AND GRUBBING: Standard Site clearing and grubbing, in accordance with FDOT Specification Section 110.2, shall be performed within the areas shown on the Drawings or otherwise noted in the above referenced specification.

3.03 EROSION CONTROL: The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104-1, 2, 3, 4, 6 and 7 and Florida Department of Environmental Protection (FDEP) regulations and permit conditions.

3.04 PROTECTION, REMOVAL AND/OR RELOCATION OF EXISTING FACILITIES: Existing facilities such as storm drains, roadways, water lines, light poles, conduits, fences, utility and telephone lines, etc. are to be carefully protected from damage during all phases of the construction. The CONTRACTOR shall make all necessary arrangements with the owner of the facility and be responsible for all costs involved in the proper protection, relocation or other WORK that such owners deem necessary. See General Terms & Conditions.

A. Refer to SECTION 02050 for additional requirements pertaining to protection, removal and/or relocation of existing facilities.

3.05 UNDERGROUND UTILITIES: The CONTRACTOR shall provide all necessary liaisons with other utilities (underground) by notification, 48 hours in advance, of any digging by telephoning the appropriate Utility Notification Center and local utilities.

END OF SECTION

SECTION 02110 CLEARING AND LAND PREPARATION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall include the removal of trees and other vegetation from areas where earthwork or other construction operations specified herein are to be performed. This section also includes land preparation activities for excavation and fill areas.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 02050 - Demolition
3. SECTION 02200 - Earthwork

1.02 APPLICABLE PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT)

a. Standard Specification for Road and Bridge Construction, Latest Edition

i. 104 - Prevention, Control and Abatement of Erosion and Water Pollution

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Prior to beginning the WORK, CONTRACTOR shall submit a detailed plan for clearing and land preparation in conformance with SECTION 01300. The plan shall detail the sequence of WORK and describe the CONTRACTOR's planned method of clearing and land preparation activities.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

A. The CONTRACTOR shall ensure the safe passage of persons around areas of clearing and land preparation. The CONTRACTOR shall conduct its operations to prevent injury to adjacent structures, vegetation designated to remain, other facilities and persons.

B. Traffic:

1. The CONTRACTOR shall conduct its operations and the removal of cleared materials to ensure minimum interference with existing access roads and other adjacent occupied or used facilities.
2. The CONTRACTOR shall not block or otherwise obstruct access roads or other occupied or used facilities without permission from the DISTRICT. Where blockage is allowed, the CONTRACTOR shall provide alternate routes around closed or obstructed traffic ways.

C. The CONTRACTOR may commence clearing or land preparation within portions of the project falling within the limits of temporary construction easements or utility Right-of-Way only with specific permission from the DISTRICT for each activity and location. All requirements under A and B above apply within these limits.

D. Refer to SECTION 02050 for additional requirements pertaining to protection, removal and/or relocation of existing facilities.

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS (Not Applicable)

PART 3 - EXECUTION

3.01 GENERAL CLEARING:

A. The CONTRACTOR shall remove the majority of the above grade non-native vegetative matter in the areas indicated on the plans. The CONTRACTOR shall complete the work of Clearing and Land Preparation as outlined below.

1. Mowing or the use of a bush-hog may be required in areas of heavy grass, weeds, or woody-stalked vegetation.

2. Completely remove all designated exotic/hazardous trees within the designated project boundaries.

3. All woody debris that measures over three-quarters inch in diameter and longer than 18-inches shall be removed.

4. All stumps shall be ground level to six inches below the surrounding ground level. Stumps on the slopes shall be cut flush with the natural angle of the existing grade and treated immediately with a herbicide approved by the DISTRICT. All seedlings within the project Site shall be treated with the herbicide.

5. All plant material (whole or chipped) will be removed from the project area and stockpiled at a location authorized by the DISTRICT. Disposal of the stockpile shall be accomplished at a maximum of every fifteen workdays.

6. Remove any garbage or other waste debris recovered during clearing.

7. On completion of the clearing, remove all sticks, rubbish and other extraneous material and rake the ground surface in order to leave a smooth and clean appearance.

8. Clearing and land preparation shall proceed sufficiently ahead of earthwork activities to minimize disruption and allow time for determination of the adequacy of the clearing procedure.

9. All WORK shall be performed in accordance with approved principles of modern arboricultural methods.

10. All trees to remain in the project area, as designated by the DISTRICT, shall be protected from damage by tree barricades.

11. All WORK shall be performed without damage to existing amenities, including trees and shrubs. The CONTRACTOR shall be responsible for repair and replacement of existing amenities to the satisfaction of the DISTRICT. The CONTRACTOR shall protect all vegetation, habitats, or amenities on the project location as indicated on the plans.

B. The CONTRACTOR shall clear adjacent to cut or fill sections to a minimum distance of ten (10) feet outside of slope lines unless lesser distances are specified. Clearing in areas of native vegetation for levee construction or removal and canal excavation shall be limited to a distance of 10 feet outside of slope lines.

C. The CONTRACTOR may burn combustible products of the clearing operation on the Site with the written approval of the DISTRICT and with permission of the local authorities. The CONTRACTOR shall comply with all local ordinances or regulations for burn locations and methods, including methods for preventing uncontrolled spread of the burn. The CONTRACTOR shall provide the DISTRICT with copies of permits prior to burning.

D. The CONTRACTOR may not burn cleared materials within the limits of any utility Right-of-Way without written permission of the controlling agency. The CONTRACTOR will be required to collect and haul all cleared materials to an approved Site for burning and disposal.

E. The CONTRACTOR shall limit burning to days when groundwater levels are adequate to prevent ignition of peat soils located throughout the project areas.

F. The CONTRACTOR shall haul all organic materials and residues left from burning operations to an approved landfill or disposal Site.

3.02 CLEARING WITHIN AREAS OF NATIVE VEGETATION: The CONTRACTOR shall remove exotic trees/plants, hazardous material, trash, and debris and leave the Site clean with a smoothly raked finish grade. Every reasonable effort shall be made to protect native vegetation designated to remain, such as Coco Plum, Salt Bush, Pond Apples, Leather fern, etc. Areas disturbed by work operations, such as, but not limited to, access points beyond the limits of the right-of way, shall be restored to original or better condition, including, but not limited to, filling, grading, sodding, and seeding/mulching as direct by the DISTRICT.

3.03 EROSION CONTROL: The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104 -1, 2, 3, 4, 6 and 7 and Florida Department of Environmental Protection (FDEP) regulations and permit conditions.

END OF SECTION

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SECTION 02200 EARTHWORK

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, equipment, and materials for all excavating, trenching, filling, construction of embankment, backfilling, compacting, grading, and all related items of earthwork necessary to complete the WORK indicated or specified.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 02220 - Excavation and Backfilling
3. SECTION 02920 - Sodding
4. SECTION 01410 - Testing and Quality Control
5. SECTION 01050 - Field Engineering and Surveying
6. SECTION 02050 - Demolition
7. SECTION 02215 – Protection of Existing Structures
8. SECTION 02230 - Roadway Excavation, Backfill, and Compaction
9. SECTION 02401 - Dewatering and Cofferdam

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. ASTM International (ASTM)

a. C33 - Standard Specification for Concrete Aggregates

b. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ ft3 (600 kN-m/m3))

c. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ ft3 (2,700 kN-m/m3))

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

e. D3740 - Standard Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction

f. D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table

g. D4254 - Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density

h. D4914 - Standard Test Methods for Density and Unit Weight of Soil and Rock in Place by the Sand Replacement Method in a Test Pit

i. D5030 - Standard Test Method for Density of Soil and Rock in Place by the Water Replacement Method in a Test Pit

j. D6938 - Standard Test Method for In-place Density and Water Content of Soil and Soil-Aggregate by Nuclear Methods (Shallow Depth)

k. E329 - Standard Specification for Agencies Engaged in Construction, Inspection,Testing or Special Inspection

2. Florida Department of Transportation (FDOT)

a. Standard Specifications for Road and Bridge Construction

3. American Association of State Highway Transportation Officials (AASHTO)

a. T 27 – Sieve Analysis of Fine and Course Aggregates

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

c. T 180 – Standard Method for Moisture-Density Relations of Soils using a 10 lb (4.54 kg) Rammer and 18 in (457 mm) Drop

4. Florida Method (FM) of Test

a. FM T-1 011 – Florida Method of Test for Sampling Aggregates

B. Miscellaneous Project Data

1. Subsurface soil data logs are provided for the CONTRACTOR's reference

C. Culvert Replacement Construction Project Phase II, Prepared by GFA International, Dated April 1, 2019.

1.03 DEFINITIONS:

A. General: Any import of soil shall be by prior written authorization by the DISTRICT. CONTRACTOR shall provide a Submittal including, but not limited to, environmental testing results that document that the imported soil is not impacted with contaminates, including but not limited to: Resource Conservation Recovery Act (RCRA) 8 metals; Organochlorine Pesticides (OCP) and Total Recoverable Petroleum Hydrocarbons (TRPH) above the Florida Department of Environmental Protection (FDEP) Soil Clean Up Target Levels (SCTL); and FDEP Sediment Quality Assessment Guidelines (SQAG).

B. Unified Classification System (USCS): USCS is a two-letter classification system used to describe the texture and grain size of a soil. In the USCS system, letters are representative as follows: G stands for gravel, S stands for sand, M stands for silt, C stands for clay, O stands for organic, P stands for poorly graded, W stands for well graded, H stands for high plasticity, and L stands for low plasticity.

C. Classification of Soils: Materials used to construct the embankments and for backfills shall be classified in accordance with ASTM D 2487 (Unified Soil Classification System). Cohesionless materials include materials classified in ASTM D 2487 as GW, GP, SW, and SP. Cohesive materials include materials classified as GC, SC, ML, CL, MH, and CH. Materials classified as GM and SM will be identified as cohesionless only when the fines are nonplastic.

D. Select Fill: Select fill consists of satisfactory materials classified in accordance with ASTM D2487 as SP or SW, and with a Uniformity Coefficient greater than 3 (ASTM D422). Select Fill shall be free from debris, roots, seeds of nuisance or exotic species, clods, and stones with a diameter greater than three (3) inches (76 mm) in any direction. Select Fill shall have an average organic content of not more than 2% or have an individual test value of not more than 4%.

E. Embankment Fill: Satisfactory materials for Embankment Fill shall consist of materials classified in accordance with ASTM D2487 as SP-SM, SW-SM, SP-SC, SW-SC, or SM, with a Uniformity Coefficient (Cu) greater than 3 (ASTM D422), and maximum fines content of 20%. In no case shall the proportion of gravel (material larger than the U.S. No. 4 Standard Sieve) exceed 40 percent by weight of the embankment or backfill material. Maximum particle size shall be 4 inches in any dimension. Organic content shall be less than 3 percent in accordance with ASTM D2974. Embankment fill shall be free from contamination from hazardous, toxic or radiological substances; trash, and debris.

F. Random Fill: Random Fill may be used to backfill existing ditches/canals or other places shown in the Drawings but shall not be used for embankment and structure foundation. Random Fill shall contain no particle sizes greater than 6 inches in any direction and the total percentage of particles greater 3 inches in any direction shall not exceed 20 percent by weight. Random Fill shall be free of trash and debris, cinders, combustibles, sod, wood, and cellulose. Organic material shall not exceed 10 percent of the total volume.

G. Unclassified Fill: Unclassified Fill may be material used to bring areas to grade where there is no potential for slope erosion and the fill will not support a structure of critical function. Unclassified Fill shall be placed where neither Select Fill nor Random Fill are shown on the Drawing. Unclassified Fill shall be free from seeds of nuisance or exotic species and will be composed of material excavated for the WORK or imported material that can be compacted to the required density.

H. Excavation: Excavation shall be the removal of all materials within the defined configuration to the limits of excavation shown on the Drawings, excluding stripping material.

I. Embankment: The terms "levee" or "embankment" as used in these specifications are defined as the earth fill portions of the embankment structure or other fills, including the temporary earthen plugs and earthen cofferdam, related to the embankment structure.

J. Backfill: Backfill as used in this section is defined as that fill material which cannot be placed around or adjacent to a structure until the structure is completed or until a specified time interval has elapsed after completion.

K. Structure Backfill: Structure Backfill shall be defined as the fill material of Select Fill, Shellrock/Limerock, or other Satisfactory Materials to the locations where indicated on the Drawings. Lifts shall not exceed six (6) inches when materials to be placed near structures and to be compacted with smaller equipment, otherwise, the maximum lifts can be 12 inches.

L. Satisfactory Materials: Satisfactory Materials shall consist of all fill and soil needed to meet the requirements for fill (or backfill) addressed thus far in this SECTION. Select fill is deemed as a satisfactory materials for this project.

M. Unsatisfactory Materials: Fill and soil that do not meet the requirements for fill (or backfill) addressed thus far in this SECTION shall be considered Unsatisfactory Materials. Unsatisfactory Materials include all other materials that are not defined as Satisfactory Materials. Random fill is deemed unsatisfactory material on this project.

N. Degree of Compaction: Degree of compaction for all fill types is expressed as a percentage of the maximum dry density obtained by the test procedure presented in ASTM D1557, abbreviated hereinafter as percent of the maximum dry density.

O. Cohesionless materials: These materials include gravels, gravel-sand mixtures, sands, and gravelly sands and are generally exclusive of clayey and silty materials.

P. Cohesive materials: These materials include silts and clays and are generally exclusive of sands and gravel.

Q. Silica Filter Sand: Silica Filter Sand shall be in accordance with the General Characteristics for ASTM C-33 and the size gradation tabulated below.

SILICA FILTER SAND GRADATION LIMITS	
SIEVE SIZE	PERCENT PASSING (%)
3/8" [9.5 mm]	100
No. 4 [4.75 mm]	95-100
No. 8 [2.36 mm]	80-100
No. 16 [1.18 mm]	50-96
No. 30 [0.60 mm]	25-60
No. 50 [0.30 mm]	5-30
No. 100 [0.15 mm]	0-10
No. 200 [0.075 mm]	0-2

The size gradation when tested at the supplier shall have a maximum fines (<#200 mesh) content of not more than 2%. The in-place compacted filter sand shall have a maximum fines content of not more than 5%. Testing of in-place filter sand may be required if there is reason to believe that the particle gradation was altered or contaminated during handling or placement.

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. The CONTRACTOR shall submit laboratory test results on the materials proposed to be used (whether native or imported) as Select Fill, Random Fill and Silica Filter Sand, Type 1 Graded Gravel and Type 2 Graded Gravel. At a minimum the laboratory testing shall include sieve analysis, organic content, USCS classification and modified proctor per ASTM D1557, as applicable. Prior to construction, the CONTRACTOR shall provide the source of each material proposed to be used.

C. The CONTRACTOR shall submit two (2) copies of field measured cross-sections at each design cross-section for record purposes for canal excavations and levee embankments as described in this SECTION. The submittal of the field measured cross-sections shall be signed and sealed by a Professional Surveyor and Mapper licensed in the State of Florida.

1.05 QUALIFICATIONS:

A. Geotechnical Testing Agency Qualifications: The CONTRACTOR shall furnish at his own expense an independent testing agency qualified according to ASTM E329 to perform all testing required to establish and maintain his Quality Control. This Quality Control involves conducting soil materials and rock-definition testing during earthwork operations, as documented according to ASTM D 3740.

B. Earthwork Contractor Qualifications: The CONTRACTOR shall use an adequate number of skilled laborers and installers who are thoroughly trained and have a minimum of five (5) years of successful experience in the necessary crafts and are completely familiar with the methods needed for the proper performance of the WORK of this SECTION. The CONTRACTOR shall employ the adequate resources and equipment necessary to successfully perform the WORK of this SECTION on schedule.

1.06 RESPONSIBILITIES:

A. The CONTRACTOR shall excavate any material encountered to the depth and grades required, shall backfill such excavations as required, and shall dispose of excess or unSatisfactory materials from excavation as approved by the DISTRICT. The CONTRACTOR shall provide and place necessary borrow material to properly backfill excavations as indicated on the Drawings, specified herein, or as directed by the DISTRICT.

B. Excavation, dewatering, sheeting, and bracing required shall be carried out so as to prevent any possibility of undermining or disturbing the foundations of any existing structure or WORK, and so that all WORK may be accomplished and inspected in the dry, except as directed by the DISTRICT. Aqueous construction may be performed only with prior written approval of the DISTRICT. Excavation and backfilling shall be in accordance with SECTION 02220.

C. The CONTRACTOR shall furnish, at his expense, the services of a Professional Surveyor and Mapper licensed in the State of Florida for the field layout of all WORK indicated or specified in this SECTION. The CONTRACTOR's licensed surveyor shall perform all initial Site layout and shall provide follow-up verification of all WORK underway as necessary.

1.07 CERTIFICATIONS AND TESTING:

A. The responsibility to retain the services of an independent testing laboratory shall be as defined in SECTION 01410.

B. The CONTRACTOR shall furnish, at his own expense, all testing required to establish and maintain his Quality Control (QC) processes required or specified in this SECTION. Field density tests shall be in accordance with all applicable ASTM Standards appropriate to each type of material used in the earthwork. Failure to meet the specified density will require the CONTRACTOR to recompact and retest, at his own expense, those areas directed by the DISTRICT.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advanced notice of its his intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED:

A. The CONTRACTOR shall excavate all materials encountered which may include, but not necessarily be limited to: Fine to medium grained sands with varying amounts of limestone fragments and silt.

B. The CONTRACTOR shall consider all materials encountered in excavations as satisfactory for use in Random Fill, provided that they consist of two (2) or more well-graded soils and achieve the required compaction as specified in this SECTION.

C. The CONTRACTOR shall consider all materials encountered, regardless of type, character, composition and condition thereof unclassified other than as indicated in Article 1.03 Definitions. The CONTRACTOR shall estimate the quantity of various materials included prior to submitting the Bid Form. Rock encountered shall be handled by the CONTRACTOR at no additional cost to the DISTRICT.

PART 3 - EXECUTION:

3.01 SITE PREPARATION:

A. Clearing and Demolition: The CONTRACTOR shall perform clearing and demolition as specified in SECTIONS 02110 and 02050.

B. Stripping: The CONTRACTOR shall remove topsoil from areas within limits of excavation and areas designated to receive compaction as shown on the Drawings, required and as provided below:

1. Scrape area clean of all brush, grass, weeds, roots, and other material.

2. Strip to a minimum depth of approximately six (6) inches or to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required segregating topsoil. All roots and branches 1/2 inch in diameter or greater shall be removed.

3. Stockpile topsoil in areas where it will not interfere with construction operations or existing facilities. Stockpiled topsoil shall be reasonably free of subsoil, debris and stones larger than two inches in diameter.

C. Existing Levee Roads: The CONTRACTOR shall remove and stockpile any existing shellrock or limerock material for later use in reconstructing the levee top road.

3.02 DISPOSAL OF SURPLUS AND UNSATISFACTORY MATERIAL: The CONTRACTOR shall dispose of all excess or unsatisfactory material off-site or in areas otherwise approved by the DISTRICT.

3.03 STOCKPILE OF EXCAVATED MATERIAL: The CONTRACTOR shall stockpile excavated materials in areas shown on the Drawings or in areas otherwise approved by the DISTRICT.

3.04 EXCAVATION AND TRENCHING:

A. Trenching for Pipes: The CONTRACTOR shall perform trenching for pipes as shown on the Drawings, required, and specified in accordance with SECTION 02221.

B. Sheeting and Bracing: The CONTRACTOR shall provide sheeting and bracing shown on the Drawings or as required in accordance with the following provisions.

1. Use when required by the specifications or Drawings and where resulting slopes from excavation or trenching might endanger the structural integrity of in-place or proposed structures.

2. Provide materials on-site prior to start of excavation. Adjust spacing and arrangement as required by conditions encountered.

3. Remove sheeting and bracing as backfill progresses. Fill voids left after withdrawal with sand or other DISTRICT approved material.

4. In-place structures damaged by sheeting and bracing activities shall be repaired by the CONTRACTOR at no additional cost to the DISTRICT.

5. Comply with all applicable Sections of Occupational Safety and Health Administration (OSHA).

6. Comply with all requirements of the Florida Trench Safety Law as specified in the General Terms and Conditions.

C. Blasting: If required and approved by the DISTRICT, the CONTRACTOR shall perform blasting in accordance with the SECTION 02211.

D. Excavation for Structures: The CONTRACTOR shall perform excavation for structures as shown, required and specified below:

1. Excavate area adequate to permit efficient erection and removal of forms.

2. Trim to neat lines where details call for concrete to be deposited against earth.

3. Excavate by hand in areas where confined space and access restricts the use of machines.

4. Notify the DISTRICT immediately when excavation has reached the depth indicated on plans.

5. Restore bottom of excavation to proper elevation with concrete in areas that are over excavated.

6. Conform to the requirements of SECTION 02221.

E. Canal Excavation: The CONTRACTOR shall perform canal excavation by any method meeting the requirements of these specifications and the Drawings. Transitions in bottom width and elevation shall be uniform. The excavated slopes and bottom of the canals shall be left as smooth as skilled use of the excavating equipment will permit.

1. A construction tolerance of 0.25 foot above or below the lines and grades indicated shall be permitted; however, the canal cross sectional area shall not be less than designed.

a. The CONTRACTOR shall provide field measured cross-sections of the "As-Built" conditions to the DISTRICT, plotted at the same stations as the detailed cross-sections shown on the Drawings to show the above specified tolerance has been met.

2. Where Select Fill is specified, the CONTRACTOR shall exercise care in excavation to avoid, to the maximum practicable extent, mixing of peat with materials Satisfactory for use in Select Fill.

3. Materials Satisfactory for use in Select Fill shall be deposited along the levee foundation in quantities sufficient for subsequent construction. Random Fill materials shall be deposited along each side of the central portion of the levee.

4. Sufficient quantities of peat or topsoil may be placed near the limits of fill (levees) for use in final dressing of side slopes.

F. Canal Cleaning: The CONTRACTOR shall clean existing canals to the lines and grades shown on the Drawings. All deposited sand, silt, and organic matter shall be removed and stockpiled for reuse or disposed of as directed by the DISTRICT.

G. Demucking: The CONTRACTOR shall remove all organic soils from areas below structures, piping, and road subgrades to the lines and grades as shown in the Drawings. Materials excavated shall not be used for backfill of structures or pipes. Organic soils (including peat) shall be used in the top layer of the final dressing of the levee.

H. Excavation of Existing Embankments: The CONTRACTOR shall perform excavation by any method acceptable to the DISTRICT and by meeting the requirements of these specifications and the Drawings. All materials removed from embankments shall be Satisfactory for reuse as Random Fill. Excavation limits shall be clearly identified and approved by the DISTRICT prior to initiation of the WORK.

I. Cross-Sections: For pay quantities and record purposes, the CONTRACTOR shall submit field measured cross-sections as required by the DISTRICT.

3.05 EMBANKMENT:

A. Embankment Construction:

1. Embankment shall consist of satisfactory materials and shall be placed to the lines and grades as shown on the Drawings. At no location shall the completed top elevation be lower than indicated. Levee side slopes indicated are nominal and may be varied. Completed side slopes shall be uniform from top to toe of the levee and shall be smoothly transitioned. The CONTRACTOR shall perform embankment WORK as shown on the Drawings, required and in accordance with these specifications.

a. Satisfactory Materials shall be placed in horizontal layers not exceeding eight (8) inches in loose thickness and compacted as indicated.

b. Random Fill shall be placed to its final position shown on the Drawings.

c. Rocks exceeding the acceptable size shall be either stockpiled or crushed to the acceptable size for use. The acceptable sizes of rocks are shown in the Definitions Section of this specification.

2. Material deposited during excavation may have a high moisture content and shall therefore be dried prior to final incorporation in the embankment to obtain Satisfactory moisture content (within plus or minus two percent of optimum moisture density) to permit placement and compaction. Drying may consist of allowing the material to drain for a sufficient period to achieve the necessary moisture content or by mechanical means. Following the drying period, organic and non-organic materials shall be completely mixed.

3. Following mixing, materials shall be placed in the levee above existing grade in horizontal layers not exceeding eight (8) inches in loose thickness and compacted as shown on the Drawings.

4. Embankment Fill shall be compacted to not less than 95% of the maximum density at optimum moisture content determined by accordance with ASTM D1557.

B. Final Dressing of Slopes: Following the completion of embankment placement and compaction, the CONTRACTOR shall grade embankment slopes and adjacent transition areas so that they are reasonably smooth and free from irregular surface changes. The CONTRACTOR shall comply with the following:

1. In areas where the embankment is to have grass, sod, or landscaping, the material within the top one (1) foot of the levee, shall be free of any rocks greater than two (2) inches (51 mm) in diameter.

2. The degree of finish shall be that ordinarily obtained from blade grader or similar operations.

3. Provide roundings at bottom of slopes and other breaks in grade.

C. Cross-Sections: Refer to SECTION 01050 for cross-section requirements.

3.06 BACKFILLING:

A. Pipe Backfill: The CONTRACTOR shall perform pipe backfill as required, shown, and specified in accordance with SECTION 02221.

B. Structure Backfill: The CONTRACTOR shall place structural backfill in accordance with the lines, grades, and cross-sections shown in the Drawings or as ordered by the DISTRICT. The CONTRACTOR shall backfill using Select Fill. Stones or rocks greater than two (2) inches (51 mm) in any dimension shall not be placed within twelve (12) inches of the structure. Lifts shall not exceed six (6) inches when materials to be placed near structures and to be compacted with smaller equipment, otherwise, the maximum lifts can be 12 inches. The following procedures shall be adhered to:

1. Structure backfill shall be compacted to not less than 95% maximum dry density as measured by ASTM D1557.

2. Backfill shall not be placed against fresh concrete without the approval of the DISTRICT. Once approved, backfill only after concrete has attained at least 70% design strength. Backfill adjacent to structures only after a sufficient portion of the structure has been built to resist the imposed load.

3. Remove all debris from excavation prior to placement of material.

4. Place backfill in level layers of thickness within the compacting ability of equipment used.

5. Perform backfilling simultaneously on all sides of structures. For walls, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall.

C. Unclassified Backfill: The CONTRACTOR shall ensure that unclassified backfill be placed in twelve (12) inch loose lifts to the lines and grades shown on the Drawings or as approved by the DISTRICT. The CONTRACTOR shall compact unclassified backfill to a density approximating the density of surrounding native material and in a manner that will prevent settlement of the completed area.

3.07 GRADING: The CONTRACTOR shall perform grading as shown on the Drawings, required, and provided for below:

A. Grade and compact all areas within the project area, including excavated and filled sections and adjacent transition areas, reasonably smooth, and free from irregular surface changes.

B. Degree of finish shall be that ordinarily obtained from blade grader or scraper operations except as otherwise specified.

C. Finished rough grades shall generally be not more than one quarter foot above or below those indicated with due allowances for topsoil.

D. Finish all ditches, swales, and gutters to drain readily.

E. Provide roundings at top and bottom of banks and at other breaks in grade.

3.08 RESTORATION: The CONTRACTOR shall restore all areas disturbed by construction activities to equal or better condition and to the satisfaction of the DISTRICT. Sod all disturbed sloped areas that are 4H:1V or steeper and/or as shown on the Drawings. Seed and mulch all other disturbed areas.

3.09 MAINTENANCE:

A. The CONTRACTOR shall protect newly graded areas from actions of the elements.

B. The CONTRACTOR shall fill, repair, and re-establish grades to the required elevations and slopes for any area that shows settling or erosion occurring prior to sodding.

C. The CONTRACTOR shall maintain grassed and sodded areas in accordance with SECTION 02920.

END OF SECTION

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SECTION 02215 PROTECTION OF EXISTING STRUCTURES

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, equipment, and materials for protecting existing structures during construction, and for monitoring and documenting the effectiveness of said protection.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 01320 - Construction Video and Photographs
3. SECTION 02050 - Demolition
4. SECTION 02110 - Clearing and Land Preparation
5. SECTION 02200 - Earthwork
6. SECTION 02401 - Dewatering and Cofferdam
7. SECTION 02435 - Turbidity Control and Monitoring

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. All applicable local (City, County, Village, Town, Tribe, etc.) codes, regulations, ordinances, and standards
2. Florida Department of Transportation (FDOT):
    a. Standard Specifications for Road and Bridge Construction, Latest Edition.

1.03 DEFINITIONS: Existing Nearby Facilities at Risk (ENFAR): the collective name of any and all nearby buildings, structures, facilities, utilities, property, access roads, levees, etc., located within or adjacent to the Site that could receive seismic motion greater than one-half inch per /second (or a more stringent velocity required by a permit or agency) and could be at risk for being damaged from ground vibrations due to construction.

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. The CONTRACTOR shall provide a complete list of all applicable rules and regulations with which they must comply.

C. Pre-Construction Condition Survey and Vibration Monitoring and Control:

1. The CONTRACTOR shall submit a Pre-Construction Condition survey in accordance with SECTION 01300, not less than 10 days prior to commencing construction operations.
2. The CONTRACTOR shall schedule and conduct a pre-construction condition survey. The CONTRACTOR shall provide one (1) person from its organization and its specialist on vibration control who meets the qualifications of Article 1.05 to organize and lead a team, with the DISTRICT and a representative of each ENFAR, in making a pre-construction condition

survey. At a minimum, each ENFAR shall be inspected and it's condition documented. The following is a list of each ENFAR specific to this Project for which a pre-construction inspection and report is mandatory whether the ENFAR criteria are met or not:

a. S.R. 70 Bridge over the C-41A Canal

b. FPL Pole 516746-2-1

3. A survey method acceptable to the CONTRACTOR's insurance company shall be used. Damage resulting from construction is the CONTRACTOR's responsibility. The CONTRACTOR shall notify the DISTRICT and occupants of nearby buildings at least 24 hours before the start of construction.

4. Fourteen days before start of construction, the CONTRACTOR shall submit the name and qualifications of the vibration specialist including the following:

a. Project names, description, locations, and dates of services performed.

b. Name and phone number of owner/agency contact who can verify the experience of the specialist.

5. The CONTRACTOR shall control vibrations and monitor each operation with approved seismographs and monitoring equipment located at acceptable locations when constructing near buildings, structures, or utilities that may be subject to damage from vibrations. When vibration damage to buildings, structures, or utilities is possible, use seismographs capable of recording particle velocity for three (3) mutually perpendicular components of vibration. The vibration specialist shall interpret the seismograph records to ensure that the data is effectively used in the control of the operations.

D. The Pre-construction condition survey document shall include at a minimum:

a. A map of the Project Site with areas of concern highlighted.

b. Videotaped or photographically documented existing conditions, and instances of pre-existing cracks or other defects. The documentation shall clearly identify each item. Documentation shall describe the location, the direction from which the photo was taken, and dates. Documentation shall include a narrative of each issue. CONTRACTOR shall note the condition of the existing structures and shall locate and identify any areas where bulging, sloughing, cracking, or existing damage is observed.

c. Actual measured horizontal and vertical dimensions (not estimated dimensions) from the nearest operations to surveyed properties, structures, levees, utilities or facilities. The CONTRACTOR is required to have a Professional Land Surveyor registered in the State of Florida supervise the measurements and recording of this information.

d. Pertinent diaries or logs of conversations with owners related to the pre-construction condition of the inspected ENFAR's.

e. The CONTRACTOR shall clearly document existing conditions.

E. Seismic Monitoring Records: The records shall be clearly tied to specific construction events and include instrument identification, locations, dates, and times with tabulated and summarized results.

F. Damage Investigation Survey Document:

1. Within seven (7) calendar days of any WORK event causing damage to any property a survey shall be conducted. Such survey shall include as a minimum:

a. Detailed description of the damage, including videotape or photographic documentation.

b. Name, address and telephone number of the Owner of the damaged property, structures, levees, utilities or facilities. The DISTRICT will supply a master list of adjacent property owner information.

c. Evaluation of the cause of the damage and measures taken or to be taken to prevent recurrence.

2. The CONTRACTOR shall supplement this report on a bi-weekly basis (or other time period as determined by the DISTRICT) until the damage is repaired or otherwise made whole.

3. The CONTRACTOR shall submit an overview of the damage survey results including the status of any damage events, within 30 calendar days of the completion of all construction operations.

G. Damage Inspection Survey:

1. The CONTRACTOR shall perform Damage Inspection surveys to detect any effects resulting from construction operations.

2. The CONTRACTOR shall submit Damage Inspection survey, photographs, and other finalized data to the DISTRICT.

3. The DISTRICT shall inspect the properties, levees, structures, facilities and utilities after receipt of the report to verify the accuracy of the survey. Florida Department of Transportation (FDOT), Florida Power & Light (FPL) or other property or utility owners may inspect their structures, facilities, levees or utilities. Any damaged areas, which were not specifically identified in the pre-construction survey narrative and photographs, shall be deemed to have been caused by the construction operations. The CONTRACTOR shall be responsible for required repairs at no additional cost to the DISTRICT.

1.05 QUALIFICATIONS: Vibration Control Specialist: The CONTRACTOR shall utilize a vibration control specialist who is permitted and licensed in the State of Florida with at least five (5) consecutive years of experience in vibration monitoring with at least three (3) Projects per year as specified in Article 1.04.

1.06 RESPONSIBILITIES:

A. The CONTRACTOR shall include in its bid consideration in its progress schedule for time it takes to obtain permits, permit revisions and inspections from the issuing entities.

B. The CONTRACTOR shall obtain copies of all applicable codes, regulations, laws and ordinances and keep them in its on-site Project file.

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: (Not Applicable)

1.09 WARRANTY: (Not Applicable)

PART 2 - PRODUCTS

2.01 MATERIALS ENCOUNTERED: Materials to be encountered include geologic formations for which the CONTRACTOR has determined appropriate methods for achieving required grades, loosening material, and fragmenting according to gradation requirements. The CONTRACTOR shall ensure in its bid that it has considered all the potential expenses related to the construction required to comply with the industry regulations and with requirements of the plans and specifications.

PART 3 - EXECUTION

3.01 GENERAL:

A. The CONTRACTOR shall be responsible for any damage to existing properties, utilities, structures, facilities, levees or access roads due to construction activities. The CONTRACTOR shall expediently

repair (within 30 days or as directed by the DISTRICT) at no additional expense. Upon the circumstance of damage:

1. The CONTRACTOR shall stop construction operations.
2. The CONTRACTOR shall provide the required damage survey.
3. The CONTRACTOR shall undertake to rectify the damage.
4. The CONTRACTOR shall revise, resubmit, and obtain the DISTRICT's acceptance, and any required third-party acceptance, on the appropriate construction methods before any further WORK is undertaken.

B. The CONTRACTOR shall have the sole responsibility for the safety of all WORK activities including labor, materials handling, shipment, storage, and equipment.

C. No time extensions will be made, nor will additional compensation be made for delays or other circumstances related to unacceptable WORK.

D. The CONTRACTOR shall take precautions to preserve the materials outside the lines of excavation in an undisturbed condition.

3.02 COORDINATION WITH THIRD PARTIES WITH RESPECT TO CONSTRUCTION:

A. Critical properties, public utilities, levees, structures or facilities may lie close to construction areas associated with this Project. During Project development agreements may have been made between the DISTRICT and relevant third parties. Some of these agreements will guide, restrict and affect the CONTRACTOR's activities. The following list includes the affected parties, and conditions, restrictions, timeframes, issues and consequences that the CONTRACTOR must consider in his bid for both costs and scheduling. The CONTRACTOR shall be responsible for plan implementation and effectiveness while accommodating such agreements. There will be no extra compensation for activities the CONTRACTOR must pursue to satisfy the conditions.

1. N/A

3.03 TURBIDITY AND EROSION CONTROL: The CONTRACTOR shall install turbidity and erosion control devices in accordance with SECTION 02435 prior to start of construction.

3.04 SITE PREPARATION:

A. The CONTRACTOR shall demolish structures and other items as shown on the Drawing and in accordance with SECTION 02050.

B. The CONTRACTOR shall clear the Site in accordance with SECTION 02110.

C. The CONTRACTOR shall strip the Site in accordance SECTION 02200.

D. Vibration Control: The CONTRACTOR shall provide a minimum of three (3) seismographs sufficient to measure and record ground movements caused by construction. The seismographs shall be placed at locations to include, but not limited to, the nearest properties, buildings, structures, levees, or utilities, and such locations are to be approved by the DISTRICT:

1. Seismograph operators shall be qualified personnel capable of setting up instruments at designated locations and efficiently recording the construction. Construction shall be controlled in such a manner that the maximum ground vibration level at any structure which is vulnerable to damage shall not exceed a zero-to-peak particle velocity of one-half inch per /second or any more stringent permit or regulatory agency requirement.
2. The instrumentation shall record three (3) orthogonal components (vertical, radial, and transverse with respect to the location of the construction) of particle velocity direct (or shall have sufficient resolution of acceleration or displacement such that particle velocity can be

readily and accurately determined from the records). The instantaneous vector sum of the three (3) directional components of vibration will be used to compute the maximum vibration level. A written memorandum of vibration intensity shall be submitted within 24 hours when specifically requested by the DISTRICT, or without request when such intensity exceeds a peak particle velocity of one and one-half inch per second.

END OF SECTION

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SECTION 02220 EXCAVATION AND BACKFILLING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, materials, and equipment to perform the excavation and backfilling as shown on the Drawings.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 02110 - Clearing and Land Preparation
3. SECTION 02221 - Trenching, Backfilling & Compaction
4. SECTION 02401 - Dewatering
5. SECTION 02200 - Earthwork

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society of Testing Materials (ASTM):
   a. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12400 ft-lbf/cu. ft. (600 kN-m/m^3))
   b. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56000 ft-lbf/cu. ft. (2700 kN-m/m^3))
   c. D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
   d. D4254 - Standard Test Method for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
2. Florida Department of Transportation (FDOT):
   a. Standard Specifications for Road and Bridge Construction, Latest Edition
3. Miscellaneous Project Data:
   a. Culvert Replacement Construction Project Phase II:, Prepared By GFA International:, Dated April 1 2019
   b. Subsurface soil data logs
   c. Project geotechnical report

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. The CONTRACTOR shall submit, prior to the start of work, the planned method of construction of the embankments shown on the Drawings, or as specified herein, for the DISTRICT's review. This plan shall also indicate the intended construction sequence for backfilling operation.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: Field density tests in accordance with ASTM Standards, for each type of material used in backfilling may be required. Failure to meet the specified density will require the CONTRACTOR to recompact and retest, at its own expense, those areas directed by the DISTRICT.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide the DISTRICT at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 STRUCTURAL BACKFILL: The CONTRACTOR shall provide satisfactory structural backfill material which shall consist of material free of muck, stumps, rocks, or other material considered unacceptable by the DISTRICT. The general requirements for fill shall be in accordance with SECTION 02200 and FDOT 120-7.1 and 7.2.

2.02 EMBANKMENT FILL: The CONTRACTOR shall provide embankment fill free of muck, stumps, roots, brush, vegetation or other material considered undesirable by the DISTRICT. The general requirements of embankment fill shall be in accordance with SECTION 02200 and FDOT 120-7.1 and 7.2.

PART 3 - EXECUTION

3.01 SITE PREPARATION:

A. Clearing and Grubbing: The CONTRACTOR shall perform clearing and grubbing in accordance with SECTION 02110 and with the following provisions:

1. Perform only in areas where earthwork or other construction operations are to be performed or otherwise shown on Drawings.
2. Protect tops, trunks, and roots of existing trees that are to remain on the Site.
3. Clear areas and dispose of other trees, brush and vegetation before starting construction.
4. Remove tree stumps and roots larger than 3 inches in diameter and backfill resulting excavations with approved material.

B. Stripping: The CONTRACTOR shall remove topsoil from areas within limits of excavation and areas designated to receive compaction as shown on the Drawings, required and as provided below:

1. Scrape area clean of all brush, grass, weeds, roots, and other material.
2. Strip to depth of approximately 6 inches or to a sufficient depth to remove excessive roots in heavy vegetation or brush areas and as required segregating topsoil.
3. Stockpile topsoil in areas where it will not interfere with construction operations or existing facilities. Stockpiled topsoil shall be reasonably free of subsoil, debris and stones larger than 2 inches in diameter.

3.02 DISPOSAL OF SURPLUS AND UNSUITABLE MATERIAL: The CONTRACTOR shall dispose of all excess or unsuitable material off-site or in areas otherwise approved by the DISTRICT.

3.03 STOCKPILE OF EXCAVATED MATERIAL: The CONTRACTOR shall stockpile excavated materials in areas shown on the Drawings or in areas otherwise approved by the DISTRICT.

3.04 PLACEMENT OF STRUCTURAL FILL: The CONTRACTOR shall place structural backfill true to the lines, grades and, cross sections shown in the Drawings or as ordered by the DISTRICT. Structural backfill shall be deposited by the CONTRACTOR in horizontal layers not exceeding 8 inches in depth measured loose, and shall be compacted to a density of not less than 95 percent of the maximum density at optimum soil moisture content +/- 2 percent as determined by ASTM D1557 Standards. Backfill shall not be placed against fresh concrete without the approval of the DISTRICT.

3.05 PLACEMENT OF EMBANKMENT FILL: The CONTRACTOR shall construct embankments true to the lines, grades, and cross sections shown on the Drawings or as directed by the DISTRICT. Fill for embankments shall be placed by the CONTRACTOR in successive layers of not more than 12 inches in thickness, measured loose, for the full width of the embankment. Each layer of the material used in the formation of the embankments shall be compacted by the CONTRACTOR to a density of at least 95 percent of the maximum density as determined by ASTM D1557 Standards. Unreasonable roughness of the surface shall be dressed out. Rocks and boulders shall not project above the finished surfaces. All areas disturbed shall be graded by the CONTRACTOR so that water drains freely at all points after construction.

3.06 COMPACTION EQUIPMENT: When placing fill adjacent to foundations or retaining walls, heavy equipment for spreading and compacting fill shall not be operated closer than a distance equal to the height of backfill above the top of the footing; the area remaining shall be compacted in layers not more than 4 inches in compacted thickness with power-driven hand tampers suitable for the materials being compacted. Backfill shall be placed carefully around pipes or tanks to avoid damage to coatings, wrappings, or tanks. Backfill shall not be placed against foundation walls prior to 7 days after completion of the walls. As far as practicable, backfill shall be brought up evenly on each side of the wall and sloped to drain away from the wall.

3.07 GRADING: The CONTRACTOR shall perform grading as shown on the Drawings, required, and provided for below:

A. Grade and compact all areas within the Project area, including excavated and filled sections and adjacent transition areas, reasonably smooth, and free from irregular surface changes.

B. Degree of finish shall be that ordinarily obtained from blade grader or scraper operations except as otherwise specified.

C. Finished rough grades shall generally be not more than 1 quarter foot above or below those indicated with due allowances for topsoil.

D. Finish all ditches, swales, and gutters to drain readily.

E. Provide roundings at top and bottom of banks and at other breaks in grade.

3.08 CLEANUP: The CONTRACTOR shall cleanup the Site as required and provided for below, to the satisfaction of the DISTRICT:

A. Clear surfaces of all stones, roots, grading stakes, and other objectionable materials.

B. Keep paved areas clean and promptly remove rock or dirt dropped upon surfaces.

3.09 PROTECTION AND MAINTENANCE: The CONTRACTOR shall maintain the embankments until final acceptance of all work. The maintenance shall include repairs of any erosion, slides, or other damages.

END OF SECTION

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SECTION 02221 TRENCHING, BACKFILLING AND COMPACTING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, materials and equipment necessary for complete and proper trenching, backfilling and compacting as specified herein.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 02200 - Earthwork

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society of Testing Materials (ASTM):
   a. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using the Standard Effort (12,400 ft-lbf/ ft3 (600 kN-m/m3))
   b. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ ft3 (2,700 kN-m/m3))
   c. D4253 - Standard Test Methods for Maximum Index Density and Unit Weight of Soils Using a Vibratory Table
   d. D4254 - Standard Test Methods for Minimum Index Density and Unit Weight of Soils and Calculation of Relative Density
2. Florida Department of Transportation (FDOT):
   a. Standard Specifications for Road and Bridge Construction, Latest Edition
3. Miscellaneous Project Data:
   a. Subsurface soil data logs are provided for the CONTRACTOR's reference:

      Culvert Replacement Construction Project Phase II : Prepared By GFA International: Date: April 1, 2019.

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Submittals shall be in accordance with SECTION 01300.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES:

A. The CONTRACTOR shall make all excavations for piping and appurtenant structures in any material encountered to the depth and grades required, shall backfill such excavations and dispose of excess or unsuitable materials from excavation, and shall provide and place necessary borrow material to properly backfill excavations, all as indicated on the Drawings, specified herein, or as directed by the DISTRICT.

B. Excavation, dewatering, sheeting and bracing required shall be carried out so as to prevent any possibility of undermining or disturbing the foundations of any existing structure or work, and so that all work may be accomplished and inspected in the dry, except as directed by the DISTRICT. Aqueous construction may be performed only with prior approval of the DISTRICT.

1.07 CERTIFICATIONS AND TESTINGS: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS: The CONTRACTOR shall furnish materials as required to complete the WORK under this SECTION.

PART 3 - EXECUTION

3.01 EXTENT OF OPEN EXCAVATION: The CONTRACTOR shall perform the excavation such that at any time the amount of excavation open will be held to a minimum consistent with normal and orderly prosecution of the work, or as restricted by permit conditions.

3.02 CUTTING PAVEMENT: When excavations are required in paved areas the CONTRACTOR shall conform to the following.

A. When excavations are to be made in paved surfaces, the pavement shall be cut ahead of the excavation by means of suitable sharp tools to provide a uniform sharp edge with minimum disturbance of remaining materials.

B. Asphalt paving and other improvements in the right-of-way and on other private property affected by this construction shall be duly protected and, where disturbed, shall be restored or replaced to meet original conditions.

3.03 TRENCH EXCAVATION: The CONTRACTOR shall perform trench excavation in accordance with the following.

A. All excavation for piping shall be open cut. Trench sides shall be approximately vertical between an elevation of 1 foot above the top of the pipe and the centerline of the pipe; otherwise, trench sides shall be as vertical as possible or as required. Trenches may be excavated by machinery to a depth that will not disturb the finish grade.

B. Trench width shall be as narrow as practical and shall not be widened by scraping or loosening material from the sides.

3.04 EXCAVATION BELOW NORMAL GRADE:

A. In the event the CONTRACTOR through error or carelessness excavates below the elevation required, the CONTRACTOR shall at his own expense backfill with selected gravel and compact to obtain a suitable pipe bedding all as directed and to the satisfaction of the DISTRICT.

B. In the event unstable or unsuitable bedding material is encountered at or below the pipe bedding level, the CONTRACTOR shall remove such material and replace it with suitable compacted material.

3.05 BACKFILLING TRENCHES:

A. The CONTRACTOR shall be responsible for obtaining the necessary inspections before, during and after backfilling and shall re-excavate, refill and perform all such related work to obtain satisfactory test results.

B. The CONTRACTOR shall use excavated materials classified as embankment fill for backfilling and such grading on the Site as is required. The CONTRACTOR shall dispose of any excess fill or unstable material in areas approved by the DISTRICT. Pipe trenches shall be backfilled with fine, loose embankment fill (see SECTION 02220, paragraph 2.02), free from large stones, carefully deposited on both sides of pipe and thoroughly and carefully rammed until enough fill has been placed to provide a cover of at least 1 foot above the pipe. The remainder of the backfill material may then be thrown in and tamped. Water settling may be permitted. The CONTRACTOR shall submit written request detailing the need to perform water settling and reasons why work in the dry is not possible. The CONTRACTOR shall also submit detailed procedures for the review and approval of the DISTRICT. Whenever trenches have not been properly filled, or if settlement occurs, they shall be refilled, smoothed off and finally, made to conform to the surface of the ground. Backfilling shall be carefully performed and the surface restored to the elevation shown on the plans. In unpaved areas the surface of trenches shall conform and be equal to quality, character and material of the surface immediately prior to making the excavation.

C. Place earth embedment as follows:

1. With level bottom layer at proper grade to receive and uniformly support pipe barrel throughout its length.

2. Form shallow depression under each joint to facilitate jointing.

3. Add second layer simultaneously to both sides of the pipe with care to avoid displacement of the pipe.

4. Place material in maximum 12 inch lifts.

3.06 BACKFILLING OF TRENCH UNDER ROADWAY AND AREAS TO BE PAVED: The CONTRACTOR shall place material in 12 inch maximum layers after filling one foot above pipe as previously described. Each layer shall be compacted to 95 percent maximum dry density as measured by ASTM D1557 so that pavement can be placed promptly. Any pavement cut or area disturbed by this work shall be replaced to match existing.

3.07 BACKFILLING OF TRENCH OPEN AREAS: The CONTRACTOR shall place material in 12 inch maximum lifts after filling one foot above pipe as previously described. The top one-foot layer shall be compacted to 85 percent maximum dry density as measured by ASTM D1557. Each layer shall be compacted to the density of adjacent soils. Restore the surface to original grade and place sod or seed as required by the contract documents.

END OF SECTION

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SECTION 02230 ROADWAY EXCAVATION, BACKFILL AND COMPACTION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The work specified by the CONTRACTOR shall consist of the excavation and embankment required for the construction of the roadway, ditches, and shoulders shown on the Drawings and includes the preparation of subgrades, the construction of embankments, and utilization or disposal of the materials excavated, and the compaction and dressing of excavated areas and embankments. All work shall be in accordance with the alignment, grades and sections as shown in the Drawings or as directed.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT):

a. Standard Specifications for Road and Bridge Construction, Latest Edition

B. American Society of Testing Materials (ASTM):

a. D698 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using the Standard Effort (12,400 ft-lbf/ft^3 (600 kN-m/m^3))

b. D1556 - Standard Test Method for Density and Unit Weight of Soil in Place by Sand Cone Method

c. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3 (2,700 kN-m/m^3))

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

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Submittals shall be in accordance with SECTION 01300.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING:

A. Tests: If the DISTRICT deems necessary, field density tests may be used in accordance with ASTM D1556, Test for Soil in Place by Sand Cone Method, or ASTM D6938. The areas to be tested shall be determined by the DISTRICT. Laboratory compaction tests shall be conducted in accordance with ASTM D698 and D1557. Cost of testing will be the responsibility of the DISTRICT. The CONTRACTOR shall make the Site available for testing and cooperate fully to allow tests to be taken. Failure to meet the specified density will require the CONTRACTOR to recompact and retest those

areas directed by the DISTRICT. The DISTRICT shall deduct cost of retesting from monies due to the CONTRACTOR.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS FOR BACKFILL: The CONTRACTOR shall use all suitable materials resulting from the excavation to the extent practicable in the construction of the roadway and such other phases as shown on the Drawings or required for completion of the WORK, as directed by the DISTRICT. Materials shall conform to FDOT Section 120-7.2 and shall contain no muck, stumps, roots, brush, organic matter, rubbish or other material that will not compact into a suitable and enduring roadbed.

PART 3 - EXECUTION

3.01 EMBANKMENT CONSTRUCTION: The CONTRACTOR shall construct by the dry fill method as specified by FDOT Specification Section 120-8.2.

3.02 COMPACTION: The CONTRACTOR shall compact each layer of material used in the formation of the embankments to a density of at least 90 percent of the maximum density as determined by ASTM D698, D1557. Each layer shall be uniformly compacted using equipment which will achieve the required density, and as compaction operations progress, each layer shall be shaped and manipulated as necessary to assure uniform density throughout the embankment. The material being compacted shall be maintained within plus or minus 2 percent of its optimum moisture content during compaction.

3.03 FINAL DRESSING: As a final grading operation the CONTRACTOR shall shape the surface of the earthwork to conform to the lines, grades and cross sections shown on the Drawings or as directed by the DISTRICT. The tolerances of 0.3-feet above or below the plan cross section will be permitted with the following exceptions:

A. The surface of shoulders and subgrade shall be shaped to within 0.1-foot of the drawing cross section.

B. Earthwork shall be shaped to match adjacent pavement, curb, sidewalk, etc.

END OF SECTION

SECTION 02233 SHELLROCK BASE

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall provide all labor, equipment and materials to construct a base course by stabilizing the access roadbed soil material with shellrock in accordance with FDOT Standard Specifications for Road and Bridge Construction Section 285 or as specified herein, and in conformity with the lines, grades, notes and typical cross sections shown in the Drawings.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT):

a. Standard Specifications for Road and Bridge Construction

2. American Society for Testing and Materials (ASTM):

a. D1557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lb/ft^3 (2,700 kN-m/m^3))

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

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Submittals shall be in accordance with SECTION 01300.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: If the DISTRICT deems necessary, field density tests in accordance with ASTM D6938 will be performed. The areas to be tested shall be determined by the DISTRICT. Laboratory compaction tests in accordance with ASTM D1557 will also be performed. The CONTRACTOR shall make the Site available for testing and cooperate fully to allow tests to be taken. Failure to meet the specified density will require the CONTRACTOR to recompact and retest those areas directed by the DISTRICT.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 SHELLROCK: The CONTRACTOR shall provide shellrock-stabilized base materials in accordance with FDOT Standard Specifications for Road and Bridge Construction Section 911. With the approval of the DISTRICT, suitable shellrock material may be obtained from approved spoil areas. Acceptance of the material will be in accordance with FDOT Standard Specifications for Road and Bridge Construction Section 200-7.

PART 3 - EXECUTION

3.01 PREPARATION: The CONTRACTOR shall complete the area to be stabilized to the lines and to a grade parallel to the finished elevation of the stabilized base before the stabilizing material is added.

3.02 SPREADING AND MIXING: The CONTRACTOR shall place shellrock on the areas to be stabilized and spread it uniformly to the loose depth of 6 inches or as directed by the DISTRICT. The CONTRACTOR shall then thoroughly mix the shellrock with the soil. The mixing operation shall be accomplished by use of a rotary tiller or other approved equipment and shall be repeated as may be necessary to distribute the shellrock uniformly throughout the soil for the depth indicated. The material shall be further manipulated until uniform distribution of the shellrock throughout the width and depth of the base course is secured.

3.03 MIXING DEPTH: The CONTRACTOR shall mix the shellrock and soil to a depth as indicated and in accordance with FDOT Standard Specifications for Road and Bridge Construction Section 230-5.5.

3.04 SURFACE: After mixing is complete the CONTRACTOR shall shape the surface so that, after being compacted, it will conform to the lines and grades as determined in the field.

3.05 COMPACTING AND FINISHING BASE: After the spreading and mixing operations are complete, the CONTRACTOR shall compact the mixed soil/shellrock base. The base shall be compacted to the density of not less than 98 percent of the maximum density as determined by ASTM D1557, and in accordance with FDOT Standard Specifications for Road and Bridge Construction Section 200-6.

END OF SECTION

SECTION 02367 FOUNDATION PILING (PRESTRESSED CONCRETE)

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, equipment, and materials necessary to install all foundation piling for the structures as shown or specified.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 03050 - Concrete Admixture Waterproofing

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Concrete Institute (ACI):
   a. 211.4R - Guide for Selecting Proportions for High-Strength Concrete Using Portland Cement and Other Cementitious Materials
   b. 214.3R - Simplified Version of the Recommended Practice for Evaluation of Strength Test Results of Concrete
   c. 304R - Guide for Measuring, Mixing, Transporting, and Placing Concrete
   d. 305R - Guide to Hot Weather Concreting
   e. 306R - Guide to Cold Weather Concreting
   f. 309R - Guide for Consolidation of Concrete
   g. 315 - Manual of Standard Practice for Detailing Reinforced Concrete Structures
   h. 318/318R - Building Code Requirements for Reinforced Concrete and Commentary
   i. 543R - Guide to Design, Manufacture, and Installation of Concrete Piles
2. American Society for Testing and Materials (ASTM):
   a. A416 - Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete
   b. A421 - Standard Specification for Stress-Relieved Steel Wire for Prestressed Concrete
   c. A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
   d. A722 - Standard Specification for High-Strength Steel Bar for Prestressing Concrete
   e. A1064 - Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete
   f. C31 - Standard Practice for Making and Curing Concrete Test Specimens in the Field
   g. C33 - Standard Specification for Concrete Aggregates
   h. C39 - Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

i. C109 - Standard Specification for Compressive Strength of Hydraulic Cement Mortars (using 2-in. or (50 mm) Cube Specimens)

j. C143 - Standard Test Method for Slump of Hydraulic Cement Concrete

k. C150 - Standard Specification for Portland Cement

l. C171 - Standard Specification for Sheet Materials for Curing Concrete

m. C226 - Standard Specification for Air-entraining Additions for Use in the Manufacture of Air-entraining Hydraulic Cement

n. C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

o. C260 - Standard Specification for Air-Entraining Admixtures for Concrete

p. C309 - Standard Specification for Liquid Membrane Forming Compounds for Curing Concrete

q. C494 - Standard Specification for Chemical Admixtures for Concrete

r. C595 - Standard Specification for Blended Hydraulic Cements

s. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

t. C666 - Standard Test Method for Resistance of Concrete to Rapid Freezing and Thawing

3. American Welding Society (AWS):

a. D1.4 - Structural Welding Code-Reinforcing Steel

4. Federal Highway Administration (FHWA):

a. NHI-16-009 / 010 - Design and Construction of Driven Pile Foundations

5. Florida Department of Transportation (FDOT):

a. Standard Specification for Road and Bridge Construction, latest edition

b. Section 455 - Standard Specification for Structural Foundation, latest edition

c. Standard Index 20612 -12 Inches Square Prestressed Concrete Pile

6. Prestressed Concrete Institute (PCI):

a. MNL 116 - Manual for Quality Control for Plants and Production of Structural Precast Concrete Products

b. MNL 120 - PCI Design Handbook, Precast and Prestressed Concrete

7. Miscellaneous Project Data:

a. Culvert Replacement Construction Project Phase II : Prepared By: GFA International , Date: April 1, 2019.

b. Subsurface soil data logs

c. Project geotechnical report

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. The CONTRACTOR shall make submittals for Driven Prestressed Reinforced Concrete Piles in accordance with SECTION 01300 and the following provisions. All information may be submitted

together, or in packages as described below. The CONTRACTOR shall be responsible for coordination of materials, equipment, and installation regardless if the submittals are made together or separately.

1. The CONTRACTOR shall submit to the DISTRICT details associated with fabrication of prestressed reinforced concrete piles as follows:

    a. Prior to piling fabrication:

        i. Submit Shop Drawings indicating erection details, build-up details, splice details, and special embedded or attached lifting devices. Shop Drawings shall indicate pick-up and support points for piles. Reinforcing details shall conform to ACI 315.

        ii. Submit shop certification test reports for MANUFACTURER's supplied cement, aggregates, admixtures, curing materials, reinforcing steel, and strand steel. Aggregate certification shall include gradation and quality results. Admixture certification shall include types and quantities to be used during fabrication.

    b. Prior to piling installation:

        i. Submit concrete records for each member indicating date, time and duration of casting, mix proportions, mixing water corrections, slump, air content, method of curing, ambient temperature during curing, duration of curing, concrete strength at time of detensioning, 28-day concrete strength.

        ii. Submit tensioning and detensioning records indicating date and time of each load, stress, and elongation of strand group under loading and unloading.

2. The CONTRACTOR shall submit details of proposed pile-driving equipment to the DISTRICT prior to driving piling. Data shall include:

    a. Make and model of pile driving hammer.

    b. Weight, dimensions, stiffness and coefficient of restitution of cap block assembly (helmet and hammer cushion); dimensions, stiffness, coefficient of restitution and type of material of cushion (pile cushion).

    c. Cushion stiffness shall be determined as:

$$\frac{AE}{S} = L$$

Where:

S	-	Cushion stiffness
A	-	Cushion area
E	-	Secant modulus of elasticity of cushion material
L	-	Length or height of cushion

3. The CONTRACTOR shall submit details of proposed pre-drilling diameter, depth, method and equipment.

C. The CONTRACTOR shall submit records for Driven Prestressed Reinforced Concrete Piles construction as described below:

1. During pile driving, the CONTRACTOR shall submit daily records to the DISTRICT that are to include the following for each pile:

    a. Name of structure and pile number

    b. Driven pile length

    c. Pile length after cutoff

d. Pile cutoff and tip elevations

e. Ground surface elevation during driving

f. Continuous driving resistances, including final driving resistances, and pressure gauge readings or hammer ram stroke

g. Hammer speed in blows per minute during driving

h. Date and time of day pile driven

i. Make and model of pile driving hammer, along with associated capblock cushion material type(s) and dimensions

j. Time required to drive pile

k. Predrilling diameter and depth

l. Heaving or redriving data

m. Remarks concerning pile-driving operations

n. Capacity achieved

1.05 QUALIFICATIONS:

A. Experience Requirement:

1. The piling fabricator shall have been regularly engaged in the production of prestressed reinforced concrete piles for a period of not less than five (5) years, and show a quality capability through certification in the PCI (Plant Certification Program) or through an established quality control program based on PCI Manual NML 116.

2. The CONTRACTOR shall have a minimum of five (5) years experience installing prestressed concrete piles.

1.06 RESPONSIBILITIES: The CONTRACTOR shall be responsible for layout of each pile to the location shown on the Drawings. The CONTRACTOR shall establish monitoring devices and benchmarks as required to complete the WORK. The CONTRACTOR shall provide elevation reference and mark each pile along its entire length at one (1) foot intervals and along at least the last foot of driving at one (1) inch increments, so as to permit determination of the pile tip elevation and corresponding driving resistances during driving.

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 PRODUCT REQUIREMENTS:

A. General Requirements: The CONTRACTOR shall furnish piles as described below.

1. Pile type and capacity shall be as follows:

a. Prestressed reinforced-concrete piles.

b. The design compression capacity of each pile shall not be less than 14 kips, with a corresponding ultimate compression capacity not less than 20 kips.

2.02 PRESTRESSED REINFORCED-CONCRETE PILES:

A. The CONTRACTOR shall provide piles conforming to the Florida Department of Transportation's "Standard Specifications for Road and Bridge Construction," and as additionally specified or indicated.

B. Materials for Piling: The CONTRACTOR shall furnish piles conforming to the following:

1. Cement:

a. Cement shall conform to ASTM C150, C226, and C595.

b. Type IV cement shall not be used.

c. The tricalcium aluminate content of the cement shall be limited to a maximum amount not in excess of eight (8) percent.

2. Aggregates:

a. Aggregates shall conform to ASTM C33 and to Grade of Coarse Aggregate for Class III Concrete to be utilized in prestressed concrete piling in accordance with FDOT Standard Specifications.

b. All aggregates shall be free from any substance that may be deleteriously reactive with the alkalies in the cement in an amount sufficient to cause excessive expansion of the concrete.

c. Fine aggregate shall consist of clean, natural sand or of hard, dense, durable, uncoated rock particles, and shall be free from injurious amounts of silt, loam, lumps, soft or flaky particles, shale, alkali, organic matter, mica, and other deleterious substances.

d. Fine aggregates from different sources of supply shall not be mixed or stored in the same stockpile or used alternately in the same concrete mix or the same structure.

e. Fine aggregate shall be well graded from coarse to fine, with a fineness modulus not less than 2.00 or greater than 3.40.

3. Admixtures:

a. Chemical admixtures, if used for water reducing set shall conform to ASTM C494, Type A or Type F.

b. Chemical admixtures, if used for water reducing and retarding set, shall conform to ASTM C494, Type D or G.

c. Air-entraining admixtures with chlorides shall not be used.

d. Flyash is allowed as long as it meets the following requirements: Maximum of 25% fly ash or a maximum of 70% slag. In extremely aggressive environments, ensure that the precast concrete has a minimum of 18% fly ash or a minimum of 50% slag. (FDOT 346-2.3 (3)); 15% to 25% Class F for replacement of Portland cement, ACI 211.4R, Table 4.3.6; If fly ash or other pozzolans are used as admixtures, the amount recommended by ACI 211.4R can be used. Because the fly ash content affects the rate of strength development, however, practical considerations may limit the amount of fly ash used for precast-pile applications to less than permitted by ACI 211.4R. Some state highway department specifications also place limits on the use of fly ash in piles. Fly ash or other pozzolans should conform to ASTM C618, ACI 543R, 3.1.4.3.

e. All concrete piles that will be underwater shall have Crystalline Capillary Waterproofing (CCW) admixture in accordance with SECTION 03050.

4. Curing Materials:

a. Curing materials, if used, shall conform to ASTM C171 or ASTM C309.

b. Curing materials, if used, shall provide adequate retention of surface moisture.

c. Burlap, if used, shall not have previously been used for the storage or handling of sugar products.

5. Water: Water for mixing concrete shall be clean and free from injurious amounts of oils, acids, alkalies, salts, organic materials, or other substances that may be deleterious to concrete or steel.

6. Reinforcing Steel:

   a. Non-prestressed reinforcing steel shall conform to ASTM A615, Grade 60.

   b. Steel for ties and spirals shall conform to ASTM A1064.

   c. Welding of reinforcing steel shall not be performed without prior written approval by the DISTRICT, and then only to be performed in accordance with AWS D1.4.

7. Prestressing Steel:

   a. Prestressing steel shall be seven-wire stress-relieved strand conforming to ASTM A416, or stress-relieved wire conforming to ASTM A421, Type WA.

   b. The minimum ultimate strength shall be 270,000 pounds per square inch (psi).

   c. Prestressing steel shall be free from grease, oil, wax, paint, soil, dirt, loose rust, kinks, bends, or other defects.

C. General Requirements: The CONTRACTOR shall furnish piles conforming to the following:

1. Prestressed reinforced-concrete piles shall be solid, shall be cast as monolithic units of homogeneous high-strength concrete, (Class III in accordance with FDOT Standard Specifications) from butt to tip, and shall be stressed with high-tensile, uncoated, cold-drawn, stressed-relieved steel strands.

2. Piles shall have a minimum cross-section of 12 inches by 12 inches.

3. Design of all prestressed piles shall be the responsibility of the CONTRACTOR. Design criteria shall be in accordance with PCI Manual MNL 120.

4. Piles shall be structurally capable of supporting a minimum load capacity of not less than 14 kips in compression.

5. Piles shall be designed to withstand stresses associated with handling, storage, and pile driving.

6. Concrete shall be conveyed from the mixer to the forms and deposited in place as rapidly as practicable by methods that will not cause segregation or loss of ingredients in accordance with ACI 304R.

7. Concrete shall be deposited as nearly and practicable in its final position in the forms without the need for rehandling.

8. Free-fall, vertical drop of concrete shall not exceed three (3) feet.

9. Aluminum conveying or formwork equipment shall not be used.

10. Chuting shall be performed only where the concrete is deposited into a hopper first before it is placed in the forms.

11. Conveying equipment shall be cleaned thoroughly before each run.

12. Concrete, which has segregated in conveying, shall be removed.

13. Piles shall not be driven until 28 days have elapsed from the time of casting or the CONTRACTOR can provide documented evidence that the pile has attained its intended minimum ultimate compressive strength.

14. Piles shall be fabricated to conform to the following manufactured tolerances from dimensions stipulated:

a. Pile length plus three-eighths inch per 10 feet of length, but not greater than plus one and one-half inch.

b. Pile outside width plus three-eighths inch or minus one-quarter inch.

c. Pile head out of square plus or minus one-quarter inch per 12 inches of width.

d. Pile ends shall be plane surfaces and perpendicular to the longitudinal axis of the pile with a maximum deviation of one-eighth inch per foot transversely from a true right angle plane.

e. Pile accumulated deviation from straight-line horizontal alignment (sweep) not more than one-eighth-inch per 10 feet of length.

f. Pile localized deviation from straight-line horizontal alignment (sweep) not more than one-quarter inch within any 10 feet of horizontal alignment.

g. Voids or knock-out inserts in piles, if used, plus one quarter inch.

h. Pile stirrup bars and spirals plus three-quarters inch.

i. Pile concrete cover to reinforcing steel plus one quarter inch or minus one half inch.

j. Pile spacing of spirals plus one-half inch.

k. Pile reinforcing tendons plus one-quarter inch.

l. Pile handling devices plus six (6) inches.

m. Piles shall present a true, smooth, and even surface free from any surface blemishes.

D. Fabrication: The CONTRACTOR shall furnish piles conforming to the following:

1. Performance:

a. Piles shall be constructed of dense concrete possessing a minimum ultimate compressive strength of 6,000 psi in 28 days.

b. Concrete used in piles shall have a slump of four (4) inches with a plus tolerance of one (1) inch, as determined in accordance with ASTM C143, or as otherwise controlled by FDOT.

c. Concrete used in piles shall have an air content from 4 to 6 percent, as determined in accordance with ASTM C231.

d. The ends of all piles and the corners of square piles shall be chamfered.

e. Test cylinders shall be prepared at the time the concrete is deposited for each production line to determine the strength of the castings. The cylinders shall be cured in the same manner as the piles and shall be placed at the point where the poorest curing conditions are afforded. This point shall be at the coolest region in the bed for steam-cured piles.

f. Making and curing of concrete test specimens shall be in accordance with ASTM C31.

g. Compressive testing of concrete cylinders shall be in accordance with ASTM C39.

h. Pile pick-up points shall be the responsibility of the CONTRACTOR.

i. Workmanship of pile fabrication shall conform to PCI Manual MNL-116.

2. Forms:

a. Forms shall be of metal, shall be well braced and stiffened against deformation, shall be accurately constructed and watertight, and shall be appropriately treated with lacquer, form oil, or other acceptable material prior to the placement of reinforcing steel so as to prevent bonding of forms to concrete.

b. Forms shall permit movement of the pile without damage during release of the prestressing force.

c. The bottom of the form shall be within one-quarter inch of a true plane in a length of 50 feet.

d. Side forms shall be released as soon as practicable, but shall not be removed until the concrete has attained a minimum compressive strength of not less than 4,000 psi.

3. Placement and Curing:

a. Concrete shall not be deposited in the forms until reinforcement steel and anchorages have been appropriately positioned.

b. Concrete shall be placed promptly after initial mixing is completed and shall be deposited close to its final position in the form.

c. Consolidation of concrete shall be in conformance with ACI 309.

d. Vibrator heads, if used, shall be smaller than the minimum distance between steel members for pretensioning.

e. Vibration of concrete shall proceed until the concrete is thoroughly consolidated.

f. Vibration of concrete shall not be performed in such a manner or for such an extended period of time that segregation of concrete occurs.

g. All piles shall be cured in accordance with Section 4 of the PCI Manual MNL-116.

4. Reinforcements and Embedments:

a. All reinforcing steel, prestressing steel, pick-up points and embedded items, shall be positioned as indicated within the forms and secured to prevent movement during concrete placement.

b. All reinforcing steel and prestressing steel shall have a minimum concrete cover of 3 inches, unless otherwise indicated on the Drawings or directed by the DISTRICT.

c. Installation of reinforcing steel and inserts shall permit the even placement of flow of concrete to all parts of the pile.

d. Knock-out inserts will not be required.

e. All knock-out inserts shall be firmly positioned to prevent them from being displaced during placement of concrete.

5. Pretensioning:

a. The tension to which the steel is to be pretensioned shall be measured by the elongation of the steel and verified by the jack pressure reading of a gauge.

b. Gauges used during pretensioning shall have been calibrated by certified laboratory within 12 months of commencing WORK and shall continue to be calibrated every five (5) months from the date of commencing throughout the term of WORK. Gauges shall be increments to read to the nearest 100 pounds of load.

c. Means shall be provided for measuring the elongation of the tendons to within one-eight-inch.

d. When the difference between the results of measurement and gauge reading is more than five (5) percent, the cause of the discrepancy shall be corrected.

e. Tensioning steel shall be given a uniform prestress prior to being brought to its design prestress. The same initial prestress shall be induced in each unit when several units of prestressing steel in a pile are prestressed simultaneously.

f. Thermal changes, a variation between ambient temperature at time of prestressing and concrete temperature at time of placing concrete, resulting in stress changes shall be accounted for in accordance with PCI Manual MNL-116.

g. For the uniform application of load to strands, the face of the anchorage of final design prestress shall be in a plane parallel to its position under initial prestress.

h. Final design prestress shall be a minimum stress not less than 8 psi across the cross-sectional area of the pile.

6. Detensioning:

a. Prestressing force in pretensioned piles shall be released in such a manner that eccentric forces are minimized by maintaining symmetry of forces about the vertical axis of the pile member.

b. Tension in the strands shall be released gradually from the anchorage in a manner that will minimize sudden or shock loading.

c. Detensioning shall be performed in such a manner and sequence that longitudinal movement is precluded.

d. If concrete has been heat cured, detensioning shall be performed immediately following curing while the concrete is still warm and moist and before dimensional changes allowing cracking or undesirable stressing of concrete are allowed to occur.

e. Detensioning shall be performed as soon as practicable, but shall not be done until the concrete has attained a minimum compressive strength of not less than 4,000 psi.

E. Handling and Storage: The CONTRACTOR shall conform to the following regarding handling and storage of piles.

1. Unless special lifting devices are attached for pick-up, pick-up points shall be clearly and plainly marked on all piles after removal of forms, and all lifting shall be performed at these points.

2. Piles shall be lifted and handled by a suitable bridge or sling where required, which shall be attached to the pick-up points.

3. Special care shall be provided in handling and transporting concrete piles to prevent any appreciable buckling of the pile or cracking of the concrete.

4. Storage areas for prestressed piles shall be stabilized, and a suitable base shall be provided, so that differential settlement or twisting or pile shall not occur.

5. Stacked piles will not be permitted unless CONTRACTOR provides appropriately separated and supported battens placed across the full width of each bearing point.

6. Battens used for storage of piles shall be arranged in vertical planes at a distance not greater than the width of the pile from designated pick-up points.

2.03 PILE DRIVING EQUIPMENT: The CONTRACTOR shall conform to the following with regards to pile driving equipment.

A. Pile Driving Hammer:

1. The CONTRACTOR shall drive piles to either the minimum penetration length stipulated or to the specified and minimum driving resistance which ever is greater.

2. Pile driving hammer shall not develop excessive energy, which would result in overstressing or crushing of pile during driving.

3. The CONTRACTOR shall submit details of pile hammer to the DISTRICT for approval at least two (2) weeks prior to driving piles. Should a change in hammer or driving equipment be

necessitated by the CONTRACTOR, CONTRACTOR shall submit revised details to the DISTRICT for approval at least 2 weeks prior to driving piles with revised equipment.

4. The pile-driving hammer shall be operated at all times at speeds and conditions recommended by the hammer MANUFACTURER.

5. The boiler or compressor capacities for the steam- or air-operated hammers shall be sufficient to operate the hammer continuously at the full-rated speed and energy.

6. For the steam- or air-operated pile hammers, the CONTRACTOR shall provide a pressure gauge to be located on the hammer steam or air line in a position such that it can be clearly read by the pile driver operator.

7. For the double-acting diesel hammer, the CONTRACTOR shall provide a bounce chamber pressure gauge to be located in a position such that it can be clearly read by the pile driver operator.

8. For a single-acting diesel hammer, the CONTRACTOR shall mark the ram as approved by the DISTRICT to permit determination of the stroke.

9. The pile driver shall be equipped with fixed leads, secured to the pile-driving rig with rigid bracing, and extending to the lowest point, which the hammer must reach to drive the piles.

B. Capblock (Helmet and Hammer Cushion) and Cushion (Pile Cushion):

1. Piles shall be protected during driving by a capblock-and-cushion assembly of approved design.

2. No pile head will be held so firmly that the slight rotation of the pile normally occurring while the pile is being driven will be prevented.

3. The capblock or cushion materials shall be replaced during driving if it has been damaged, highly compressed, charred, burned, or has become spongy or deteriorated in any manner.

4. The driving helmet or capblock shall fit loosely around the top of the pile so that the driving helmet does not restrain the pile should the pile tend to rotate during driving.

5. The driving helmet or capblock shall fit flush with the plane of the pile end so that a uniform impact force is applied to the pile during driving.

6. If CONTRACTOR elects to use a pile head with projecting strands or mild steel reinforcing, a special driving head or helmet device shall be used to prevent damage to the reinforcement and prevent direct impact forces from being transmitted through the reinforcement.

7. The CONTRACTOR shall submit to the DISTRICT for approval, details concerning the stiffness of the cushion assembly, the coefficient of restitution, and the weight of the capblock-cushion assembly at least two (2) weeks prior to changes on-site to this equipment.

C. Templates: Provide a fixed steel pile template adequate to maintain the pile in proper position and alignment during driving in accordance with FDOT Section 455.

PART 3 - EXECUTION

3.01 DRIVEN PILES:

A. Equipment for Driving Prestressed Reinforced Concrete Piles: All pile-driving equipment shall be subject to the DISTRICT's approval after observation at the Site.

B. Driving Procedure: The CONTRACTOR shall complete the pile driving in conformance with the guidelines below:

1. Drive each pile continuously and without voluntary interruption until the specified penetration length and driving resistance have been obtained.

2. Drive piles in contact with surrounding soil and leave permanently in place.

3. Drive piles in a sequential operation, which will minimize heaving of adjacent piles.

4. Pile driving operations shall be suspended if impact shock results in problems to any adjacent structures or equipment, until corrective measures can be taken.

5. No method requiring force to correct the position or line of any pile during driving will be permitted.

C. Penetration and Driving Resistance:

1. The CONTRACTOR shall drive piles to either the minimum penetration length stipulated or to the specified and minimum driving resistance, which ever is greater. The minimum driving resistance will be determined utilizing the U.S. Department of Transportation, Federal Highway Administration's Wave Equation Analysis of Pile Driving (WEAP) for the pile hammer and associated capblock-cushion materials and properties, as to be submitted and utilized for pile driving by the CONTRACTOR and according to load test results.

2. The CONTRACTOR shall familiarize itself with conditions present at the Site prior to bidding; specifically, should there be limited access dimensions, headroom clearances, or other conditions, which restrict the use of particular driving equipment, and thereby affect the associated minimum driving resistance.

D. Heaving:

1. The CONTRACTOR shall check for heaving on a reference pile selected by the DISTRICT within each pile group or cluster.

2. The reference pile shall be checked by comparison of elevations before and after driving of all adjacent piles within a group or cluster.

3. Heaving shall be considered as occurring to all piles within a group or cluster when the reference pile head elevation changes in excess of 0.025 foot.

4. Piles within a group or cluster shall be redriven when the reference pile heaves in excess of 0.025 foot.

E. Redriving:

1. A pile selected by the DISTRICT from within the initial pile group or cluster driven shall be redriven not less than 4 hours, and preferably 24 hours, after completion of initial driving in order to check for relaxation or freeze. Relaxation is indicated by a lesser number of blows per inch required to mobilize the pile than was attained at completion of its original final driving resistance.

2. Redriving shall be complete using not less than the same number of blows originally applied to the pile, after the hammer has warmed up. Driving resistance shall be noted for each inch of pike penetration. If redriving indicates relaxation, the DISTRICT shall be notified. All piles within a pile group or cluster, which has indicated relaxation, shall be redriven until the driving resistance for the last inch indicates that specified pile capacities have been attained.

3. Redrive all piles within a group or cluster that have indicated heave of the reference pile.

4. Redrive all reaction piles, if undamaged and if permitted by the DISTRICT, beyond their original pile tip penetration to accommodate tip movement from load test and then to minimum driving resistance criteria.

F. Cutoff:

1. When necessary, and upon approval by the DISTRICT, the CONTRACTOR shall cutoff with pneumatic tools, hydraulic stripper, sawing, or other approved methods.

2. The use of explosives or other method that may damage the reinforcing steel or the concrete of the pile to be left in place will not be permitted.

3. Cutoff shall be perpendicular to the vertical axis of the pile within one half inch of the cutoff elevation indicated.

4. If excavation around the piles is required to achieve pile cutoff, excavated material shall be stockpiled for recompaction or removed and disposed of as directed by the DISTRICT.

5. Concrete and reinforcing steel materials wasted from cutoff methods shall be removed and disposed of offsite at the CONTRACTOR's expense, or as otherwise directed by the DISTRICT.

G. Splices and Build-Ups:

1. The CONTRACTOR shall use full-length piles where applicable.

2. Splicing or building up of piles will not be permitted unless otherwise approved by the DISTRICT subsequently in the field during driving; should such activities be approved by the DISTRICT, such splicing or building up of piles shall conform to design considerations regarding driving stresses, lateral applied loads, and water exposure where required.

H. Predrilling and Jetting:

1. When necessary to assist in attaining the indicated penetration length without damage to piles, the CONTRACTOR may be required to predrill and grout the pile which shall be accomplished as recommended in the Culvert Replacement Construction Project Phase II : Prepared By: GFA International , Date: April 1, 2019.

2. CONTRACTOR shall have equipment for predrilling available or on-site with the anticipation that predrilling may be necessary to achieve sufficient embedment length to support uplift loads.

3. Pile points shall be well seated with moderate soil resistance at the point before full driving energy is applied.

4. The CONTRACTOR shall use continuous flight augers for predrilling with a maximum diameter not larger than 13 inches and a depth of drilling deep enough to penetrate bearing stratum, as approved by the DISTRICT.

5. Jetting will be permitted.

a. Where jetting is allowed by the DISTRICT, at least two (2) jets shall be used. All jetted piles shall be driven for the final five (5) feet of penetration, unless otherwise directed by the DISTRICT.

I. Installation Tolerance:

1. Piles shall not exceed a variation from either the vertical axis or battered axis of the pile after driving of more than one-quarter-inch per foot of pile length.

2. The center of axis of the pile head after driving shall not vary from the plan location at cutoff by more than three (3) inches.

3. Acceptable tolerance of top of pile from intended cutoff elevation shall be between one and one-half (1.5) inches and four (4) inches in accordance with FDOT Specifications 455-5.15. The CONTRACTOR may elect to trim piles to cutoff elevation after the pile cap is excavated.

J. Rejected Piles:

1. The DISTRICT will determine the acceptability of all piles driven and may, at their option, reject those piles that do not conform to the Drawings and specifications.

2. The CONTRACTOR shall perform one of the following, as directed by the DISTRICT, for those piles, which have been rejected.

a. Leave the piles in place, cut off as directed and drive one (1) or more new piles in locations designated by the DISTRICT to replace the rejected pile and maintain symmetry of the pile group or cluster.

b. Withdraw the pile and drive a new pile. Any holes, which result from pile withdrawal, shall be packed with an approved nonplastic (noncohesive) material before redriving the replacement pile.

END OF SECTION

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SECTION 02370 RIPRAP SYSTEM

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, equipment and hauling necessary for the proper placement of stone riprap including temporary riprap for Earthen plug slope protection and the CONTRACTOR shall furnish all labor, equipment, hauling and materials necessary for the proper placement of bedding stone and filter fabric where indicated, as required by the Contract Documents.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society for Testing and Materials (ASTM):

a. C127 - Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate

b. C295 - Standard Guide for Petrographic Examination of Aggregates for Concrete

c. C535 - Standard Test Method for Resistance to Degradation of Large Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine

d. D3744 - Standard Test Method for Aggregate Durability Index

e. D5240 - Standard Test Method for Evaluation of Durability of Rock for Erosion Control Using Sodium Sulfate or Magnesium Sulfate

f. D5312 - Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Freezing and Thawing Conditions

g. D5313 - Standard Test Method for Evaluation of Durability of Rock for Erosion Control Under Wetting and Drying Conditions

2. American Association of State Highway and Transportation Officials (AASHTO):

a. T85 - Standard Method of Test for Specific Gravity and Absorption of Coarse Aggregate

b. T210 - Standard Method of Test for Aggregate Durability Index

3. Florida Department of Transportation (FDOT):

a. Standard Specifications for Road and Bridge Construction

i. 514 - Standard Specification for Plastic Filter Fabric (Geotextile)

ii. 901 - Standard Specifications for Coarse Aggregate

b. Florida Methods:

i. 3-C-535 - Resistance to Degradation of Large-Size Coarse Aggregates by Abrasion and Impact in the Los Angeles Machine

ii. 5-538 - Sampling and Testing Rip-Rap Material

4. U.S. Army Corps of Engineers (USACE)

a. ERDC/GL TR-81-8 Evaluation of Quality and Performance of Stone as Riprap or Armor

b. EM 1110-2-1601, Engineering and Design: Hydraulic Design of Flood Control Channels

c. EM 1110-2-1100 Part VI, Coastal Engineering Manual: Design of Coastal Project Elements

d. EM 1110-2-2302, Engineering and Design: Construction with Large Stone

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS:

A. Bedding Stone Test Reports: The CONTRACTOR's bedding stone supplier shall submit certified test reports prepared by a qualified independent testing laboratory selected and compensated by CONTRACTOR for confirmation of weight and gradation.

B. Filter Fabric: The CONTRACTOR shall submit MANUFACTURER's data for filter fabric demonstrating compliance with specified material properties, and including MANUFACTURER's recommendations for storage, handling, installation, and anchoring fabric.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide the DISTRICT at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - MATERIALS

2.01 RIPRAP: All riprap is to be sourced form Lake Point Restoration in western Martin County. The DISTRICT shall be responsible for payment for all riprap required for the WORK. The CONTRACTOR shall be responsible for hauling from Lake Point Restoration, handling, and all other efforts related to the completion of rip rap work. CONTRACTOR to submit to the DISTRICT a request for Lake Point Restoration purchase order. DISTRICT shall review requested quantities and if approved, provide purchase order information to CONTRACTOR within 30 days of CONTRACTOR'S request. Material pick-up receipts shall be provided to the DISTRICT at the time of delivery.

A. The riprap shall be graded as follows:

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

2.02 GRANULAR BEDDING:

A. The CONTRACTOR shall place a layer of bedding material beneath the riprap materials to the lines and grades shown on the Drawings. Stone for use in granular bedding shall weigh not less than 135 pounds/cubic foot (saturated surface dry – pounds/cubic foot). The material shall be composed of tough, durable particles, shall be reasonably free from thin, flat and elongated pieces, and shall contain neither organic matter nor soft, friable particles in quantities considered objectionable by the DISTRICT. Bedding stone shall be placed within the limits shown on the Drawings and shall be reasonably well graded in accordance with FDOT Section 901. The bedding stone for each type of riprap shall be as follows:

Type of Riprap	Bedding Stone
Type B	ASTM C33 Size No. 357

2.03 FILTER FABRIC: The CONTRACTOR shall provide a 12 ounce per square yard, non-woven, needle-punched geotextile (filter) fabric conforming to the following properties:

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

PART 3 - PERFORMANCE

3.01 FIELD QUALITY CONTROL:

A. The CONTRACTOR shall transport to the Project Site, and place in a location acceptable to the DISTRICT. The size of the riprap stockpiled at the Site shall be clearly identified for reference.

3.02 SUBGRADE PREPARATION:

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

B. Subaqueous Installation: The CONTRACTOR shall excavate the subgrade to the lines and grades shown on the Drawing. Tolerance shall be plus 0.0 feet to minus 0.5-feet in the Canal invert, and plus or minus 0.5-feet on the Canal banks.

3.03 FILTER FABRIC:

A. Filter fabric shall be placed only on subgrade approved by the DISTRICT.

B. Overlap adjacent strips of fabric a minimum of 12 inches, and anchor them with securing pins inserted through both strips of fabric along a line through the midpoint of overlap and to the extent necessary to

prevent displacement of the fabric. Securing pins shall be as per the MANUFACTURER's recommendations. The CONTRACTOR may opt for a six (6) inch stitched overlap.

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

D. The fabric shall be placed on the entire slope, continuous from top to bottom, without any joints or splices.

E. Do not drop bedding stone or riprap from heights greater than three (3) feet onto the fabric.

3.04 GRANULAR BEDDING: The CONTRACTOR shall place bedding material beneath the riprap, to a nominal depth of 6 inches except where marine mattress is required.

A. Bedding material shall be spread uniformly over filter fabric material. Placement shall not commence until the DISTRICT has approved subgrade preparation and filter fabric installation.

B. Placement methods, which segregate the bedding particles, will not be permitted.

C. Compaction of the bedding material will not be required, but material shall be finished to a reasonably even surface.

D. Tolerance shall be + three-tenths foot provided this tolerance is not continuous over an area greater than 200 square feet when placed in the dry, or greater than 400 square feet when placed subaqueous.

E. The CONTRACTOR shall maintain the bedding material until the riprap is in place.

3.05 RIPRAP: The CONTRACTOR shall proceed placing the riprap upon completion of filter fabric and bedding material and after receiving written approval of the DISTRICT to proceed. The CONTRACTOR shall place riprap in accordance with the following.

A. Stone shall be placed in such a manner as to produce a reasonably well-graded mass with the minimum practicable percentage of voids.

1. Place to full course thickness in one (1) operation in a manner to avoid displacing or puncturing filter fabric. Stone shall not be dropped from a height greater than three (3) feet above the fabric.

2. Finished riprap shall be free from objectionable pockets of small stones and clusters of larger stones. Hand place or adjust if necessary to secure the desired results, to the satisfaction of the DISTRICT.

B. Surface Tolerances:

1. Dry Installation: The finished stone surface shall not vary from design grade by more than three (3) inches at any location, except that any extreme of the tolerance shall not be continuous over an area greater than 100 square feet.

2. Subaqueous Installation: The finished stone surface shall not vary from design grade by more than plus one (1) foot, minus one-half feet at any location; either extreme of the tolerance shall not be continuous over an area greater than 225 square feet.

3.06 MAINTENANCE: The CONTRACTOR shall maintain the riprap until accepted by the DISTRICT. The CONTRACTOR shall replace riprap displaced by any cause prior to acceptance.

END OF SECTION

SECTION 02401 DEWATERING AND COFFERDAM

PART 1 - ENERAL

1.01 SCOPE:

A. Summary or Work: The CONTRACTOR shall furnish all labor, material and equipment necessary for the removal of all surface and subsurface waters from excavation areas. This SECTION includes the construction of a well-point system used in conjunction with an open excavation or cofferdam, temporary cofferdams with steel sheet piling and bracing, or other systems as proposed by the CONTRACTOR. The WORK includes the removal of temporary sheet piling and other temporary features at the completion of the WORK.

B. Related Work Specified Elsewhere:

1. SECTION 01300 Submittals
2. SECTION 01010 Summary of Work
3. SECTION 01530 Temporary Barriers and Controls
4. SECTION 2402 Bypass
5. SECTION 02435 Turbidity Control and Monitoring

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. ASTM International (ASTM)
   a. A36 - Standard Specification for Carbon Structural Steel
   b. A328 - Standard Specification for Steel Sheet Piling
2. Culvert Replacement Construction Project Phase II : Prepared By: GFA International, Date: April 1, 2019.

1.03 SUBMITTALS: The CONTRACTOR shall make submittals in accordance with SECTION 01300 and shall include, but not be limited to, the following:

A. The CONTRACTOR shall submit to the DISTRICT a site-specific dewatering plan for regulatory approval, which includes qualifications of the design professional(s), the dewatering system and temporary cofferdam design, dewatering equipment, safety procedures, sequence of construction, and re-watering procedures, prior to the start of any such operations. The dewatering plans shall also include the items specified in Article 1.05 of this SECTION.

B. Refer to SECTION 02402 for bypass flow requirements. Bypass must be approved prior to implementing dewatering and/or cofferdam.

C. Submit certification from a Professional Engineer registered in the State of Florida that the temporary cofferdam has been designed to meet the criteria specified herein.

D. Two (2) sets of prints, signed and sealed by Florida licensed Professional Engineer, of the temporary cofferdam system shall be submitted to the DISTRICT.

E. Acquire all permits required to discharge water and protect waterways from turbidity during the dewatering operation.

1.04 QUALIFICATIONS:

A. The CONTRACTOR shall demonstrate a minimum of ten (10) years experience in the construction of dewatering systems including, but not necessarily limited to, sheet pile, pumping and cofferdams.

B. Qualifications of the dewatering system design engineer must demonstrate a minimum of ten (10) years experience doing similar work as approved by the DISTRICT and be a Professional Engineer registered in the State of Florida.

1.05 RESPONSIBILITIES:

A. This is a performance specification. Except as otherwise specified or indicated, selection of equipment, materials, and methods shall be CONTRACTOR's responsibility. The dewatering of any excavation areas and disposal of all water handled shall be in strict accordance with all applicable local and state government rules and regulations.

B. The CONTRACTOR shall be responsible for the design of the dewatering system including, but not necessarily limited to, the temporary cofferdam, required pump equipment, temporary shoring, as well as any miscellaneous temporary structures required.

In accordance with Chapter 40E-2 F.A.C., the CONTRACTOR shall be responsible for obtaining the appropriate permit for dewatering activities by submitting the required permit application, fees and other supporting information necessary (including the CONTRACTOR's site-specific dewatering plan) to the DISTRICT's Water Use Division and obtain the required dewatering permit.

C. If it is anticipated that offsite discharges will occur due to construction dewatering activities, the CONTRACTOR must comply with the requirements of the National Pollutant Discharge Elimination System (NPDES) Generic Permits as required in Chapter 62-621.300 Florida Administrative Code. Compliance with these NPDES requirements include submittals of the Notice(s) of Intent to Use the Generic Permit(s), receipt of written notification from the Florida Department of Environmental Protection, compliance with all applicable conditions, monitoring and reporting.

D. The CONTRACTOR shall prepare a site-specific dewatering plan that shall include at a minimum:

1. A site plan of the Project indicating the location of the proposed discharge point(s) with the associated water quality monitoring locations including background and compliance turbidity monitoring locations, the location and type of erosion and turbidity control devices, and the methods necessary to ensure that the state water quality standards are met.
2. Calculations for estimating the area of influence of dewatering, depth of dewatering, pumping rates, duration and volumes, and the proposed method of dewatering must be submitted for review.
3. A water quality monitoring plan.

E. Volume of water discharged must be reported at each Site. The CONTRACTOR shall submit, calibration data, operating ranges of the pumping equipment, flows validated by direct measurement for each temporary pump and instrumentation to be used to determine flows and daily volumes pumped. Detailed documentation describing the instrumentation and methods used for flow measurements be reported.

F. Unless otherwise specified, the dewatering system shall lower the groundwater table to a minimum of two (2) feet below the excavation. The dewatering plan shall include installation of a minimum of two (2) groundwater monitoring wells located on opposite sides of the excavation.

1.06 CERTIFICATIONS AND TESTING: A Professional Engineer registered in the State of Florida hired by the CONTRACTOR shall inspect, accept, and certify the temporary sheet piling for temporary cofferdam(s) used for dewatering purposes.

1.07 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The Contractor shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

1.08 WARRANTY: The CONTRACTOR shall warrant the WORK as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 PRODUCT REQUIREMENTS: All materials used in the construction of the dewatering facilities shall be selected, furnished and installed by the CONTRACTOR in accordance with the CONTRACTOR'S design as submitted to the DISTRICT.

2.02 SHEET PILE: The CONTRACTOR shall provide new or used sheet piling, for use in the temporary cofferdam, conforming to the requirements of ASTM A328.

2.03 STRUCTURAL STEEL: The CONTRACTOR shall provide structural steel, for use in the cofferdam, conforming to the requirements of ASTM A36.

PART 3 - EXECUTION

3.01 PERFORMANCE: The CONTRACTOR shall furnish and install sheet pile cofferdams in accordance with the following.

A. Cofferdam System:

1. The CONTRACTOR shall retain the services of a Professional Engineer registered in the State of Florida for the design of the cofferdam system. The walls and bracing shall be designed to withstand, without damage, the maximum water elevations indicated in the Regulation Schedule referenced in SECTION 01010. Bracing will not be allowed to impart loads to the permanent structure. Temporary construction loads to the permanent structure in excess of those imparted during in-situ operating conditions will not be allowed.
2. Sheet pile wing walls are supported by anchor rods connected to anchor walls, concrete deadmen, pilings, etc., so installation of a cofferdam shall be phased to avoid interfering with these elements or otherwise reducing their load-carrying capacity.
3. Temporary cofferdams for construction through levees shall be designed such that:
    a. The cofferdam will act as the levee; i.e. shall be at the minimum height of the levee, for the duration of the construction.

B. Approximate locations of cofferdam, structural characteristics and embedment depths shall be determined by the engineer designing the cofferdam. It should be noted that steel sheet pile cutoff walls and wing walls are a part of the permanent features to be constructed both within and outside the dewatered areas. If a sheet pile cofferdam is proposed, the CONTRACTOR shall provide a sequence of construction that complies with the requirement of SECTION 02262 and does not affect the integrity of the permanent components.

C. The layout and design of the interior and exterior bracing system for the cofferdam shall fully accommodate with appropriate factors of safety, all applied loading indicated. Those loadings may be increased if considered appropriate by the engineer designing the cofferdam.

3.02 DEWATERING:

A. The CONTRACTOR shall provide adequate equipment for removal of storm, subsurface or cofferdam leakage waters, which may accumulate in the cofferdam interior.

B. The CONTRACTOR shall perform all WORK for the water control structure in the cofferdam interior free from water. The CONTRACTOR shall furnish, install, maintain, and operate all necessary pumping and other equipment necessary for dewatering the WORK area.

1. All dewatering equipment shall be in first-class condition and shall at all times be maintained and operated at the efficiency and capacity necessary for maintaining the cofferdam interior free from standing water or wet conditions that may prevent proper construction.

C. The CONTRACTOR shall provide dewatering facilities with stand-by pumps with 100 percent standby capacity.

D. The CONTRACTOR shall comply with all applicable local, state and federal regulations when disposing of water generated by dewatering operations.

E. In the event of a major storm, the CONTRACTOR is responsible for 24 hour standby equipment to remove cofferdams within 48 hours notice, and to re-install cofferdams once the storm has cleared

3.03 TURBIDITY BARRIER: The CONTRACTOR shall install and maintain suitable turbidity barriers as described in SECTIONS 01530 and 02435.

3.04 REMOVAL OF DEWATERING SYSTEM AND COFFERDAMS:

A. The CONTRACTOR shall remove the dewatering system in such a manner as to allow groundwater and surface water elevations to slowly return to natural elevations without causing erosion or damage to the structure or foundation.

B. The CONTRACTOR shall slowly flood the dewatered area to establish water surface elevations upstream of water control structure equal to tailwater elevation downstream of water control structure prior to removal of temporary cofferdams.

C. If a portion of the cofferdam is incorporated into the structure, the CONTRACTOR shall review the Drawings to determine what portion of the sheet pile of the cofferdam that shall be removed.

3.05 REGULATION SCHEDULE:

A. Canal Water Levels: Refer to SECTION 01010.

B. Noise Abatement: The CONTRACTOR shall furnish, install, and maintain throughout the course of the WORK, mufflers, noise-control enclosures, or other noise control methods, measures, and features on and around all dewatering pumps and their drive units such that steady noise emanating from this equipment does not exceed the permissible sound levels defined in applicable ordinances, rules and regulations.

END OF SECTION

SECTION 02402 BYPASS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish and install all necessary equipment, labor, and materials to provide pumped bypass as indicated on the Contract Drawings and specified herein.

B. Required Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 01050 Field Engineering
3. SECTION 01020 Measurement and Payment
4. SECTION 02401 Dewatering and Cofferdam

C. The CONTRACTOR shall be responsible for obtaining and paying for all permits required for the installation of the Bypass, including but not limited to:

1. United States Army Corps of Engineers (USACE)
2. Florida Department of Environmental Protection (FDEP)
3. Applicable Local regulatory and Building permits.

D. The CONTRACTOR shall be responsible for all mitigation and environmental impacts caused by the installation, operation, and removal of the bypass.

E. The CONTRACTOR shall furnish all necessary measures and facilities to comply with federal, state, and local environmental requirements and preserve existing Site conditions (i.e. prevent shoaling, erosion and degradation of the canal banks and bottom).

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American National Standards Institute (ANSI):
   a. PTC 19.1 - Test Uncertainties - Section 10

1.03 SUBMITTALS: Submittals shall be in accordance with this SECTION and SECTION 01300.

A. Pre-Construction and Post-Construction Surveys, signed and sealed by a Professional Surveyor and Mapper registered in the State of Florida, shall be submitted to the DISTRICT by the CONTRACTOR to document pre- and post- construction conditions of all areas utilized for bypass flow including the canal downstream of the structure for pumped bypass. Surveys shall include, but not necessarily be limited to the following:

1. Establish elevations (NAVD88) along the centerline of the bypass flow route at 50 foot intervals, or 25 foot intervals if an electronic sounding device is utilized, and at all grade changes and features.
2. Establish cross sections (NAVD88) at approximately 50 foot intervals, throughout the entire limits of the area utilized for bypass flow and terminating approximately 600 feet downstream. For pumped bypass, cross sections shall start at the downstream apron of the structure or where flow discharges back to the canal, whichever is closer to the structure. Elevations (NAVD88) along the cross section lines shall be determined at 5 foot intervals in the Canal, 10 foot intervals outside of the canal to top of bank and at all grade changes and features.

B. For Pumped Bypass:

1. Pumping System Plan: The CONTRACTOR shall prepare and submit to the DISTRICT a detailed plan outlining schedules, locations, elevations, equipment capacity, and materials needed for bypass pumping while maintaining construction access to the WORK area(s) and

protecting against damage due to discharge flows. The plan shall include, but not be limited to:

a. Pump staging areas

b. Number, size, and types of pumps meeting the aggregate bypass capacity noted in the Drawings.

c. Downstream discharge plan and downstream erosion protection measures

d. Schedule of installation, maintenance, and refueling of equipment

e. Supporting calculations for selection of equipment

f. The CONTRACTOR shall keep daily logs of bypass pump operations to include pumping hours, pump driver revolutions per minute (RPMs), and estimated flow rates. Logs are to be submitted to the DISTRICT on a daily basis or as requested.

g. On-site Flow Capacity Testing Procedures: Equipment and Procedures shall be in compliance with standard flow measurement practices in hydrometry if based on open-channel measurements. If measurements rely on velocity measurements in the discharge pipe, the measurement points should be selected based on equal area schemes and data should be reported with estimates of measurement uncertainty based on the approach proposed in ANSI/ASME PTC 19.1-1998 and illustrated in Section 10 of this code.

h. Volume of water discharged must be reported at each Site. The CONTRACTOR shall submit, calibration data, operating ranges of the pumping equipment, flows validated by direct measurement for each temporary pump and instrumentation to be used to determine flows and daily volumes pumped. Detailed documentation describing the instrumentation and methods used for flow measurements be reported.

2. Bypass Pump System Start up and acceptance test report.

1.04 WARRANTY: The CONTRACTOR shall warrant the WORK as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS AND EQUIPMENT:

A. For Pumped Bypass:

1. The CONTRACTOR shall furnish, maintain, and operate all temporary facilities such as dams, plugs, pumping equipment, conduits, channels, all necessary power, and all other labor and equipment necessary to furnish specified bypass flows around the dewatered area as specified below:

a. Dry Season Bypass Requirements:

Minimum Bypass Flow	Calculated at Discharge Pipe Centerline Elevation
80 cfs	TBD

2. Materials utilized for bypass pumping shall be appropriate for the intended use and operation. All bypass pumping systems shall include:

a. Minimum of two (2) pumping units.

b. Pumping units shall be equally sized in terms of flow capacity, intake and discharge pipe sizes, drive unit configuration, etc. to facilitate maintenance and interchangeability/replacement of components if required.

c. Steel discharge piping in applications where the discharge head is less than that of the intake head.

d. Fuel storage for the drive units to provide a minimum of five (5) days continuous pumping at the specified bypass capacity. Initial filling of the fuel tanks shall be included in the CONTRACTOR's base bid. Subsequent filling of the tanks shall be included in a separate bid item based on unit cost per gallon of fuel delivered to the Site. The unit cost per gallon of delivered fuel shall be an itemized part of the "Bypass Pump" bid item in SECTION 01020.

e. Maintenance of the pumping systems shall be provided through to Substantial Completion or when the facility undergoing repair or construction is flow capable.

3. Additional requirements for critical flood control applications are as follows:

a. A minimum of one (1) redundant pumping unit including pump, drive unit, intake pipe, and discharge pipe capable of operation in the event of a failure of any of the other installed pumping units. This unit shall be equal in size and capacity to the pumping units required by 2.01.A of this SECTION.

b. Fuel storage for the drive units be provided for a minimum of seven (7) days continuous pumping at the rated bypass capacity. Rated bypass capacity does not include the capacity of the redundant pump and drive unit required for critical flood control applications.

PART 3 - EXECUTION

3.01 BYPASS:

A. For Pumped Bypass:

1. Facilities: If the CONTRACTOR's bypass includes bypass pumps, then the CONTRACTOR shall furnish all materials, labor, equipment, power, fuel, maintenance, etc. to implement a bypass pump system to divert water around the WORK area. The CONTRACTOR shall provide protection for the entire bypass system including pumps, pipes, piping connections and ancillary equipment. The bypass system shall meet requirements of paragraph 2.01A.

2. Start Up and Acceptance Testing: Testing of the installed pump systems shall be performed by the CONTRACTOR, witnessed, and accepted by the DISTRICT. A report documenting the testing shall be generated by the CONTRACTOR and furnished to the DISTRICT. Testing shall be scheduled and planned by the CONTRACTOR to accommodate the DISTRICT and shall be completed and accepted prior to flows through the structure being impacted by construction activities. Testing shall at a minimum include:

a. Each pump and drive unit shall demonstrate that it can be successfully started and stopped three (3) consecutive times.

b. The bypass pump system shall be run for 24 hours continuously.

c. Flow capacity of each pump, engine operational parameters, and head conditions at the time of testing shall be measured and recorded. The DISTRICT reserves the right to have the CONTRACTOR performs the acceptance testing multiple times if head conditions change or if a pumping unit fails to perform as required during initial acceptance testing or during operation. Typical operational parameters to be recorded shall include but not limited to the following:

i. Flow measurement per the CONTRACTOR's accepted bypass pumping system plan
ii. Drive unit engine water temperature
iii. Drive unit engine oil pressure
iv. Drive unit engine RPM
v. Hydraulic power unit supply and return hydraulic pressures
vi. Fuel level in storage tanks. Fuel tanks shall be topped off after completion of acceptance testing

3. Operations: The bypass pumping system shall be operated by the CONTRACTOR as directed by the DISTRICT. Flow capacity shall be maintained and run continuously 24 hours per day seven (7) days per week, from the time the facility under repair or construction is taken out of service until it is flow capable with flow rates as directed by the DISTRICT. Flow rates may vary from no-flow up to the bypass capacity indicated.

   a. The CONTRACTOR shall furnish staff to start, stop, and change flow rates of the bypass pumping system during a twelve (12) hour per day period, from 7:00 a.m. to 7:00p.m., seven (7) days per week from the time the pumps are placed in service until Substantial Completion or when the facility undergoing repair or construction is flow capable. The pumping system shall be configured to run unattended from 7:00 p.m. to 7:00 a.m. or the CONTRACTOR shall furnish staff to monitor the pumps continuously. Response time to operate the pumping system shall be less than one (1) hour from the time of notification by the DISTRICT.

   b. The CONTRACTOR shall include in the base bid staff to start, stop, and change flow rates of the bypass pumping system for up to five (5) unplanned events which may occur outside of the 7:00 a.m. to 7:00 p.m. time frames noted in paragraph 3.01.A.3.a. Response time to operate the pumping system shall be less than two (2) hours from the time of notification by the DISTRICT.

4. Inspection: The CONTRACTOR shall inspect the bypass pumping system daily to ensure equipment is continuously fueled/powered and working correctly. A responsible operator shall be available and on-call at all times during bypass pumping operations.

   a. The CONTRACTOR shall include in the base bid staff to start, stop, and change flow rates of the bypass for up to five (5) unplanned events which may occur outside of the 7:00 a.m. to 7:00p.m. time frames noted in paragraph 3.01.B.3.a. Response time to operate the bypass shall be less than two (2) hours from the time of notification.

END OF SECTION

SECTION 02435 TURBIDITY CONTROL AND MONITORING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all necessary equipment, labor and materials and utilize appropriate means and methods of turbidity controls necessary and sufficient to ensure that the more restrictive and protective of the following are achieved at all times: (1) all applicable State water quality standards, as prescribed in Chapter 62-302.530, Florida Administrative Code (F.A.C.), incorporated by reference, (2) all applicable environmental permit conditions, as prescribed in the permits appended to the Contract, and (3) all stormwater and erosion control shall be in accordance with the Florida Department of Environmental Protection (FDEP) Florida Stormwater Erosion and Sedimentation Control Inspector's Manual.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Environmental Protection (FDEP)

a. Florida Stormwater Erosion and Sedimentation Control Inspector's Manual

2. Florida Department of Transportation (FDOT)

a. Standard Specification for Road and Bridge Construction - Sections 104 - 1, 2, 3, 4, 6 and 7

3. U.S. Army Corps of Engineers (USACE)

B. The environmental protection rules and standards in the applicable sections of the Florida Administrative Code (F.A.C.) incorporated herein by reference are:

1. http://www.dep.state.fl.us/legal/Rules/rulelistnum.htm.

2. Design and Performance Standards - 62-25.025 F.A.C.

3. Quality Assurance - 62-160 F.A.C.

4. Surface Waters of the State - 62-301 F.A.C.

5. Surface Water Quality Standards - 62-302 F.A.C.

6. Generic Permits - 62-621.300(2)&(4) F.A.C.

1.03 SUBMITTALS: The CONTRACTOR shall make submittals for the turbidity control and monitoring system in accordance with SECTION 01300 and the requirements herein.

A. Provide details of the turbidity controls proposed.

B. Provide proposed layout of the turbidity controls and monitoring system on the Site plan.

C. Obtain the monitoring data and prepare quarterly reports in accordance with Paragraph 3.03B.

1.04 QUALIFICATIONS: The CONTRACTOR shall have at least one (1) employee, on-site, certified by the Florida Department of Environmental Protection as a Stormwater Erosion and Sedimentation Control

Inspector. The certification shall be submitted to the DISTRICT for review prior to the installation, inspection, maintenance, repair or replacement of any erosion or sedimentation control Best Management Practices, including but not limited to the turbidity controls. The turbidity monitoring shall be conducted according to the FDEP-approved procedures.

1.05 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

PART 2 - PRODUCTS

2.01 FABRIC: The CONTRACTOR shall provide floating turbidity barriers with fabric that is flexible and of sufficiently fine mesh to prevent passage of suspended material through the fabric. The floating turbidity barriers shall extend to within a foot of the bottom of the canal except in the areas with the potential for the presence of manatees the barriers shall be two (2) feet above the bottom.

2.02 FLOATS: The CONTRACTOR shall provide floats for the turbidity barriers of sufficient buoyancy to prevent the top of the barrier from submerging under any water and wind conditions. If the top of the barrier becomes submerged for any reason, the CONTRACTOR shall suspend construction operations until the condition is corrected.

2.03 ANCHORS AND WEIGHTS: The CONTRACTOR shall provide and maintain an anchor system to secure the turbidity barrier in position. Attach weights to the barrier as necessary to keep the fabric at an angle to the vertical of 30 degrees or less. Fabric material shall not be attached to the canal bottom.

PART 3 - EXECUTION

3.01 TURBIDITY BARRIERS:

A. The CONTRACTOR shall install and maintain the turbidity barriers as noted in the Drawings and where necessary to maintain turbidity releases at or below the permit compliance levels. Turbidity barriers shall be installed prior to any backfilling, clearing and grubbing, dredging, or excavation and maintained in place until construction is complete and turbidity from construction has dissipated. All barriers shall be adequately marked and appropriate signage erected to identify them as obstructions to navigation.

B. The turbidity barriers shall be made of material in which manatees cannot become entangled, shall be properly secured, and shall be regularly monitored to avoid manatee entanglement or entrapment. The barriers must not impede manatee movement.

C. The applicable U.S. Amy Corps of Engineers in-water work protection guidelines for the endangered West Indian Manatee incorporated herein by reference are: http://www.saj.usace.army.mil/Portals/44/docs/regulatory/sourcebook/endangered_species/Manatee/2011_StandardConditionsForIn-waterWork.pdfAny rips or tears that occur in the turbidity barrier material during use shall be repaired or replaced immediately by the CONTRACTOR at its expense. Rips or tears that occur in the turbidity barrier material in use that are not repaired or replaced immediately by the CONTRACTOR will result in a suspension of excavation and/or construction operations, and shall require repairs and replacements as a prerequisite to the resumption of WORK.

D. The CONTRACTOR shall keep in place and maintain all barriers until the WORK is complete (construction areas stabilized with vegetation) and turbidity levels return to the background levels based on the monitoring results. Upon completion of use, the CONTRACTOR shall remove the turbidity barriers and associated items to an off-site location at its own expense.

E. The CONTRACTOR shall conduct its operations at all times in a manner that minimizes turbidity. The CONTRACTOR is required to conform to the State Water Quality standards as prescribed in Chapter 62-302.530, F.A.C., and to meet the special requirements of any environmental permits that have been issued.

F. The turbidity controls shall be inspected by the CONTRACTOR every work day, after every rainfall event of 0.5 inches or greater in a 24 hour period, and after every extreme weather event that could dislodge or damage the turbidity controls, to assure that the turbidity controls remain properly installed, undamaged, and fully functional at all times.

3.02 EROSION CONTROL: The CONTRACTOR shall prevent and control erosion, sedimentation and water pollution as per the Florida Department of Transportation (FDOT) Specification Sections 104-1, 2, 3, 4, 6 and 7 and FDEP regulations and permit conditions.

3.03 MONITORING:

A. The CONTRACTOR shall conduct and record the results of turbidity monitoring appropriate to the conditions and at the locations, times, and frequencies specified below. An FDEP approved Turbidity Monitoring Log is attached (Appendix A) for the CONTRACTOR's use.

1. Background Monitoring Location: At least 100 feet (or as specified in the applicable environmental permit) upstream of any construction activities that may generate turbidity within a canal or conveyance feature outside the construction area, in the middle of the canal, at mid-depth in the water column, and outside of any visible turbidity plume.

2. Compliance Monitoring Location: Located in the canal or water body adjacent to each WORK area, downstream or radial to the construction or maintenance work area, directly outside of the turbidity barriers, and within the densest portion of any visible plume.

3. Sampling Time:

a. During Activities or Environmental Conditions that Can Generate Construction-Related Turbidity: Water samples for the turbidity measurement shall be collected beginning no sooner than one (1) hour after and no later than two (2) hours after construction activity commences (or as specified in the applicable environmental permit) and every four (4) hours thereafter until the work day ends. Water samples shall be collected at the same time(s) every work day according to this schedule. Any substantial deviation from this schedule must be approved by the DISTRICT, unless otherwise compelled by force majeure, in which case, an explanation must be provided verbally as soon as possible and in writing within 48 hours of the deviation.

b. During Activities and Conditions That Cannot Generate Construction-Related Turbidity: Once daily at 10:00 AM or as specified in the applicable environmental permit.

4. Equipment: The turbidity monitoring equipment shall meet the specifications and be calibrated, maintained, repaired, and replaced according to the methods, procedures, and frequencies set forth in Chapter 62-160, F.A.C.

5. Records Management: The individual conducting the turbidity monitoring shall transcribe the readings to the approved Daily Turbidity Monitoring Log form (Appendix A) and sign and date the form at the close of each monitoring day. The notebook containing the signed and dated daily turbidity monitoring log forms shall be accessible at the construction Site during the work day.

B. The CONTRACTOR shall submit the quarterly monitoring data (Turbidity Monitoring Log forms), to the DISTRICT. Documents submitted shall contain the following information:

1. Permit number

2. Project name

3. Dates of sampling and analysis

4. A statement describing the methods used in collection, handling, storage and analysis of the samples

5. A map indicating the sampling locations

6. A statement by the individual responsible for implementation of the sampling program concerning the authenticity, precision, limits of detection and accuracy of the data.

C. The CONTRACTOR shall submit monitoring reports that also include the following information for each sample that is taken:

1. Date and time of the day samples were taken

2. Depth of the water body

3. Depth of the sample

4. Antecedent weather conditions

5. Water level stage

6. Direction of flow

3.04 EXCEEDANCES OF WATER QUALITY STANDARDS

A. If at any time, monitoring reveals the turbidity level, at the compliance sampling station is greater than 29 NTUs above the corresponding background sample in Class I or III receiving waters or greater than 0 NTU above background samples in receiving waters classified as OFW (Outstanding Florida Waters), construction activities shall cease immediately and not resume until corrective measures have been taken and turbidity has returned to an acceptable level. Turbidity violations and corrective measures shall be documented in the monitoring reports.

1. The CONTRACTOR must notify the DISTRICT Construction Manager and the DISTRICT's Permitting and Compliance Staff immediately who then, per the permit, must notify the permitting agency of the exceedance. If known, the CONTRACTOR may also contact the DISTRICT's assigned Permitting and Compliance Staff for the Project directly.

END OF SECTION

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APPENDIX A

DAILY TURBIDITY MONITORING LOG

Multiple work areas that may contribute to turbidity in receiving waters must be monitored separately. A Site map depicting sampling locations must accompany the quarterly turbidity monitoring reports.

Project Name:	Permit No.:
Collector Name:	Collection Date:
Meter/Sonde Identification No.	

Water Observations		Weather Observations
Water Level Stages		Temperature:
Direction of Flow		Conditions:
Water Depth		

Activity Taking Place During Sampling	Yes	No
Excavation or Filling within 50 ft radius of surface waters or wetlands?		
Please describe:		
Other In-Water Work? (e.g., dewatering; installing piling or forms; injecting concrete; sand blasting; painting)		
Please describe:		
Other Activity? (e.g., materials transfer; washdown; interim stabilization)		
Please describe:		

Turbidity Monitoring Data						
Background Location Description:	**Background**	**Compliance**	**Background**	**Compliance**	**Background**	**Compliance**
Compliance Location Description:	**A.M. Mid-Depth**		**Mid-Day Mid-Depth**		**P.M. Mid-Depth**	
Collection Time						
Analysis Time						
Turbidity (NTU)						
Did Compliance Sample exceed 29 NTU's above Background Sample?	☐ Yes* ☐ No		☐ Yes* ☐ No		☐ Yes* ☐ No	

***If the 29 NTU limitation is exceeded, please describe cause and corrective actions taken on reverse side of this form. Immediately stop activities contributing to turbidity and notify the SFWMD Construction Manager and Permit Compliance Staff.**

Explanation of gaps in sampling activity (e.g., rained out, phased activity, etc.):

Construction activity complete and slopes stabilized? ☐ Yes ☐ No

Statement of Authenticity	
I certify this test was performed as required by Chapter 62-160, F.A.C., conducted with an approved instrument calibrated in accordance with the appropriate FDEP-SOPs. The results are complete and accurate.	
Print Name:	
Signature:	Date:

Additional Comments:

***Explain turbidity water quality standard exceedance (>29 NTU above background for Class III or > 0 NTU above background for an Outstanding Florida Water (OFW)) and describe corrective actions taken.**

SECTION 02436 ENVIRONMENTAL PROTECTION

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall provide all labor, equipment and materials necessary for the prevention of environmental damage as the result of construction operations under this Contract and for those measures set forth in other requirements of the Technical Specifications.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Environmental Protection Agency (EPA):
    a. Clean Air Act (CAA)
    b. Clean Water Act (CWA)
    c. Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)
    d. Executive Orders and EPA requirements, as appropriate; and all general and specific Federal Permit Conditions as applicable.
    e. Federal Insecticide, Fungicide and Rodenticide Act (FIFRA)
    f. National Environmental Laboratory Accreditation Conference (NELAC)
    g. National Environmental Policy Act (NEPA)
    h. National Pollution Discharge Elimination System (NPDES)
    i. Resource Conservation and Recovery Act (RCRA)
    j. Safe Drinking Water Act
    k. Toxic Substance Control Act (TSCA)
2. Code of Federal Regulations (CFR):
    a. 40 CFR - Parts 109, 261.10, 260-268, 273, 279
3. Florida Department of Environmental Protection (FDEP):
    a. Florida Administrative Code (FAC)
        i. 62-770, 62-780
    b. Florida Stormwater, Erosion and Sedimentation Control Inspector’s Manual
4. Florida Department of Transportation (FDOT):
    a. Standard Specification for Road and Bridge Construction - Sections 104-1, 2, 3, 4, 6 and 7
5. Florida Statutes
    a. Chapter 403
6. National Oceanic and Atmospheric Administration (NOAA):
    a. Coastal Zone Management Act (CZMA)
7. National Park Service (NPS):
    a. Native American Graves Protection and Repatriation Act (NAGPRA)
    b. National Historic Preservation Act (NHPA)
8. U.S. Army Corps of Engineer (USACE)
9. U.S. Fish & Wildlife Service (FWS):
    a. Endangered Species Act (ESA)
    b. Fish and Wildlife Coordination Act (FWCA)

c. Migratory Bird Treaty Act (MBTA)

B. State and local codes, permits, regulations and ordinances as applicable.

1.03 DEFINITIONS: For the purpose of this SECTION, environmental damage is defined as the presence of hazardous, physical, or biological elements or agents which alter the physical, chemical or biological integrity of the environment in such a way that it represents an unacceptable risk to public health, safety or welfare; unfavorably alter ecological balances; affect other species, biological communities, or ecosystems; or degrade the quality of the environment for aesthetic, cultural, and/or historical purposes. The control of environmental damage requires consideration of land, water, and air, and includes management of visual aesthetics, noise, solid waste, radiant energy and radioactive materials, as well as other pollutants.

1.04 SUBMITTALS: Within 20 calendar days after the Notice to Proceed (NTP), the CONTRACTOR shall submit an Environmental Protection Plan (Plan) for review and acceptance by the DISTRICT in accordance with SECTION 01300. Approval of the Plan shall not relieve the CONTRACTOR of its responsibility for adequate and continuing control of pollutants and appropriate environmental protection measures. Approval of the Plan is conditional and predicated on satisfactory performance during construction. The DISTRICT reserves the right to require the CONTRACTOR to modify the Plan if it is determined that environmental protection requirements are not being met. No physical WORK at the Site shall begin prior to acceptance of the Plan. The Plan shall include, but not be limited to the following:

A. Submittals shall be in accordance with SECTION 01300.

B. A list of the Federal, State and Local laws, regulation and permits concerning environmental protection, pollution control and abatement that are applicable to the CONTRACTOR's proposed operations and the requirements imposed.

C. Methods for protection of features to be preserved within the authorized WORK areas: The CONTRACTOR shall prepare a listing of methods to protect resources needing protection (trees, shrubs, vines, grasses and ground cover, landscape features, air and water quality, fish and wildlife, soil and historical, archeological and cultural resources).

D. Procedures to be implemented are to provide all necessary environmental protection and to comply with applicable laws and regulations: The CONTRACTOR shall provide written assurance that immediate corrective action will be taken to correct any environment damage due to accident, natural causes or failure to follow the procedures set out in accordance with the Plan.

E. Environmental monitoring plans, if applicable.

F. Traffic control plan, if applicable.

G. Drawings showing locations of proposed temporary activities, such as material storage areas or stockpiles of excess spoil or materials.

H. Erosion and sediment control methods, for protecting surface waters, wetlands, and groundwater during construction. All stormwater and erosion control methods shall be in accordance with the FDEP Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual. The CONTRACTOR shall prevent and control erosion and water pollution as per FDOT Specification Sections 104-1, 2, 3, 4, 6 and 7 and all applicable FDEP regulations and permit conditions.

I. Spill Prevention Methods: The CONTRACTOR shall identify any hazardous or potentially hazardous substances to be used on the Site and indicate intended actions to prevent accidental or intentional introduction of these materials into the air, ground, water, wetlands or drainage areas. The Plan shall specify the actions that will be taken to meet the federal, state and local laws regarding labeling, storage, removal, transport and disposal of all hazardous or potentially hazardous substances.

J. Spill Contingency Plan for hazardous, toxic or petroleum material.

K. A WORK area plan, showing proposed activities and identifying areas of limited use or non-use, and including measures that will be taken for field identification of these areas.

L. Identification of the person who shall be responsible for implementation of the Plan. This person shall have authority to respond for the CONTRACTOR in all environmental protection matters.

M. A recycling and waste management plan. The CONTRACTOR shall include waste minimization efforts in the Plan.

1.05 QUALIFICATIONS:

A. The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

B. When the Eastern Indigo Snake is identified as a species of concern in the environmental permits the CONTRACTOR shall supply qualified eastern indigo snake observers during ground clearing activities. Qualified Observers are defined as individuals who have been instructed by the DISTRICT on proper techniques and protocols for protection of the Eastern Indigo Snake during Site activities. The observer's names and documentation showing completion of the DISTRICT's instruction shall be provided to the DISTRICT at least 2 weeks prior to the commencement of ground clearing activities.

1.06 RESPONSIBILITIES:

A. Quality Control: The CONTRACTOR shall establish and maintain quality control for the environmental protection of all items set forth herein. The CONTRACTOR shall record on daily quality control reports or attachments thereto, any problems in complying with applicable laws, regulations and ordinances, and corrective action(s) taken.

B. Permits and Authorizations: The CONTRACTOR shall apply for and obtain all necessary permits or licenses unless the DISTRICT has already acquired them. The CONTRACTOR shall be responsible for implementing and complying with all terms, conditions and requirements of all permits issued for construction of the Project. The CONTRACTOR shall install speed limit signs for off-road and improved road travel for construction equipment and employee vehicles that identify speeds protective of wildlife. The CONTRACTOR shall also provide all necessary signage describing all Threatened and/or Endangered species which are identified in applicable environmental permits.

C. Training: Prior to the onset of construction activities the CONTRACTOR and all personnel shall be trained on how to identify and implement the Standard Protection Measures and Guidelines for the Threatened and Endangered Species and ground-nesting birds. The Standard Protection Measures for the Eastern Indigo Snake dated August 12, 2013, is attached in Appendix C.

1.07 CERTIFICATIONS AND TESTINGS: All physical, chemical, and biological measurements and analyses that are necessary to comply with the monitoring requirements in all applicable permits or in this Contract must be performed according to approved methods and procedures by a commercial laboratory that is certified to perform the required analyses according to the approved methods and procedures by the National Environmental Laboratory Accreditation Conference (NELAC).

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide to the DISTRICT at least 48 hours advance notice of its intention to begin new WORK activities.

PART 2 - PRODUCT (ENVIRONMENTAL PROTECTION PLAN)

2.01 NOTIFICATION:

A. In the event that the DISTRICT notifies the CONTRACTOR of any non-compliance with federal, state or local laws, permits or other elements of the CONTRACTOR's Environmental Protection Plan, the CONTRACTOR shall without delay inform the DISTRICT of the proposed correction action and take such action as approved.

B. The CONTRACTOR shall notify the DISTRICT immediately of any warnings or notices of noncompliance, fines, citations or tickets issued directly to the CONTRACTOR by any federal, state, or local environmental protection, waste management, code enforcement, or fire, police, or public health agency.

C. If the CONTRACTOR fails to comply, the DISTRICT may order all WORK to cease until corrective action has been taken. No time extensions shall be granted or damages allowed for the suspension of WORK under this circumstance.

D. A Notice of Termination (NOT) shall be sent to the applicable federal, state, and local permit-issuing authorities with a copy to the DISTRICT within 14 days of final stabilization

2.02 SUMMARY: The CONTRACTOR shall submit a written report within 30 days of completion of the Project. This report shall delineate the absence, or occurrence, of reported or unreported environmental incidents during the course of the Project.

2.03 TRAINING:

A. The CONTRACTOR shall train its personnel in relevant phases of environmental protection. The training shall include methods of detecting and avoiding pollution, familiarization with pollution standards, and careful installation and monitoring of the Project to ensure continuous environmental pollution control.

B. Due to the probability that wildlife species of concern, including but not limited to Threatened and/or Endangered species and Protected Migratory Bird species may be present within or adjacent to construction Sites, prior to initiation of construction activities, the CONTRACTOR(s) will be trained by the DISTRICT and/or U.S. Fish & Wildlife Service on how to identify and implement appropriate protection measures for each species.

PART 3 - EXECUTION (PROTECTION OF ENVIRONMENTAL RESOURCES)

3.01 GENERAL: During the entire period of the Contract, the CONTRACTOR shall protect environmental resources within the Project boundaries and those affected outside the limits of construction. The CONTRACTOR shall confine its activities to the areas defined by the Drawings and specifications. Any deviations from the Drawings including, but not limited to borrow areas, disposal areas, staging areas, and alternate access routes will require additional review by the DISTRICT to ensure compliance with applicable environmental rules and regulations prior to implementation/or commencement of those deviations.

3.02 PROTECTION OF LAND RESOURCES: Prior to the beginning of any construction the CONTRACTOR shall delineate, install protection and be responsible for preservation of all land resources that are to be preserved or avoided within the WORK area. The CONTRACTOR shall not remove, cut, deface, injure, or destroy any land resources (trees, shrubs, vines, grasses, topsoil, or land forms) unless indicated in the Drawings or specifically authorized by the DISTRICT. All damaged areas shall be restored to original or better condition, to the satisfaction to the DISTRICT.

3.03 DISTURBED AREAS: The CONTRACTOR shall effectively prevent erosion and control sedimentation through approved materials and methods as identified in the Environmental Protection Plan. Disturbed areas will include areas of ingress and egress, construction materials storage, staging, washdown areas, and toxic, hazardous, and solid materials/waste storage areas. Disturbed areas shall be temporarily stabilized within 7 days of cessation of phased construction activity and permanently stabilized within 14 days of cessation of all phases of construction activity. Temporary Best Management Practices (BMPs) shall remain in place and in effect until the final Site inspection is complete and Site is certified as stabilized.

3.04 PROTECTION OF WATER RESOURCES:

A. The CONTRACTOR shall conduct all activities in a manner to avoid pollution of surface water, ground water and wetlands. The CONTRACTOR's construction methods shall protect wetland and surface water areas from damage due to mechanical grading, erosion, sedimentation and turbid discharges. No storage or stockpiling of equipment shall be allowed within any wetland area unless specifically authorized under a permit for the Project.

B. Water directly derived from construction activities shall not be allowed to directly discharge to water areas, but shall be collected in retention areas to allow settling of suspended materials. The CONTRACTOR shall monitor water quality of dewatering discharge into water bodies or leaving the Site in accordance with applicable environmental permits. All monitoring of any water areas that are affected by construction activities shall be the responsibility of the CONTRACTOR.

3.05 OIL, FUEL AND HAZARDOUS SUBSTANCE SPILL PREVENTION:

A. The CONTRACTOR shall prepare a spill contingency plan in accordance with 40CFR, Part 109. The CONTRACTOR shall prevent oil, fuel or other hazardous substances from entering the air, ground, drainage, and local bodies of water or wetlands. In the event that a spill occurs, despite design and procedural controls, the CONTRACTOR shall take immediate action to contain and clean up the spill and report the spill immediately to the DISTRICT and to other appropriate federal, state, and local agency contacts. Reportable quantities (greater than 25 gallons) of petroleum-based fluids must be reported within 1 hour to the National

Response Center (800-424-8802) and State Warning Point (800-320-0519) if it reaches the waters of the state or, if not, within 24 hrs to State Warning Point. Toxic and hazardous substance spills directly into waters of the state, in any quantity, must be reported immediately to the DISTRICT and those federal and state points of contact listed above.

B. The CONTRACTOR shall submit a written report to the DISTRICT and to the State of Florida Bureau of Emergency Response providing certification of commitment of manpower, equipment and materials necessary to prevent the spread and effect expeditious cleanup and disposal. This report shall be submitted within 48 hours of the spill event.

3.06 MATERIALS AND WASTE MANAGEMENT:

A. For sanitary waste management, the CONTRACTOR shall ensure that portable restrooms will be anchored on level ground with at least a 15-foot set-back from water bodies or banks or slopes thereto. For solid waste management, dumpster(s) will either be outfitted with a water-tight cover or be covered with a tarpaulin when not in use to minimize infiltration and leaching of rain with at least a 15-foot set-back from water bodies, conveyances thereto, or banks or slopes thereto. Hazardous materials storage areas and liquid refuse and hazardous waste collection and storage areas shall be denoted on the Plan.

B. The CONTRACTOR shall ensure toxic substances and hazardous materials are stored in a locked, blast-resistant shed anchored to a bermed concrete or asphalt pad on level ground with at least a 15-foot setback from any water bodies, conveyances thereto, or banks or slopes thereto.

C. For solid and/or hazardous waste disposal involving lead-based paint, the CONTRACTOR shall ensure containers with Toxicity Characteristic Leaching Procedure – Tetraphenylborate (TCLP TPb) concentrations in excess of the Resource Conservation and Recovery Act (RCRA) action level will be transported by a licensed hazardous waste hauler to a licensed hazardous waste disposal facility within the time limit appropriate to the generation rate and accumulated volume of hazardous waste material. Containers with TCLP TPb concentrations less than the RCRA action level shall be transported by a licensed solid waste hauler to a licensed Class I solid waste disposal facility. In either case, the CONTRACTOR shall obtain and transmit signed and dated copies of the transport and disposal manifests to the DISTRICT's for records retention.

D. The CONTRACTOR is prohibited from the on-site burning of hazardous wastes (aerosol cans, oil filters, etc.). All hazardous wastes shall be disposed of as required by law. Copies of relevant Material Safety Data Sheets (MSDSs) shall be appended to the Environmental Protection Plan, Safety Plan, Spill Prevention Plan, and Stormwater Pollution Prevention Plan (SWPPP).

E. The CONTRACTOR is responsible for the materials and processes where wastes may be generated under the contracted activities. The CONTRACTOR is responsible for providing the materials in order to implement the Contract and is responsible for operating and maintaining any processes from which waste material may be generated.

F. The CONTRACTOR is deemed to be the "generator" as defined in 40 CFR 261.10 for any hazardous wastes or spill residue that is generated during the activities encompassed in this Contract. It is recognized that it is the CONTRACTOR's or a subcontractor of the CONTRACTOR whose act first causes a hazardous waste to become subject to regulation. The CONTRACTOR is a different legal entity from the owner/operator of the physical location/property where the contracted activities will be conducted. CONTRACTOR is a "person" within the meaning of Section 403.031(5), Florida Statutes.

G. The CONTRACTOR is responsible for compliance with applicable standards of 40 CFR 260-268 and 40 CFR 273 and 279 and state regulations which adopt or reference these federal standards.

H. The CONTRACTOR is responsible for the generation and retention of records associated with waste management practices and disposition. All records shall be maintained for a minimum of 3 years from the date of generation. All records will be made available to the DISTRICT or regulatory agencies upon request.

I. In the event of any chemical discharges associated with CONTRACTOR's or subcontractor's activities, CONTRACTOR shall be responsible for reporting, assessment and remediation of such discharges in accordance with applicable federal, state or local regulations and/or guidelines including, but not limited to, 40 CFR 264/265, Chapter 62-770, Florida Administrative Code (F.A.C.) and Chapter 62-780, F.A.C.

3.07 FISH AND WILDLIFE RESOURCE PROTECTION: The CONTRACTOR shall control and minimize interference with, disturbance to, and damage of fish and wildlife resources.

A. If adverse impacts occur to fish and wildlife species of concern, including but not limited to Threatened and/or Endangered Species and Protected Migratory Bird Species, the CONTRACTOR shall immediately notify the DISTRICT and provide details of adverse impacts for determination of further action that may be required. Adverse impact is defined as any harassing, harming, pursuing, hunting, shooting, wounding, killing, trapping, capturing, collecting, or attempting to engage in any such activity. Threatened and/or Endangered Species that require specific protection measures as identified in the environmental permits shall be listed in the Environmental Protection Plan.

B. In the event that the DISTRICT determines that an adverse impact to species of concern, including but not limited to Threatened and/or Endangered Species and Protected Migratory Bird Species occur as a result of the construction activities, the DISTRICT shall notify the U.S. Army Corps of Engineers and the U.S. Fish and Wildlife Service for determination of further action and possibly to determine if seasonal or daily timing restrictions on construction activities is needed. The CONTRACTOR shall be aware that the Crested Caracara, indigo snake, and gopher tortoise, though not known to inhabit the Site, have been known to inhabit and nest in County.

C. The CONTRACTOR and all personnel shall be familiar with the Plan shall be able to identify the threatened and endangered species listed in the Plan. Any activity observed by the CONTRACTOR that may result in adverse impact to threatened or endangered species shall be reported immediately to the DISTRICT, who shall have sole authority for any WORK stoppages, creation of a buffer area, or restart of construction activities.

D. Any Threatened and/or Endangered Species and species of concern observed at the Site will be recorded and logged. The logs shall be provided to the DISTRICT on a bi-weekly basis. See attached Wildlife Log, Appendix A. If nesting activity is detected within and/or adjacent to the Site, the CONTRACTOR shall immediately contact the DISTRICT for determination of further action and possibly to determine if seasonal or daily timing restrictions on construction activities is needed.

E. The CONTRACTOR shall keep construction activities under surveillance, management, and control to prevent impacts to migratory birds and their nests. The CONTRACTOR may be held responsible for harming or harassing the birds, their eggs or their nests as a result of the construction. Any nesting activity observed by the CONTRACTOR shall be reported immediately to the DISTRICT's Construction Manager who shall have sole authority for any WORK stoppages, creation of the buffer area, or restart of construction activities.

3.08 ENVIRONMENTAL PROTECTION RETENTION RECORD RETENTION: The CONTRACTOR shall retain a copy of all required permits, the Plan, the SWPPP, the Spill Prevention Plan, and all associated reports, records and documentation required by these permits or the Contract at the construction Site or an appropriate alternative location as specified in the Notice of Intent (NOI) from NTP through Notice of Termination (NOT). Such documentation includes but is not limited to soil disturbance and stabilization logs, inspection and corrective action logs, turbidity monitoring logs, wildlife observation logs and reports, TCLP and Synthetic Precipitation Leaching Procedure (SPLP) assay results, sanitary, solid, and hazardous waste transport and disposal manifests, spill reports, material safety data sheets, and any warnings, citations or notices of noncompliance, or fees, levees, fines or penalties. A copy of all such records shall be submitted to the DISTRICT at the time of Contract close-out.

3.09 PROTECTION OF AIR RESOURCES: The CONTRACTOR shall minimize pollution of air resources. All activities, equipment, processes and WORK operated or performed in accomplishing the specified construction shall be in strict accordance with the applicable air pollution standards of the State of Florida (F.S. Chapter 403 – Environmental Control and F.A.C. Section 200 – Recirculation Chiller) and all Federal emission and performance laws and standards as applicable. This includes, but is not limited to, control of particulates, dust generated by or incidental to construction activities, burning and odors.

3.10 PRESERVATION AND RECOVERY OF HISTORIC, ARCHEOLOGICAL, AND CULTURAL RESOURCES: If applicable, known historic, archeological and cultural resources within the CONTRACTOR's WORK area(s) will be designated as a "Sensitive Environmental Area" on the Drawings or other documents. If so designated, the CONTRACTOR shall install protection for these resources and shall be responsible for their preservation during the Contract's duration. The CONTRACTOR shall not distribute maps or other information on these resource locations except for distribution among the CONTRACTOR's staff with a "need to know" technical responsibility for protecting the resources.

A. Inadvertent Discoveries: If, during construction or other activities, the CONTRACTOR observes items that may have historic or archeological value, such observations shall be reported immediately to the DISTRICT so that the appropriate staff may be notified and a determination made for what, if any, additional action is

needed. Examples of historic, archeological and cultural resources are bones, remains, artifacts, shell, midden, charcoal or other deposits, rocks or coral, evidences of agricultural or other human activity, alignments, and constructed features. The CONTRACTOR shall cease all activities that may result in the destruction of these resources and shall prevent his employees from further removing, or otherwise damaging, such resources.

B. Claims for Downtime due to Inadvertent Discoveries: Upon discovery and subsequent reporting of a possible inadvertent discovery of cultural resources, the CONTRACTOR shall seek to continue WORK well away from, or otherwise protectively avoiding, the area of interest, or in some other manner that strives to continue productive activities in keeping with the Contract. Should an Inadvertent Discovery be of the nature that substantial impact(s) to the WORK schedule are evident; such delays shall be coordinated with the DISTRICT.

END OF SECTION

Appendix A
Wildlife Log

For Threatened and/or Endangered Species and Species of Concern Listed in Permit

Wood Storks Sightings, since they are so abundant, will be logged on a bi-weekly basis in coordination with Bi-weekly Construction Progress Meetings and will be reported quarterly along with other sightings.

☐ **Eastern Indigo Snake** ☐ **Bald Eagle** ☐ **Wood Stork** ☐ **Florida Panther** ☐ **Caracara** ☐ **Gopher Tortoise** ☐ **Other**_____	
Project Name	
Date of Sighting	
Time of Sighting	
Temperature	
Wind (mph)	
Weather Conditions (ex: note sky cover, raining, humid, cloudy, sunny, cool, hot, etc)	
Construction Activity Occurring	
Equipment being Used	
Condition of Animal (ex: injured, unharmed, etc)	
Behavior of Animal (ex: disoriented, aggressive, etc)	
Actions taken after sighting	
Size of Animal	
GPS Coordinates/Specific Location	
Pictures Taken (Attach pictures)	
Date this form was completed	
Observers Company/Agency	
Observers Name	Print Name:
	Signature:
Observers Contact Info	Office:
	Cell:
	Email:

EXAMPLE FORM
Wildlife Log

For Threatened and/or Endangered Species and Species of Concern Listed in Permit

Wood Storks Sightings, since they are so abundant, will be logged on a bi-weekly basis in coordination with Bi-weekly Construction Progress Meetings and will be reported quarterly along with other sightings.

☑ **Eastern Indigo Snake** ☐ **Bald Eagle** ☐ **Wood Stork** ☐ **Florida Panther** ☐ **Caracara** ☐ **Gopher Tortoise** ☐ **Other**_____	
Project Name	C-44 Reservoir
Date of Sighting	Tuesday, January 29, 2008
Time of Sighting	0900
Temperature	75°
Wind (mph)	5-10 mph
Weather Conditions (ex: note sky cover, raining, windy, humid, cloudy, sunny, cool, hot, etc)	Partial cloud/Sunny
Construction Activity Occurring	Demobilization of Construction Trailers, nothing near the area snakes were sighted
Equipment being Used	n/a
Condition of Animal (ex: injured, unharmed, etc)	Good
Behavior of Animal (ex: disoriented, aggressive, etc)	under a door in an abandoned citrus office
Actions taken after sighting	Determined sex, took photos, estimated size
Size of Animal	Approx 6'
GPS Coordinates/Specific Location	N 27 05 33.59 W 80 26 59.90 NE Corner of Project along Eastern Levee
Pictures Taken (Attach pictures)	Yes, attached
Date this form was completed	Tuesday, February 5, 2008
Observers Company/Agency	Land Clearing Inc.
Observers Name	Print Name:
	Signature:
Observers Contact Info	Office:
	Cell:
	Email:

Appendix B

Killing, harming, or harassing indigo snakes is strictly prohibited and punishable under State and Federal Law.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

LEGAL STATUS: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

August 12, 2013

ATTENTION:

THREATENED EASTERN INDIGO SNAKES MAY BE PRESENT ON THIS SITE!!!

Please read the following information provided by the U.S. Fish and Wildlife Service to become familiar with standard protection measures for the eastern indigo snake.

IF YOU SEE A LIVE EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

IF YOU SEE A DEAD EASTERN INDIGO SNAKE ON THE SITE:

- Cease clearing activities and immediately notify supervisor or the applicant's designated agent, **and** the appropriate USFWS office, with the location information and condition of the snake.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Thoroughly soak the dead snake in water and then freeze the specimen. The appropriate wildlife agency will retrieve the dead snake.

USFWS Florida Field Offices to be contacted if a live or dead eastern indigo snake is encountered:

North Florida ES Office – (904) 731-3336
Panama City ES Office – (850) 769-0552
South Florida ES Office – (772) 562-3909

DESCRIPTION: The eastern indigo snake is one of the largest non-venomous snakes in North America, with individuals often reaching up to 8 feet in length. They derive their name from the glossy, blue-black color of their scales above and uniformly slate blue below. Frequently, they have orange to coral reddish coloration in the throat area, yet some specimens have been reported to only have cream coloration on the throat. These snakes are not typically aggressive and will attempt to crawl away when disturbed. Though indigo snakes rarely bite, they should NOT be handled.

SIMILAR SNAKES: The black racer is the only other solid black snake resembling the eastern indigo snake. However, black racers have a white or cream chin, thinner bodies, and WILL BITE if handled.

LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

Appendix C
STANDARD PROTECTION MEASURES FOR THE EASTERN INDIGO SNAKE
U.S. Fish and Wildlife Service
August 12, 2013

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- Cease clearing activities and allow the eastern indigo snake sufficient time to move away from the site without interference.
- Personnel must NOT attempt to touch or handle snake due to protected status.
- Take photographs of the snake, if possible, for identification and documentation purposes.
- Immediately notify supervisor or the applicant's designated agent, **and** the appropriate U.S. Fish and Wildlife Service (USFWS) office, with the location information and condition of the snake.
- If the snake is located in a vicinity where continuation of the clearing or construction activities will cause harm to the snake, the activities must halt until such time that a representative of the USFWS returns the call (within one day) with further guidance as to when activities may resume.

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LIFE HISTORY: The eastern indigo snake occurs in a wide variety of terrestrial habitat types throughout Florida. Although they have a preference for uplands, they also utilize some wetlands and agricultural areas. Eastern indigo snakes will often seek shelter inside gopher tortoise burrows and other below- and above-ground refugia, such as other animal burrows, stumps, roots, and debris piles. Females may lay from 4 - 12 white eggs as early as April through June, with young hatching in late July through October.

PROTECTION: The eastern indigo snake is classified as a Threatened species by both the USFWS and the Florida Fish and Wildlife Conservation Commission. "Taking" of eastern indigo snakes is prohibited by the Endangered Species Act without a permit. "Take" is defined by the USFWS as an attempt to kill, harm, harass, pursue, hunt, shoot, wound, trap, capture, collect, or engage in any such conduct. Penalties include a maximum fine of $25,000 for civil violations and up to $50,000 and/or imprisonment for criminal offenses, if convicted.

Only individuals currently authorized through an issued Incidental Take Statement in association with a USFWS Biological Opinion, or by a Section 10(a)(1)(A) permit issued by the USFWS, to handle an eastern indigo snake are allowed to do so.

August 12, 2013

SECTION 02451 GUARDRAIL

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all equipment, labor, and material for installation of metal guardrail with posts of timber, steel, or aluminum as required by the Drawings or as specified herein

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals.

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society of Testing Materials (ASTM):

a. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products

b. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

2. Florida Department of Transportation (FDOT):

a. Standard Specifications for Road and Bridge Construction Section, Latest Edition

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Submit shop drawings and installation drawings for the DISTRICT's review prior to fabrication and delivery. These drawings shall provide detailed information and specifications for all materials, finishes, dimensions, and erection instructions.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 GUARDRAIL: The CONTRACTOR shall furnish guardrail that is corrugated, in 12foot, sixinch sections, and meets the requirements of ASTM A123. All fasteners and other accessories, including bolts, nuts and washers, shall be galvanized as specified in ASTM A153.

2.02 POSTS: The CONTRACTOR shall furnish guardrail posts complying with the construction and dimensions shown on the Drawings and conforming to FDOT Specification Section 536-2.2, Posts.

2.03 ANCHOR BLOCKS: The CONTRACTOR shall furnish anchor blocks of Class I concrete complying with the construction and dimensions shown on the Drawings.

2.04 OFFSET BLOCKS: The CONTRACTOR shall furnish offset blocks complying with the construction and dimensions shown on the Drawing and conforming to FDOT Specification Section 536-2.4, Offset Blocks.

PART 3 - EXECUTION

3.01 SETTING POSTS: The CONTRACTOR shall set guardrail posts vertically to the depth shown on the Drawings. Posts shall be set in concrete, mounted on structures or backfilled with suitable thoroughly compacted material. For guardrail post replacement, backfill and compact the existing hole prior to setting the new post.

If driving posts through asphalt pavement, the CONTRACTOR shall block out or cut holes that are 50 percent larger than the area of the post being driven prior to post installation. After installing the posts and compacting the backfill material, patch the asphalt area around each post with fresh hot bituminous mixture.

3.02 ERECTION OF RAILS: The CONTRACTOR shall erect the guardrail as shown on the Drawings.

END OF SECTION

SECTION 02510 CONCRETE WALKWAYS, CURBS AND GUTTERS, RAMPS, MISCELLANEOUS CONCRETE SLABS AND WHEEL STOPS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, materials and equipment necessary for the construction for concrete walkways, curbs and gutters, ramps, miscellaneous concrete slabs and wheel stops, as shown on the Drawings.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 03200 - Concrete Reinforcement
3. SECTION 03300 - Cast-In-Place Concrete

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT)
    a. Standard Specifications for Road and Bridge Construction
        i. 346 - Standard Specifications for Portland Cement Concrete
        ii. 350 - Cement Concrete Pavement
        iii. 520 - Standard Specifications for Concrete Gutter, Curb Elements, and Traffic Separators
        iv. 522 - Standard Specifications for Concrete Sidewalk
        v. 931 - Standard Specifications for Metal Accessory Materials for Concrete Pavement and Concrete Structures

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

1. Copies of proposed concrete mix design and compression strength tests.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: Perform tests in accordance with standards hereinafter specified.

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 CONCRETE: The CONTRACTOR shall provide concrete for sidewalks, curbs and gutters, ramps and miscellaneous concrete slabs as specified in FDOT Specifications Section 346. For miscellaneous concrete slabs Class I concrete shall have a minimum strength of 3000 psi.

2.02 METAL ACCESSORY MATERIALS: The CONTRACTOR shall provide metal accessory materials for miscellaneous concrete slabs as indicated on the Drawings and as specified in FDOT Specification Section 931.

2.03 PRE-CAST CONCRETE WHEEL STOPS: The CONTRACTOR shall furnish pre-cast concrete wheel stops that are nominally 6 inches high by 6 inches wide by 6 feet long or accepted equivalent. One wheel stop shall be furnished per parking space or as shown on the Drawings. Wheel stops shall be reinforced with two (2), #4 bars.

2.04 FORMS: The CONTRACTOR shall furnish forms for the forming of the concrete curb in accordance with the following:

A. The forms shall be wood or metal.

B. The forms shall be straight and strong enough to resist springing during placement of concrete.

C. The forms shall have sufficient bearing surface to prevent tipping.

D. The height of the forms shall be equal to full depth of section to be constructed.

E. Slip form.

PART 3 - EXECUTION

3.01 CONCRETE WALKS AND RAMPS: The CONTRACTOR shall construct concrete sidewalks and ramps as specified in FDOT Specifications Section 522 where shown on the Drawings.

3.02 CURBS AND GUTTERS: The CONTRACTOR shall construct concrete curbs and gutters as specified in FDOT Specifications Section 520 where shown on the Drawings.

3.03 MISCELLANEOUS CONCRETE SLABS: The CONTRACTOR shall construct miscellaneous concrete slabs for mechanical equipment as indicated on the Drawings and as specified in FDOT Specifications Section 350.

3.04 PRE-CAST CONCRETE WHEEL STOPS: The CONTRACTOR shall install pre-cast concrete wheel stops by anchoring them with at least two (2), one-half inch, (#4) round reinforcing bars driven a minimum of 12 inches into the pavement. Wheel stops damaged when driving rods shall be replaced with new wheel stops.

3.05 FORMS: The CONTRACTOR shall install the forms in accordance with the following:

A. Use flexible forms for all curved form lines except:

1. Curves having a radius of 200 feet or greater may be formed in 10 foot or shorter chords.

2. Curves having a radius of 100 feet or greater may be formed in 5 foot or shorter chords.

B. Thoroughly clean, oil, securely stake, brace, and hold forms to line and grade.

C. Remove forms from front face of curb section at the time necessary to permit finishing concrete. Leave other forms in place not less than 12 hours after placement of concrete.

3.06 JOINTS: The CONTRACTOR shall install joints in the curbs as follows:

A. Contraction Joints:

1. Construct at locations indicated and as follows:

a. Divide concrete curb into monolithic sections not greater than 10 feet in length.

2. Form contraction joints by any of the following methods:

a. Place one-half inch thick steel separators after concrete has taken its initial set, but before final finishing.

b. Cut a groove in the fresh concrete to a depth of at one quarter the section thickness by use of a jointer having a radius of one-half inch and thickness not exceeding one-half inch.

c. Saw the hardened concrete before shrinkage cracking occurs. Depth of cut not less than one quarter the section thickness and width of key not to exceed three sixteenths inch.

B. Expansion Joints:

1. Construct at the following locations:

a. Locations as indicated on the Drawings.

b. All points of curvature and points of tangency of curves having a radius of 100 inches or less and at intervals not exceeding 60 inches in tangent section.

c. Locations where curb abuts other structures and slabs.

2. Stake, support, and secure preformed joint filler in position to prevent displacement during and finishing operations.

3. Round edges of joints with an edging tool of one quarter inch radius.

C. Construction Joints:

1. Locate to coincide with contraction, expansion or key joints.

2. When concrete placement is interrupted between joint locations for a sufficient time for the concrete to take its initial set, remove concrete to the nearest joint location before resuming placement.

END OF SECTION

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SECTION 02645 CORRUGATED ALUMINUM-ALLOY PIPE AND RISER

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, materials, and equipment for installation of the corrugated metal pipe and furnishing such appurtenances as may be required to complete the Work as indicated on the Drawings and as specified herein.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 02200 - Earthwork
3. SECTION 02220 - Excavation and Backfilling

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society for Testing and Materials (ASTM):
   a. B361 - Standard Specification for Factory-Made Wrought Aluminum and Aluminum-Alloy Welding Fittings
   b. B745 - Standard Specification for Corrugated Aluminum Pipe for Sewers and Drains
   c. B746 - Standard Specification for Corrugated Aluminum Alloy Structural Plate for Field-Bolted Pipe, Pipe-Arches, and Arches
   d. B788 - Standard Practice for Installing Factory-Made Corrugated Aluminum Culverts and Storm Sewer Pipe
   e. B789 - Standard Practice for Installing Corrugated Aluminum Structural Plate Pipe for Culverts and Sewers
   f. B790 - Standard Practice for Structural Design of Corrugated Aluminum Pipe, Pipe-Arches, and Arches for Culverts, Storm Sewers, and Other Buried Conduits
   g. B864 - Standard Specification for Corrugated Aluminum Box Culverts
2. Florida Department of Transportation (FDOT):
   a. Standard Specifications for Road and Bridge Construction, Latest Edition
   b. 945 - Aluminum Pipe, Including Underdrain, Pipe Arch and Structural Plate and Pipe Arch
   c. 430 - Pipe Culverts and Storm Sewers
3. American Association of State and Highway Transportation Officials (AASHTO):
   a. M 196 - Standard Specification for Corrugated Aluminum Pipe for Sewer and Drain

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. The CONTRACTOR shall submit MANUFACTURER'S shop drawings and data for the culvert and riser.

C. The CONTRACTOR shall submit MANUFACTURER'S certification that corrugated aluminum-alloy pipe and riser meet the requirements of this specification and the Drawing.

D. The CONTRACTOR shall submit a culvert installation plan. The plan shall include at a minimum the following:

1. Details on the methods used to restrain the pipe to prevent floatation and movement during the installation of the backfill material, excavatable flowable fill.

2. Details on the placement of the flowable fill to include the number and thickness of individual lifts.

3. Calculations demonstrating that the culvert pipe restraint system is adequate to counteract the effects of floatation during the placement of the individual lifts of flowable fill.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide the DISTRICT at least 48 hours advance notice of its intention to begin new WORK activities.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 – General Terms and Conditions.

PART 2 - PRODUCTS

2.01 CORRUGATED ALUMINUM-ALLOY PIPE AND RISERS: The CONTRACTOR shall furnish corrugated aluminum-alloy pipe and risers as shown on the Drawings conforming to the requirements of ASTM B745 and FDOT Specification Section 945. Corrugated aluminum-alloy pipe and risers shall have a full circular cross-section, with a single thickness of corrugated sheet, fabricated with helical corrugations. The pipe and risers shall be of aluminum-alloy sheet metal of the gauge specified in FDOT Specification Section 945. All pipe, coupling bands, and risers shall have a bituminous coating where in contact with concrete or flowable fill per FDOT/AASHTO Specifications. The nominal diameter of the pipe shall be as stated on the Drawings and shall not vary more than one percent or one-half inch, whichever is greater, when measured on the inside crest of the corrugations. Aluminum Pipe end sections and toe plate extensions shall conform to ASTM B745 and B789.

2.02 The CONTRACTOR shall furnish lumber used for flashboards that is kiln-dried to the maximum specified moisture content, grade marked, surfaced on four sides, pressure preservative treated, Southern Pine excluding the species specified, with a minimum allowable bending stress value (Fb) of 1,250 psi. Flashboards shall be as indicated on the Drawings. Flashboards shall be preservative treated. Provide each board with 316 stainless steel lifting lugs at each end for easy handling.

2.03 JOINTS: The CONTRACTOR shall continuously weld the first section of the pipe to the riser.

2.04 COUPLING BANDS AND GASKETS:

A. The CONTRACTOR shall provide pipe with coupling bands for joining pipe sections that meet the applicable requirements of FDOT Specification 430 and the following.

1. Each end of a pipe section that will be coupled to an adjacent pipe section shall have a 2' section of pipe with annular corrugations welded to the pipe end. The annular corrugations shall match the annular corrugations of the coupling band. Re-rolling of the end of the pipe to form the annular corrugations is not permitted.

2. Coupling bands shall be two-piece lap-type couplings with annular corrugations that match the corrugations of the pipe ends.

3. The coupling bands shall be 2 feet in width minimum and constructed to lap an equal portion of each culvert section being joined.

4. All banded connections shall be wrapped with two (2) layers of filter fabric to extend a minimum of 2 feet past the ends of the coupling band.

B. The CONTRACTOR shall furnish gaskets of either neoprene continuous bands or O-ring type gaskets as specified in ASTM B745/B745M and FDOT Section 430.

2.05 BEDDING MATERIAL: The CONTRACTOR shall furnish coarse sand or other granular bedding material approved by the DISTRICT.

2.06 PIPE BACKFILL: The CONTRACTOR shall furnish pipe backfill as shown on the Drawings or as specified herein.

PART 3 - EXECUTION

3.01 EXCAVATION:

A. General: The CONTRACTOR shall perform all excavation of every description and of whatever substances encountered to the depths indicated on the Drawings, or as necessary. Excavation shall be unclassified regardless of material encountered.

This shall include all necessary clearing and grubbing of any foreign substances encountered within the structure or trench area. No separate payment for excavation as such will be made. The cost thereof shall be included in the prices for the pipe installation.

The CONTRACTOR shall stockpile excavated material suitable for backfill in an orderly manner at a sufficient distance from the trench to avoid overloading and to prevent slides or cave-ins. The CONTRACTOR shall perform excavation in accordance with the following:

1. Excavation in rock shall be made by a method accepted by the DISTRICT.

2. All muck below pipes and structures shall be completely removed to the width of the trenches at the pipe center line and to the depths where sand or other acceptable material is encountered. After removal of all muck, the trench shall be filled to the invert of the pipe with select fill placed and tamped in not greater than 8 inch layers. Each layer shall be compacted to not less than 95 percent of the maximum density as determined by ASTM D698.

3. The CONTRACTOR shall dispose of the excavated materials not required or suitable for backfill, and shall perform such grading as may be necessary to prevent surface water from flowing into the trenches. Hauling or disposal of the material will be the responsibility of the CONTRACTOR. Sheeting and shoring shall be installed as may be necessary for the protection of the work, for the preservation of adjoining property and structures, and for the safety of the employees. Unless otherwise indicated, excavation shall be by open cut.

4. The CONTRACTOR shall provide adequate equipment for the removal of storm or subsurface waters that may accumulate in the excavated areas. If subsurface water is encountered, the CONTRACTOR shall utilize approved means to adequately dewater the excavation so that it will be dry for working and pipe laying. A wellpoint system or other approved dewatering method shall be utilized, if necessary, to maintain the excavation in a dry condition for

preparation of the trench bottom and for pipe laying. All existing improvements such as pavements, conduits, poles, pipes and other structures shall be carefully supported and fully protected from damage and, in case of damage; they shall be restored by the CONTRACTOR without compensation. Existing utilities and other underground obstructions are shown on the plans, but the accuracy of the locations and depths is not guaranteed. The CONTRACTOR shall be responsible for all utilities prior to the commencement of excavation. The CONTRACTOR shall be responsible for damages to these existing utilities and shall, in case they are damaged, restore them to their original condition.

B. Trench Excavation: The CONTRACTOR shall excavate trenches to such a width as is necessary for proper laying of the pipe with banks as nearly vertical as practicable, but at all times maintaining a safe trench condition for workers and the WORK. The bottom of trenches shall be accurately graded by the CONTRACTOR to provide uniform bearing on undisturbed soil for the entire length of each section of pipe. The trench may be as wide as necessary for sheeting and bracing and the proper performance of the work. Unauthorized over-excavation of the trench shall be backfilled by the CONTRACTOR at its sole cost with selected gravel and compact to obtain suitable bedding all as directed and to the satisfaction of the DISTRICT. Whenever the presence of incipient slides is noted during excavation, the trench walls shall be restrained with adequate sheeting, shoring and bracing. Either steel or wood sheeting shall protect trench excavation in the proximity of certain existing sanitary sewers and other utility lines. Should used sheet pile be used, it will be the CONTRACTOR'S responsibility to guarantee the integrity of the used sheet piles. A professional engineer retained by the CONTRACTOR shall certify the sheet pile used.

C. Removal of Rock: Where rock is encountered, the CONTRACTOR shall remove the rock and replace it with suitable selected materials as directed and to the satisfaction of the DISTRICT. Select materials shall be placed in such manner as to provide a compacted earth cushion having a thickness under the pipe of not less than 8 inches or one-half inch per foot height of fill over the top of the pipe, whichever is greater.

D. Removal of Unsuitable Material: The CONTRACTOR shall provide all pipe and appurtenances with a stable foundation. Any material encountered at the elevation shown on the Drawings or specified for pipe that will not or cannot be improved to provide a stable foundation for the pipe, shall be considered unsuitable and removed and replaced by the CONTRACTOR. All unsuitable material below the grade line of the pipe shall be removed for the full width of the trench and replaced with suitable select material compacted as specified elsewhere in these specifications. For the purpose of this specification, muck, peat, other highly organic soils, and any other materials with high plasticity shall be considered to be unsuitable materials. Unless otherwise specifically approved by the DISTRICT, any soil which is or might become wet to such a degree that its moisture content is equal to or greater than 90% of its liquid limit will be considered unsuitable and shall removed and replaced with suitable material.

E. Bedding: The CONTRACTOR shall provide (native or imported) bedding material for the pipe that shall provide a firm foundation of uniform density throughout the entire length of the pipe.

3.02 INSTALLATION OF PIPE:

A. General: The CONTRACTOR shall install piping and appurtenances for storm sewers that are of the type and material specified in these specifications or on the Drawings. All pipe and other appurtenances and materials shall be new material to be included in the work and, if not specifically described herein, shall be of the best quality and entirely suitable for the service intended. The CONTRACTOR shall submit shop drawings and MANUFACTURERS' specifications for all such materials for the DISTRICT's approval, prior to installation.

B. Handling and Storage: The CONTRACTOR shall protect the pipe during shipping, storage, handling, and installation against impact shocks, free fall or other damage. Any damaged pipe shall be removed from the job Site immediately.

C. Pipe Laying: The CONTRACTOR shall execute pipe laying that meets the requirements of FDOT Specification 430 and as required and specified herein:

1. The trench shall be prepared as specified herein and each pipe section shall be laid in strict conformance to the line and grade shown on the Drawings.

2. As pipe laying progresses, the interior of the pipe shall be cleaned of all dirt and superfluous materials. The CONTRACTOR shall at all times take whatever measures are necessary to prevent the entrance of dirt and other foreign matter into the drainage system. In the event that it is necessary to clean the pipe before final acceptance, the CONTRACTOR shall do so without additional compensation.

D. Open Trench: The CONTRACTOR shall leave no more than 200 linear feet, or the length of the trench between consecutive drainage structures, open behind pipe laying, whichever distance is greater. In no instance shall any trench be left open for more than 24 hours before backfilling in accordance with these specifications.

3.03 BACKFILLING:

A. Under Pipe: The CONTRACTOR shall backfill trenches from the bottom of the trench to the centerline of the pipe with select fill. The CONTRACTOR shall take care to prevent pipe rotation or movement during the placement of the backfill material.

B. Over Pipe: From the centerline of the pipe, fittings and appurtenances, to an elevation one foot above the top of the pipe, the CONTRACTOR shall backfill the trench by hand or by approved mechanical methods. The backfill material shall be select fill as specified in SECTION 02200, and shall be compacted to the specified requirements.

3.04 WATER CONTROL: Unless specifically authorized by the DISTRICT, the CONTRACTOR shall lay all pipes in the dry, and the CONTRACTOR shall do such pumping as is required for proper execution of the work and to dispose of the water without damage or undue inconvenience of the work, the surrounding area or the public. The CONTRACTOR shall not dam, divert or cause water to flow in excess in existing gutters, pavements or other structures, and to this end may be required to conduct the water to a suitable place of discharge. Wellpoint system or other approved equipment shall be used to maintain excavations in a dry condition for pipe laying.

END OF SECTION

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SECTION 02782 FLOATING TRASH BARRIER - TUFFBOOM

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish equipment, labor and materials for the installation of floating trash barriers as required for the WORK.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 05120 - Steel

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society for Testing and Materials (ASTM):
   a. A123 - Standard Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products
   b. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
   c. A572 - Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel
   d. A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot-Dip Process
   e. C272 - Standard Test Method for Water Absorption of Core Materials for Sandwich Constructions
   f. C578 - Standard Specification for Rigid, Cellular Polystyrene Thermal Insulation
   g. D1505 - Standard Test Method for Density of Plastics by the Density-Gradient Technique
   h. F3125 - Standard Specification for High Strength Structural Bolts, Steel and Alloy Steel, Heat Treated, 120 ksi (830 MPa) and 150 ksi (1040 MPa) Minimum Tensile Strength
2. American Welding Society (AWS):
   a. D1.1/D1.1M - Structural Welding Code-Steel

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Submittals shall be in accordance with SECTION 01300. The CONTRACTOR's submittals shall include:

A. MANUFACTURER's Shop Drawing showing the general arrangement, full dimensions, assembly of materials and connections, and specifications of the booms and accessory products.

1. Catalog cut sheets on all wire cable and attachment hardware.

B. MANUFACTURER shall provide a testing certificate attesting to the load capacity of the connection shackles.

1.05 QUALIFICATIONS: Manufacture shall be by a company in the business of designing and manufacturing the specified type or similar structure for at least five (5) years.

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING: (Not Applicable)

1.08 INSPECTION COORDINATION: (Not Applicable)

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 GENERAL: The CONTRACTOR shall furnish "Tuffboom" floating barrier system as manufactured by Worthington Products, or DISTRICT approved equal, and shall include the following MANUFACTURER's accessory items:

A. Provide deflector panels to close the gaps between booms.

B. Provide hanging debris skirts.

C. The individual barrier sections shall be factory assembled.

D. The number of floating barriers provided for each barrier system shall consist of the number required to span the barrier length shown on the Drawings (which includes slack length for deflection) in accordance with the MANUFACTURER's standard length for connected barriers. In no case shall less than four (4) barriers be provided per barrier system. The length shall include 4 foot minimum of cable on each end.

2.02 DESIGN REQUIREMENTS: The CONTRACTOR shall furnish floating barriers capable of complying with the following performance conditions.

A. Waves: The floating barrier system shall be designed to withstand storm conditions of up to one-foot waves on a periodic, but not continual, basis.

B. Currents: Design for currents up to 4 feet per second, maximum.

C. Debris Loads: Design for 50 feet wide (across canal) x 2 feet deep

D. Water Elevations: Design for an elevation change of +/- 3 feet

2.03 MATERIAL DATA: The CONTRACTOR shall furnish floating barriers complying with the following material requirements.

A. Floating Logs/Devices:

1. Floatation logs shall have a nominal diameter of 16 inches and consist of an external encasement, internal foam fill and internal galvanized structural steel channel. Each floatation log shall maintain its original buoyancy even if structurally damaged or punctured or supplied with hanging debris skirt attachments.

2. The external encasement shall be manufactured of polyethylene and have a minimum density of 0.935 g/cm^3, per ASTM D1505, be UV stabilized and have a nominal wall thickness of 0.170 inch.

3. The standard encasement color shall be international safety orange.

4. The internal foam shall be polystyrene meeting the requirements of ASTM C578 and shall have a minimum in-place density of 0.9 pounds per cubic foot and a maximum in-place density of 1.2 pounds per cubic foot.

5. The internal structural steel channel shall meet ASTM A572 grade 50 structural steel, with a four (4) inch width and shall not weigh less than 5.4 pounds per foot.

6. All internal structural steel channels shall be hot dipped galvanized.

7. Provide four (4), 3 inch wide by 12 inch long, horizontal piece of silver/white reflective tape to be located on the top and upstream face at each end of each boom.

B. Inter-boom Connection Hardware:

1. Connecting hardware between floatation units shall consist of bottom steel connector plates with screen lug for optional screen attachment, load-rated galvanized safety shackles and load-rated galvanized weldless links.

2. All load bearing connections between floatation logs shall be designed such that the load is distributed through the channel.

3. Bottom steel connector plates shall be fabricated from 5/8-inch thick x 3 inch wide steel plate, ASTM A572, grade 50 and shall be hot dipped galvanized.

4. Connection shackles shall have a minimum pin diameter of 3/4-inch, have a working load limit (WLL) of not less than 4 - 3/4 tonnes (5.23 tons) Green Pin safety type stamped on the body of each shackle, and shall be hot dipped galvanized. The minimum average tensile breaking strength of each shackle shall be 60,000 lbs. Shackle pins shall use a galvanized lock washer, heavy duty castle nut, and secured with a type 304 stainless steel thick-walled cotter pin.

5. Weldless links shall be 3/4-inch, hot dipped galvanized, and have a WLL of not less than 7 tons. The minimum average tensile breaking strength of each link shall be 70,000 lbs.

6. Connection opening between barrier sections shall not exceed 15 inches.

7. Bolts shall be galvanized structural steel and shall meet ASTM F3125.

C. Deflector Panels: Panels shall be 18 oz urethane expandable material, safety orange in color, complete with two (2) aluminum guide rails, attaching hardware and four (4) type 304 stainless steel cotter pins by Worthington Products or DISTRICT approved equal at each boom interconnection point.

D. Cable and Cable Clamps for Boom to Pile Connection:

1. Provide all cable, thimbles, connection clamps and accessories necessary for attaching the floating barrier system to the pile anchor system in type 304 stainless steel.

2. All cable shall be 3/4-inch diameter wire cable with a minimum breaking strength of 49,600 lbs.

3. All cable, thimbles, clamps and accessory items for attachment purposes shall be type 304 stainless steel.

E. Float Collar Can Buoy:

1. When shown on the Drawings, provide: a float collar can buoy per Worthington Products, part number FWFCCB-1428W, or DISTRICT approved equal, at the locations shown on the Drawings.

2. Provide hazard warning symbol and standard message “Hazard Area”, on each buoy.

3. Connect to floating barrier system using 3/8-inch diameter x 6 feet long sling with swaged eyes, both ends and connecting hardware.

2.04 SHOP PROTECTIVE COATING: (Not Applicable)

PART 3 - EXECUTION

3.01 INSTALLATION: The CONTRACTOR shall install floating barriers as required for the WORK and in accordance with the following.

A. Field measure distances between anchor points to assure proper fit-up.

B. Install barrier according to MANUFACTURER's standard assembly drawings.

3.02 ADJUST AND CLEAN: The CONTRACTOR shall adjust and clean the floating barriers as required to ensure their proper function and in accordance with the following.

A. Ensure that connections have been properly installed to accommodate water level fluctuations.

B. Make adjustments as required and as permitted by the MANUFACTURER.

C. Clean abraded areas of shop coating, and touch-up damaged areas with same type coating as used for shop coating.

END OF SECTION

SECTION 02920 SODDING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall provide all labor, equipment and materials necessary to establish a stand of grass within the specified areas by furnishing and placing sod, and rolling, fertilizing, watering and maintaining the sodded areas to ensure a healthy stand of grass.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 01600 - Equipment and Materials

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this section and those of the listed document, the requirements of this SECTION shall prevail.

1. Florida Department of Transportation (FDOT):

a. Standard Specifications for Road and Bridge, Latest Edition

1.03 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Sod certification for grass species and location of sod source.

1.04 QUALITY ASSURANCE:

A. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years experience, and certified by the State of Florida.

B. Installer: Company approved by the sod producer.

C. Sod: Minimum age of 18 months, with root development that will support its own weight, without tearing, when suspended vertically by holding the upper two (2) corners.

D. The DISTRICT reserves the right to test, reject or approve all materials before application.

1.05 REGULATORY REQUIREMENTS: Comply with regulatory agencies for fertilizer.

1.06 DELIVERY, STORAGE, AND HANDLING:

A. Deliver products to Site in accordance with the provisions of SECTION 01600.

B. Store and protect products in accordance with the provisions of SECTION 01600.

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

D. Do not deliver more sod than can be laid within 48 hours.

E. Deliver fertilizer in water proof bags showing weight, chemical analysis, and name of MANUFACTURER.

F. The CONTRACTOR shall furnish the DISTRICT with the MANUFACTURER's application/installation instruction for all materials received in order that the minimum application rate of materials may be determined.

1.07 MAINTENANCE SERVICE: Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

1.08 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions

PART 2 - PRODUCTS

2.01 MATERIALS:

A. Sod:

1. The sod shall be Argentine Bahia to closely match existing as directed, with well matted roots.
2. The sod shall be commercial size rectangular measuring 12 inches by 24 inches or larger.
3. The sod shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of 2 inches.
4. The sod shall be live, fresh and uninjured at the time of planting.
5. The sod shall have a soil matt of sufficient thickness adhering firmly to the roots to withstand all necessary handling and be reasonably free of weeds and other grasses.
6. The sod shall be planted as soon as possible after being harvested, and shall be shaded and kept moist from the time of harvesting until it is planted.
7. The source of the sod may be inspected for approval by the DISTRICT prior to construction.

B. Topsoil: Excavated from Site and free of weeds.

C. Fertilizer: Commercial fertilizer shall be Ammonium Sulfate (21-0-0-24S) containing 21 percent nitrogen and 24 percent sulfur. Fertilizer containing phosphorus is not acceptable.

D. Water: Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

PART 3 - EXECUTION

3.01 SOIL PREPARATION:

A. Any growth, rocks, or other obstructions which might interfere with maintenance operations shall be removed and disposed of properly. Remove stones over 2 inches in any dimension and sticks, roots, rubbish and other extraneous matter.

B. Areas to be sodded are to be graded to a smooth, even surface with loose, uniformly fine texture. Roll and rake, remove ridges and fill depressions, to meet finish grades. Limit fine grading to areas which can be planted within immediate future.

C. Moisten prepared areas before planting if soil is dry. Water thoroughly and allow surface to dry before planting.

D. If prepared areas are eroded or otherwise disturbed after fine grading and prior to planting they shall be restored to specified condition prior to planting.

E. Immediately upon completion of construction, sod shall be planted in all disturbed areas and as designated in the Drawings.

3.02 FERTILIZING:

A. Apply fertilizer in accordance with MANUFACTURER's instructions.

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

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

D. Mix thoroughly into upper 2 inches of topsoil.

E. Lightly water to aid the dissipation of fertilizer.

3.03 LAYING SOD:

A. Moisten prepared surface immediately prior to laying sod.

B. Lay sod tight with no open joints visible. Do not overlap. Stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

C. Do not use sod which has been cut for more than 48 hours

D. Peg sod at locations where sod may slide, as directed by the DISTRICT.

E. Roll sod using a lightweight turf roller to provide and true and even surface.

3.04 MAINTENANCE:

A. Water all newly grassed areas at least once a week, at a rate equivalent to 1/2-inch to 3/4-inch per week, to prevent grass and soil from drying out.

B. Immediately replace sod in areas which show deterioration or bare spots.

C. The CONTRACTOR shall include in pricing, water and equipment to insure adequate survival of the sod and such maintenance as filling, leveling and repairing of any washed or eroded areas as may be necessary, for 60 days after Substantial Completion.

END OF SECTION

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SECTION 03050 CONCRETE ADMIXTURE WATERPROOFING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The WORK of this SECTION specifies crystalline waterproofing admixture for use with new concrete, cast-in-place concrete and/or self-consolidating concrete (SCC) required by the Contract Documents.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 02367 – Foundation Piling (Prestressed Concrete)
3. SECTION 03300 - Cast-In-Place Concrete
4. SECTION 03600 - Grout

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Concrete Institute (ACI)
    a. 117 - Specifications for Tolerance for Concrete Construction and Materials and Commentary
    b. 212.3R - Report on Chemical Admixtures for Concrete
2. American Society for Testing and Materials (ASTM):
    a. C1202 - Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration
    b. C494 / C494M - Standard Specification for Chemical Admixtures for Concrete
    c. D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter
3. US Army Corps of Engineers (USACE)
    a. CRD-C48-92 Standard Test Method for Water Permeability of Concrete
4. National Sanitation Foundation International/American National Standards Institute (NSF/ANSI)
    a. 61 Drinking Water System Components - Health Effects
5. Florida Building Code and Local Building Codes as applicable.
6. Florida Department of Transportation (FDOT)
    a. Standard Specifications for Road and Bridge Construction, latest edition

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS:

A. General: Submittals shall be in accordance with SECTION 01300, of the Technical Specifications and the General Terms and Conditions of the Contract.

B. Product Data: Submit product data, including MANUFACTURER's product sheet, for specified products.

1. Material safety data sheets (MSDS)

C. Quality Assurance:

1. Test Reports: Certified test reports showing compliance with specified performance characteristics and physical properties. Indicate volatile organic compounds (VOCs) during application.

2. Certificates: Product certificates signed by MANUFACTURER certifying materials comply with specified performance characteristics and criteria and with physical requirements.

3. MANUFACTURER's Instructions: MANUFACTURER's written installation instructions.

4. The CONTRACTOR shall provide permeability test results using both the USACE CRD-C48-73 Method and ASTM C1202 Method, for each compressive strength test samples. The concrete shall have a permeability that meets Article 2.02 B.1 of this SECTION.

D. MANUFACTURER's Field Reports: MANUFACTURER's field reports specified.

E. Quality Assurance:

1. Qualifications:

a. Installer: Experienced in performing WORK of this SECTION who has specialized in installation of work similar to that required for this Project.

b. MANUFACTURER: Capable of providing field service representation during construction and approving application method.

2. Regulatory Requirements: Provide admixture that complies with requirements as follows:

a. NSF/ANSI 61, Drinking Water System Components - Health Effects

b. USACE CRD-C48-73 Standard Test Method for Water Permeability of Concrete

c. D5084 - Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter

3. Preinstallation Meetings: Conduct preinstallation meeting to verify Project requirements, MANUFACTURER's installation instructions and MANUFACTURER's warranty requirements.

F. Mix Designs: Prior to beginning the WORK and within fourteen (14) days of the Notice to Proceed, the CONTRACTOR shall submit preliminary concrete mix designs which shall show the proportions and gradations of all materials, including crystalline waterproofing admixture, proposed for each class and type of concrete. Mix designs shall be checked by an independent testing laboratory acceptable to the DISTRICT. All costs related to such checking shall be CONTRACTOR's responsibility.

1.05 RESPONSIBILITIES: (Not Applicable)

1.06 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - MATERIALS

2.01 GENERAL: All materials shall be classified as acceptable for potable water use according to NSF Standard 61.

2.02 CRYSTALLINE WATERPROOFING:

A. MANUFACTURERS:

1. ICS Penetron International Ltd.

2. Xypex Chemical Corporation

3. Kryton International Inc.

B. The concrete with the crystalline waterproofing admixture shall have following properties:

1. Permeability: 1.2mm (3/64 inch) after 120 hours (5 days), USACE CRD C48 or ASTM D5084.

2. Compressive Strength of Concrete: in accordance with SECTIONS 02367 and 03300.

C. A single MANUFACTURER for the crystalline waterproofing materials shall be used throughout the WORK, and prior to its use, the brand shall be accepted by the DISTRICT.

PART 3 - EXECUTION

3.01 PERFORMANCE REQURIEMENTS:

A. Provide concrete concentrate admixture that has been manufactured and added to concrete mix at time of concrete batching to maintain performance criteria stated by MANUFACTURER without defects, damage or failure.

B. Coordinate and schedule addition of concrete admixture with concrete batching.

3.02 MANUFACTURER'S INSTRUCTIONS:

A. Compliance: Comply with MANUFACTURER's written data, including product technical bulletins, product catalog installation instructions, product installation instructions and specifications.

1. All concrete WORK shall be in accordance with SECTIONS 02367 and 03300.

3.03 APLICATION PROCEDURES:

A. Add crystalline waterproofing admixture to concrete at time of batching at the dosage rate of 2% by weight of cement content. The procedure sequence for addition varies according to type of batch, plant operation and equipment.

1. Ready-Mix Plant, Dry Batch Operation: Add crystalline waterproofing admixture in powder form to drum of ready-mix truck. Add 70% of required water along with 400 pounds (lbs) of aggregate. Mix materials for three (3) minutes minimum to ensure crystalline waterproofing admixture is distributed evenly throughout mix water. Add balance of materials in accordance with standard batch practices.

2. Ready-Mix Plant, Central Mix Operation: Mix crystalline waterproofing admixture with water to form thin slurry in ratio fifteen (15) lb powder to three (3) gallons of water. Pour required amount of material into drum of ready-mix truck. Pour concrete into truck and mix for five (5) minutes minimum to ensure even distribution of crystalline waterproofing admixture throughout concrete.

a. Ensure aggregate, cement and water are batched and mixed in plant in accordance with standard practices and taking into account quantity of water that has already been placed in ready-mix truck.

3. Precast Batch Plant, Pan-Type Mixer: Add crystalline waterproofing admixture to aggregate and mix thoroughly for three (3) minutes minimum prior to adding cement and water.

a. Ensure total concrete mass is blended using standard practices.

b. Obtain homogeneous mixture of crystalline waterproofing admixture with concrete.

c. Do not add dry crystalline waterproofing admixture directly to wet concrete.

4. CURING: Curing shall be in accordance with SECTIONS 02367 and 03300.

3.04

3.05 FIELD QUALITY CONTROL:

A. The MANUFACTURER of the crystalline waterproofing admixture supplied under this SECTION shall be involved in handling, installation, application and protection of product, and submit written report in acceptable format to verify compliance of WORK.

B. MANUFACTURER's Field Services: Have MANUFACTURER's technical representative schedule Site visits to review WORK during delivery and pouring of concrete.

END OF SECTION

SECTION 03100 CONCRETE FORMWORK AND ACCESSORIES

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall provide all labor, materials and equipment for the following:

1. Design and construction of all necessary formwork including the required bracing, supports, scaffolding, shoring, and other falsework to produce cast-in-place concrete in the finished structure within the required tolerances for line, grade dimension and detail.

2. Joints in concrete, complete and in place, in accordance with the Contract Documents. Joints in concrete structures shall be the types defined below and will be permitted only where indicated, unless specifically accepted by the DISTRICT.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals

2. SECTION 03300 - Cast-in-Place Concrete

1.02 APPLICABLE STANDARDS AND PUBLICATIONS: The following standard specifications shall apply to the WORK of this SECTION:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Concrete Institute (ACI)

a. 347 - Guide to Formwork for Concrete

b. 117 - Specification for Tolerances for Concrete Construction and Materials

2. American Society of Testing and Materials (ASTM)

a. A775 – Standard Specification for Epoxy Coated Reinforcing Steel Bars

b. C920 – Standard Specification for Elastomeric Joint Sealant

c. D412 - Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers - Tension

d. D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers

e. D638 - Standard Test Method for Tensile Properties of Plastics

f. D746 - Standard Test Method for Brittleness Temperature of Plastics and Elastomers by Impact

g. D747 - Standard Test Method for Apparent Bending Modulus of Plastics by Means of a Cantilever Beam

h. D1056 – Standard Specification for Flexible Cellular Materials - Sponge or Expanded Rubber

i. D1752 – Standard Specification for Preformed Sponge Rubber and Cork Expansion Joint Fillers for Concrete Paving and Structural Construction

j. D2000 - Standard Classification System for Rubber Products in Automotive Applications

k. D2240 - Standard Test Method for Rubber Property - Durometer Hardness

l. D2241 – Standard Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR Series)

3. US Product Standards (PS)

a. PS-1 - Construction and Industrial Plywood for Concrete Forms

b. PS-20 - American Softwood Lumber Standard

4. NSF International

a. 61 - Drinking Water System Components - Health Effects

5. United States Army Corps of Engineers (USACE)

a. CRD-C572 - PVC Waterstops

6. Federal Specifications

a. TT-S-0227 E(3) - Sealing Compound, Elastomeric Type, Multicomponent, for Caulking, Sealing, and Glazing Buildings and Other Structures

7. Occupational Safety and Health Association (OSHA)

a. CFR Title 29 Part 1926 - Safety and Health Regulations for Construction

1.03 DEFINITIONS:

A. Construction Joints:

1. When fresh concrete is placed against a hardened concrete surface, the joint between the two pours is called a construction joint. If indicated on the drawings, joints in water bearing members shall be provided with a waterstop and/or sealant groove of the shape indicated. The surface of the first pour may also be required to receive a coating of bond breaker as indicated.

B. Contraction Joints: Contraction joints are similar to construction joints except that the fresh concrete shall not bond to the hardened surface of the earlier pour, which shall be coated with a bond breaker. The slab reinforcement shall be stopped 4-1/2 inches from the joint, which is provided with a sleeve-type dowel, to allow shrinkage of the concrete of the later pour. Waterstop and/or sealant groove shall also be provided when indicated.

C. Expansion Joints:

1. To allow the concrete to expand freely, a space is provided between the two pours, and the joint shall be formed as indicated. The space is obtained by placing a filler joint material against the earlier pour, to act as a form for the later pour. Unless otherwise indicated, expansion joints in water bearing members shall be provided with a center-bulb type waterstop as indicated.

2. Premolded expansion joint material shall be installed with the edge at the indicated distance below or back from finished concrete surface, and shall have a slightly tapered, dressed, and oiled wood strip secured to or placed at the edge thereof during concrete placement, which shall later be removed to form space for sealing material.

3. The space so formed shall be filled with a joint sealant material as indicated herein. In order to keep the two walls or slab elements in line the joint shall also be provided with a sleeve-type dowel as indicated.

D. Control Joints: The function of the control joint is to provide a weaker plane in the concrete, where shrinkage cracks will probably occur. A groove, of the shape and dimensions indicated, is formed or saw-cut in the concrete. This groove is afterward filled with a joint sealant material.

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Falsework Calculations and Drawings: The CONTRACTOR shall submit calculations and drawings prepared and sealed by a Professional Civil Engineer registered in the State of Florida, which indicate the falsework complies with the requirements of OSHA Title 29, Part 1926.703. The submission of design details and calculations for falsework is for information only.

C. The plans of falsework proposed to be used shall be in sufficient detail to indicate the general layout, sizes of members, anticipated stresses, grade of materials to be used in the falsework, means of protecting existing construction which supports falsework, and typical soil conditions.

D. The CONTRACTOR shall submit placement drawings showing the location and type of all joints for each structure.

E. Prior to production of the waterstop materials required under this SECTION, qualification samples of waterstops shall be submitted which represent in all respects the material proposed. Such samples shall consist of extruded or molded sections of each size or shape to be used. The balance of the material to be used shall not be produced until after the DISTRICT has reviewed the qualification samples.

F. Prior to use of the waterstop material in the field, a sample of a prefabricated (shop made fitting) mitered cross and a tee constructed of each size or shape of material to be used shall be submitted. These samples shall be prefabricated (shop made fitting) so that the material and workmanship represent in all respects the fittings to be provided. Field samples of prefabricated (shop made fitting) fittings (crosses, tees, etc.) may also be selected at random by the DISTRICT for testing by a laboratory at the DISTRICT's expense. When tested, tensile strength across the joints shall be at least 1120 psi.

G. The CONTRACTOR shall submit MANUFACTURER’s information demonstrating compliance with requirements for the following:

1. Form ties and related accessories, including taper tie plugs, if taper ties are used
2. Form gaskets
3. Form release agent, including NSF certification if not using mineral oil
4. List of form materials and locations for use
5. Bearing Pads
6. Neoprene Sponge
7. Preformed Joint Filler
8. Backing Rod
9. Bond Breaker
10. Waterstops
11. Slip Dowels
12. PVC Tubing

1.05 RESPONSIBILITIES:

A. The CONTRACTOR is fully responsible for the design and construction of all forms and falsework to be in compliance with all applicable OSHA requirements, and the requirements of all agencies having jurisdiction on the project. The submission of design details and calculations for falsework is for information only.

B. The CONTRACTOR shall prepare adhesion and cohesion test specimens for construction joint sealant as required herein, at intervals of 5 working days while sealants are being installed.

C. The sealant material shall show no signs of adhesive or cohesive failure when tested in accordance with the following procedure in laboratory and field tests:

1. Sealant specimen shall be prepared between 2 concrete blocks (1-inch by 2-inch by 3-inch). Spacing between the blocks shall be 1-inch. Coated spacers (2-inch by 1-1/2-inch by 1/2-inch) shall be used to insure sealant cross-sections of 1/2-inch by 2 inches with a width of 1-inch.

2. Sealant shall be cast and cured according to MANUFACTURER's recommendations except that curing period shall be not less than 24 hours.

3. Following curing period, the gap between blocks shall be widened to 1-1/2-inch. Spacers shall be used to maintain this gap for 24 hours prior to inspection for failure.

1.06 CERTIFICATIONS:

A. Form materials, which may remain or leave residues on or in the concrete, shall be certified as compliant with NSF 61.

B. Joint materials shall be certified as compliant with NSF 61.

C. The CONTRACTOR shall submit certified test reports from the sealant MANUFACTURER on the actual batch of material being supplied indicating compliance with requirements herein before the sealant is used on the job.

D. The CONTRACTOR shall provide copies of the Waterstop Welding Certifications provided by MANUFACTURER or authorized agent of MANUFACTURER for every person who is to be involved with waterstop installation.

1.07 INSPECTIONS:

A. Falsework shall be inspected for conformance with the accepted submittal. No workers will be allowed to use falsework for access and no concrete placement to related forms will be permitted until the falsework is inspected by the CONTRACTOR for conformance with the submittals and appropriately tagged. No variations or alterations to falsework, as compared to the reference submittal, will be allowed without certification of the variation by the original Professional Engineer.

B. All waterstop field joints shall be subject to rigid inspection, and no such WORK shall be scheduled or started without having made prior arrangements with the DISTRICT for the required inspections. Not less than 24 hours advance notice shall be given for scheduling such inspections.

C. Field joints in waterstops shall be subject to rigid inspection for misalignment, bubbles, inadequate bond, porosity, cracks, offsets, and other defects, which would reduce the potential resistance of the material to water pressure at any point. Defective joints shall be replaced with material, which passes inspection; faulty material shall be removed from the site and properly disposed of.

D. The following waterstop defects represent a partial list of defects which shall be grounds for rejection:

1. Offsets at joints greater than 1/16-inch or 15 percent of material thickness, at any point, whichever is less

2. Exterior crack at joint, due to incomplete bond, which is deeper than 1/16-inch or 15 percent of material thickness, at any point, whichever is less

3. Any combination of offset or exterior crack which will result in a net reduction in the cross section of the waterstop in excess of 1/16-inch or 15 percent of material thickness at any point, whichever is less

4. Misalignment of joint which results in misalignment of the waterstop in excess of 1/2-inch in 10 feet

5. Porosity in the welded joint as evidenced by visual inspection

6. Bubbles or inadequate bonding which can be detected with a penknife test (If, while prodding the entire joint with the point of a penknife, the knife breaks through the outer portion of the weld into a bubble, the joint shall be considered defective.)

7. Visible signs of separation when the cooled splice is bent by hand at any sharp angle

8. Any evidence of burned material

1.08 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 FORM AND FALSEWORK MATERIALS:

A. Except as otherwise expressly accepted by the DISTRICT, lumber brought on the Site for use as forms, shoring, or bracing shall be new material. Forms shall be smooth surface forms and shall be of the following materials:

Walls	-	Steel, fiberglass, or plywood panel
Columns	-	Steel, plywood, PVC, fiberglass, or spiral wound fiber forms
Roof and floor	-	Plywood
All other work	-	Steel panels, fiberglass, or plywood

B. Materials for concrete forms, formwork, and falsework shall conform to the following requirements:

1. Plywood shall be new, waterproof, synthetic resin bonded, exterior type, manufactured especially for concrete formwork and shall conform to Plyform Class I, B-B EXT, of PS-1, and shall be edge sealed.

2. Lumber shall be Douglas Fir or Southern Yellow Pine, construction grade or better, in conformance with PS 20.

3. Form materials shall be metal, wood, plywood, or other material that will not adversely affect the concrete and will facilitate placement of concrete to the shape, form, line, and grade indicated. Metal forms shall accomplish such results. Wood forms for surfaces to be painted shall be Medium Density Overlaid plywood, MDO EXT Grade.

C. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4-inch chamfers or be tooled to 1/2-inch radius. Re-entrant corners in concrete members shall not have fillets unless otherwise indicated.

D. Forms and falsework to support the roof and floor slabs shall be designed in accordance with ACI 347.

2.02 FORM TIES:

A. Ties shall be standard crimped snap ties with one-inch (1") snapback. Ties shall be provided with a plastic cone or other suitable means for forming a conical hole to insure that the form tie may be broken off back of the face of the concrete. The maximum diameter of removable cones for rod ties, or of other removable form-tie fasteners having a circular cross-section, shall not exceed 1-1/2 inches; and all such fasteners shall be such as to leave holes of regular shape for reaming. Form ties for water-retaining structures shall have integral waterstops that tightly fit the form tie so that they cannot be moved from mid-point of the tie.

B. Removable taper ties may be used when approved by the DISTRICT. A preformed neoprene or polyurethane tapered plug sized to seat at the center of the wall shall be inserted in the hole left by the removal of the taper tie.

2.03 FORM RELEASING AGENT: Form release agent shall be non-staining and shall leave no residues on or in the concrete unless certified as compliant with NSF 61 and shall not adversely affect the adhesion of paint or other coatings.

2.04 WATERSTOPS:

A. PVC Waterstops:

1. PVC Waterstops shall be extruded from an elastomeric polyvinyl chloride compound containing the plasticizers, resins, stabilizers, and other materials necessary to meet the requirements of this SECTION. No reclaimed or scrap material shall be used. The CONTRACTOR shall obtain from the waterstop MANUFACTURER and shall furnish to the DISTRICT for review, current test reports and a written certification of the MANUFACTURER that the material to be shipped to the job meets the physical requirements as outlined in the USACE CRD-C572, and those listed herein.

2. Flatstrip and Center-Bulb Waterstops: The thickness of waterstops, including the center bulb, shall not be less than 3/8-inch. Waterstop shall be provided with factory installed hog rings at 12 inches on centers along the waterstop.

3. Multi-Rib Waterstops: Multi-rib waterstops where required shall have prefabricated (shop made fitting) joint fittings at all intersections of the ribbed-type waterstops.

4. Retrofit Waterstops: Retrofit waterstops and batten bars shall be manufactured as a complete system including waterstop, SS batten bar, SS anchor bolts, and epoxy gel.

5. Waterstop Testing Requirements: When tested in accordance with the test standards, the waterstop material shall meet or exceed the following requirements:

Property	Value	ASTM Standard
Physical Property, Sheet Material		
Tensile Strength-min (psi)	2000	D 638, Type IV
Ultimate Elongation-min (percent)	350	D 638, Type IV
Low Temp Brittleness-max (degrees F)	-35	D 746
Stiffness in Flexure-min (psi)	600	D 747
Accelerated Extraction (CRD-C572)		
Tensile Strength-min (psi)	1500	D 638, Type IV
Ultimate Elongation-min (percent)	300	D 638, Type IV
Effect of Alkalies (CRD-C572)		
Change in Weight (percent)	+ 0.25/- 0.10	------
Change in Durometer, Shore A	+/- 5	D 2240
Finish Waterstop		
Tensile Strength-min (psi)	1400	D 638, Type IV
Ultimate Elongation-min (percent)	280	D 638, Type IV

B. Pre-formed Hydrophilic Waterstops:

1. Hydrophilic (bentonite-free) waterstops shall be the type that expands in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast.

2. Waterstop shall be manufactured from chloroprene rubber and modified chloroprene rubber with hydrophilic properties. Waterstop shall have a delay coating to inhibit initial expansion

due to moisture present in fresh concrete. The minimum expansion ratio of modified chloroprene shall be not less than 2 to 1 volumetric change in distilled water at 70 degrees F (21 degrees C).

3. Hydrophilic Waterstop shall meet the following minimum requirements:

Property	Value	ASTM Standard
Physical Property, Chloroprene		
Tensile Strength-min (psi)	1275	D 412
Ultimate Elongation-min (percent)	350	D 412
Hardness, Shore A	55 +/- 5	D 2240
Physical Property, Modified Chloroprene		
Tensile Strength-min (psi)	300	D 412
Ultimate Elongation-min (percent)	600	D 412
Hardness, Shore A	55 +/- 5	D 2240

4. Bonding agent for hydrophilic waterstop shall be the MANUFACTURER's recommended adhesive for wet, rough concrete.

C. Other Types of Waterstops:

1. When types of waterstops not listed above are indicated, they shall be subjected to the same requirements as those listed herein.

2.05 JOINT SEALANT FOR WATER BEARING JOINTS:

A. Joint sealant shall be polyurethane polymer designed for bonding to concrete, which is continuously submerged in water. No material will be acceptable which has an unsatisfactory history as to bond or durability when used in the joints of water retaining structures.

B. Joint sealant material shall meet the following requirements (73 degrees F and 5percent R.H.):

Requirement	Value	ASTM Standard
Work Life (minutes)	45 - 180	-----
Time to Reach 20 Shore "A" Hardness (at 77 degrees F, 200 gr quantity) - max (hours)	24	-----
Ultimate Hardness	20 - 45 Shore "A"	D 2240
Tensile Strength - min (psi)	175	D 412
Ultimate Elongation - min (percent)	400	D 412
Tear Resistance - min (pounds per inch of thickness)	75	D 624 (Die C)
Color	Light Gray	-----

C. Polyurethane sealants for waterstop joints in concrete shall conform to the following requirements:

1. Sealant shall be 2-part polyurethane with the physical properties of the cured sealant conforming to or exceeding the requirements of ASTM C 920, or TT-S-0227 E(3) for 2-part material, as applicable.

2. For vertical joints and overhead horizontal joints, only "non-sag" compounds shall be used; all such compounds shall conform to the requirements of ASTM C 920 Class 25, Grade NS, or TT-S-0227 E(3), Type II, Class A.

3. For plane horizontal joints, the self-leveling compounds which meet the requirements of ASTM C 920 Class 25, Grade P, or TT-S-0227 E(3), Type I shall be used. For joints subject to either pedestrian or vehicular traffic, a compound providing non-tracking characteristics, and having a Shore "A" hardness range of 35 to 45, shall be used.

4. Primer materials, if recommended by the sealant MANUFACTURER, shall conform to the printed recommendations of the MANUFACTURER.

D. Sealants for non-waterstop joints in concrete shall conform to SECTION 07920.

2.06 JOINT MATERIALS:

A. Bearing Pad: Bearing pad shall be neoprene conforming to ASTM D 2000, BC 420, 40 durometer hardness unless otherwise indicated.

B. Neoprene Sponge: Sponge shall be neoprene, closed-cell, expanded, conforming to ASTM D 1056, Type 2C5-E1.

C. Joint Filler

1. Joint filler for expansion joints in waterholding structures shall be neoprene conforming to ASTM D1056, Type 2C5-E1.

2. Joint filler material in other locations shall be of the preformed non-extruding type joint filler constructed of cellular neoprene sponge rubber or polyurethane of firm texture. Bituminous fiber type will not be permitted. All non-extruding and resilient-type preformed expansion joint fillers shall conform to the requirements and tests set forth in ASTM D 1752, for Type I, except as otherwise indicated.

2.07 BACKING ROD: Backing rod shall be an extruded closed-cell, polyethylene foam rod. The material shall be compatible with the joint sealant material and shall have a tensile strength of not less than 40 psi and a compression deflection of approximately 25 percent at eight (8) psi. The rod shall be 1/8-inch larger in diameter than the joint width except that a one-inch diameter rod shall be used for a 3/4-inch wide joint.

2.08 BOND BREAKER:

A. Bond breaker shall contain a fugitive dye so that areas of application will be readily distinguishable.

B. Bonding agent for hydrophilic waterstop shall be the MANUFACTURER’s recommended adhesive for wet, rough concrete.

2.09 SLIP DOWELS: Slip dowels in joints shall be smooth epoxy-coated bars, conforming to ASTM A 775.

2.10 PVC TUBING: PVC tubing in joints shall be Schedule SDR 13.5, conforming to ASTM D 2241.

2.11 CHAMFER STRIP: Provide three quarter inch triangular fillets, milled clear straight grained wood, surfaced each side, or extruded vinyl type, with or without nail flange to form all exposed concrete edges such as columns, pilasters, beams, curbs, equipment pads, tops of walls, and as indicated. Unless otherwise indicated, exterior corners in concrete members shall be provided with 3/4” chamfers. Re-entrant corners in concrete members shall not have fillets, unless otherwise indicated.

PART 3 - EXECUTION

3.01 FORMS:

A. Forms shall conform to the shape, lines, and dimensions as shown on the Drawings and shall be substantial and sufficiently tight to prevent leakage. Forms shall be properly braced or tied so as to maintain position and shape. Plumb and string lines shall be installed before concrete placement and shall be maintained during placement. Such lines shall be used by CONTRACTOR's personnel and by the DISTRICT and shall be in sufficient number and properly installed. During concrete placement, the CONTRACTOR shall continually monitor plumb and string line form positions and immediately correct deficiencies.

B. The CONTRACTOR shall be fully responsible for the adequacy of the formwork in its entirety and any forms that are unsafe or inadequate in any respect shall promptly be removed from the WORK and

replaced. The CONTRACTOR shall provide worker protection from protruding reinforcement bars in accordance with applicable safety codes.

C. The CONTRACTOR may reuse forms only if in good condition and only if acceptable to the DISTRICT. Reused forms shall be thoroughly cleaned and may require light sanding between uses to obtain a uniform surface texture on all exposed concrete surfaces. Forms shall not be reused if they have developed defects that would affect the surface texture of exposed concrete. Exposed concrete surfaces are defined as surfaces, which are permanently exposed to view. In the case of forms for the inside wall surfaces of hydraulic/water retaining structures, unused tie rod holes in forms shall be covered with metal caps or shall be filled by other methods acceptable to the DISTRICT.

D. Forms shall be sufficiently tight to prevent leakage. Forms shall be properly braced or tied together to maintain their position and shape under a load of freshly-placed concrete. If adequate foundation for shores cannot be secured, trussed supports shall be provided.

E. Immediately before the placing of reinforcing, faces of all forms in contact with concrete shall receive a thorough coating of form release agent. Any excess agent shall be satisfactorily removed before placing concrete. If using mineral oil, the CONTRACTOR shall oil the forms at least two weeks in advance of their use. Care shall be exercised to keep oil/release agent off the surfaces of steel reinforcement and other items to be embedded in concrete.

F. The CONTRACTOR shall supply sufficient number of forms of each kind to permit the required rate of progress to be maintained.

G. The design and inspection of concrete forms, falsework, and shoring shall comply with applicable local, state, and Federal regulations.

3.02 WATERSTOPS:

A. Waterstops shall be embedded in the concrete across joints as indicated. Waterstops shall be fully continuous for the extent of the joint. Splices necessary to provide such continuity shall be accomplished in conformance to printed instructions of MANUFACTURER of the waterstops. The CONTRACTOR shall take suitable precautions and means to support and protect the waterstops during the progress of the WORK and shall repair or replace at its own expense any waterstops damaged during the progress of the WORK. Waterstops shall be stored so as to permit free circulation of air around the waterstop material.

B. When any waterstop is installed in the concrete on one side of a joint, while the other half or portion of the waterstop remains exposed to the atmosphere for more than 2 days, suitable precautions shall be taken to shade and protect the exposed waterstop from direct rays of the sun during the entire exposure and until the exposed portion of the waterstop is embedded in concrete.

3.03 SPLICES IN PVC WATERSTOPS:

A. Splices in PVC waterstops shall be performed by heat sealing the adjacent waterstop sections in accordance with the MANUFACTURER's printed recommendations. It is essential that:

1. The material not be damaged by heat sealing.

2. The splices have a tensile strength of not less than 80 percent of the unspliced material tensile strength.

3. The continuity of the waterstop ribs and of its tubular center axis be maintained. No edge welding is allowed.

B. Butt joints of the ends of 2 identical waterstop sections may be made while the material is in the forms.

C. All joints with waterstops involving more than 2 ends to be jointed together, and all joints which involve an angle cut, alignment change, or the joining of 2 dissimilar waterstop sections shall be

prefabricated (shop made fitting) prior to placement in the forms, allowing not less than 24-inch long strips of waterstop material beyond the joint. Upon being inspected and approved, such prefabricated (shop made fitting) waterstop joint assemblies shall be installed in the forms and the ends of the 24-inch strips shall be butt welded to the straight run portions of waterstop in place in the forms.

D. Where a centerbulb waterstop intersects and is jointed with a non-centerbulb waterstop, care shall be taken to seal the end of the centerbulb, using additional PVC material if needed.

3.04 FORM DESIGN:

A. Forms shall be true in every respect to the required shape and size, shall conform to the established alignment and grade, and shall be of sufficient strength and rigidity to maintain their position and shape under the loads and operations incident to placing and vibrating the concrete. Suitable and effective means shall be provided on all forms for holding adjacent edges and ends of panels and sections tightly together and in accurate alignment so as to prevent the formation of ridges, fins, offsets, or similar surface defects in the finished concrete.

B. Plywood, 5/8-inch and greater in thickness, may be fastened directly to studding if the studs are spaced close enough to prevent visible deflection marks in the concrete. The forms shall be tight so as to prevent the loss of water, cement, and fines during placing and vibrating of the concrete. Specifically, the bottom of wall forms that rest on concrete footings or slabs shall be provided with a gasket to prevent loss of fines and paste during placement and vibration of concrete. Such gasket may be a 1- to 1-1/2-inch diameter polyethylene rod held in position to the underside of the wall form.

C. The CONTRACTOR shall provide adequate clean-out holes at the bottom of each lift of forms. The size, number, and location of such clean-outs shall be as acceptable to the DISTRICT. Whenever concrete cannot be placed from the top of a wall form in a manner that meets the requirements of the Contract Documents, form windows shall be provided in the size and spacing needed to allow placement of concrete to the requirements of SECTION 03300. The size, number, and location of such form windows shall be as acceptable to the DISTRICT.

3.05 FORM CONSTRUCTION:

A. Vertical Surfaces: All vertical surfaces of concrete members shall be formed, except where placement of the concrete against the ground is indicated. Not less than 1-inch of concrete shall be added to the indicated thickness of a concrete member, where concrete is permitted to be placed against trimmed ground, in lieu of forms. Permission to do this on other concrete members will be granted only for members of comparatively limited height and where the character of the ground is such that it can be trimmed to the required lines and will stand securely without caving or sloughing until the concrete has been placed.

B. Construction Joints: Concrete construction joints will not be permitted at locations other than those indicated, except as may be acceptable to the DISTRICT. When a second lift is placed on hardened concrete, special precautions shall be taken in the way of the number, location, and tightening of ties at the top of the old lift and bottom of the new to prevent any unsatisfactory effect whatsoever on the concrete. Pipe stubs and anchor bolts shall be set in the forms where required.

C. Form Ties

1. Embedded Ties: Holes left by the removal of form tie cones shall be reamed with suitable toothed reamers so as to leave the surface of the holes clean and rough before being filled with mortar. Wire ties for holding forms will not be permitted. No form-tying device or part thereof, other than metal, shall be left embedded in the concrete. Ties shall not be removed in such manner as to leave a hole extending through the interior of the concrete members. The use of snap-ties, which cause spalling of the concrete upon form stripping or tie removal, will not be permitted. If steel panel forms are used, rubber grommets shall be provided where the ties pass through the form in order to prevent loss of cement paste. Where metal rods extending through

the concrete are used to support or to strengthen forms, the rods shall remain embedded and shall terminate not less than 1-inch back from the formed face or faces of the concrete.

2. Removable Ties: Where taper ties are approved for use, the larger end of the taper tie shall be on the wet side of walls in water retaining structures. After the taper tie is removed, the hole shall be thoroughly cleaned and roughened for bond. A precast neoprene or polyurethane tapered plug shall be located at the wall centerline. The hole shall be completely filled with non-shrink grout for water bearing and below-grade walls. The hole shall be completely filled with non-shrink or regular cement grout for above-grade walls, which are dry on both sides. Exposed faces of walls shall have the outer 2 inches of the exposed face filled with a cement grout, which shall match the color and texture of the surrounding wall surface.

3.06 JOINT CONSTRUCTION:

A. Setting Waterstops:

1. In order to eliminate faulty installation that may result in joint leakage, the CONTRACTOR shall be particularly careful to get the correct positioning of the waterstops during installation. Adequate provisions must be made to support and anchor the waterstops during the progress of the WORK and to insure the proper embedment in the concrete. The symmetrical halves of the waterstops shall be equally divided between the concrete pours at the joints. The center axis of the waterstops shall be coincident with the joint openings. Maximum density and imperviousness of the concrete shall be insured by thoroughly working it in the vicinity of all joints.

2. In placing PVC waterstops in the forms, the CONTRACTOR shall provide means to prevent the waterstop from being folded over by the concrete as it is placed. Waterstops shall be held in place with light wire ties on 12-inch centers which shall be passed through hog rings at the edge of the waterstop and tied to the curtain of reinforcing steel. Horizontal waterstops, with their flat face in a vertical plane, shall be held in place with continuous supports to which the top edge of the waterstop shall be tacked. In placing concrete around horizontal waterstops, with their flat face in a horizontal plane, the CONTRACTOR shall work concrete under the waterstops by hand so as to avoid the formation of air and rock pockets.

3. In placing centerbulb waterstops in expansion joints, the centerbulb shall be centered on the joint filler material.

4. Waterstop in vertical wall joints shall stop 6 inches from the top of the wall where such waterstop does not connect with any other waterstop and is not to be connected to a future concrete placement.

B. Joint Location:

1. Construction joints and other types of joints shall be provided where indicated. When not indicated, construction joints shall be provided at 25-foot maximum spacing for all concrete construction. Where joints are indicated spaced greater than 40 feet apart, additional joints shall be provided to maintain the 25-foot maximum spacing. The location of all joints, of any type, shall be submitted for acceptance by the DISTRICT.

C. Joint Preparation:

1. The CONTRACTOR shall take special care in preparing concrete surfaces at joints where bonding between 2 sections of concrete is required. Unless otherwise indicated, such bonding will be required at all horizontal joints in walls. Surfaces shall be prepared in accordance with the requirements of SECTION 03300. Except on horizontal wall construction joints, wall to slab joints, or where otherwise indicated, at all joints where waterstops are required, the joint face of the first pour shall be coated with a bond breaker as indicated herein.

D. Retrofit Joint Preparation:

1. Existing surfaces to receive a retrofit waterstop shall be clean and free from any loose or foreign material. Surface shall be given a light sandblast or hydroblast finish to 1/8-inch amplitude prior to application of epoxy and waterstop.

E. Construction Joint Sealant:

1. Construction joints in water-bearing floor slabs, and elsewhere as indicated, shall be provided with tapered grooves which shall be filled with a construction joint sealant. The material used for forming the tapered grooves shall be left in the grooves until just before the grooves are cleaned and filled with joint sealant. After removing the forms from the grooves, all laitance and fins shall be removed, and the grooves shall be sandblasted. The grooves shall be allowed to become thoroughly dry, after which they shall be blown out; immediately thereafter, they shall be primed, bond breaker tape placed in the bottom of the groove, and filled with the construction joint sealant. The primer shall be furnished by the sealant MANUFACTURER. No sealant will be permitted to be used without a primer. Care shall be used to completely fill the sealant grooves. Areas designated to receive a sealant fillet shall be thoroughly cleaned, as outlined for the tapered grooves, prior to application of the sealant.

2. The primer and sealant shall be placed strictly in accordance with the printed recommendations of the MANUFACTURER, taking special care to properly mix the sealant prior to application. The sides of the sealant groove shall not be coated with bond breaker, curing compound, or any other substance which would interfere with proper bonding of the sealant. Sealant shall achieve final cure at least 7 days before the structure is filled with water.

3. Sealant shall be installed by a competent waterproofing specialty contractor who has a successful record of performance in similar installations.

4. Thorough, uniform mixing of 2-part, catalyst-cured materials is essential; special care shall be taken to properly mix the sealer before its application. Before any sealer is placed, the CONTRACTOR shall arrange to have the crew doing the WORK carefully instructed on the proper method of mixing and application by a representative of the sealant MANUFACTURER.

5. Any joint sealant which fails to fully and properly cure after the MANUFACTURER's recommended curing time for the conditions of the WORK hereunder shall be completely removed; the groove shall be thoroughly sandblasted to remove all traces of the uncured or partially cured sealant and primer, and shall be re-sealed with the indicated joint sealant. Costs of such removal, joint treatment, re-sealing, and appurtenant WORK shall be the CONTRACTOR's responsibility.

F. Hydrophilic Waterstop

1. Where a hydrophilic waterstop is called for in the Contract Documents, it shall be installed with the MANUFACTURER's instructions and recommendations except as modified herein.

2. When requested by the DISTRICT, the CONTRACTOR shall arrange for the MANUFACTURER to furnish technical assistance in the field.

3. Hydrophilic waterstop shall only be used where complete confinement by concrete is provided. Hydrophilic waterstop shall not be used in expansion or contraction joints or in the first 6 inches of any non-intersecting joint.

4. The hydrophilic waterstop shall be located as near as possible to the center of the joint and it shall be continuous around the entire joint. The minimum distance from the edge of the waterstop to the face of the member shall be 5 inches.

5. Where the thickness of the concrete member to be placed on the hydrophilic waterstop is less than 12 inches, the waterstop shall be placed in grooves formed or ground into the concrete. The groove shall be at least 3/4 inch deep and 1-1/4 inches wide. When placed in the groove, the minimum distance from the edge of the waterstop to the face of the member shall be 2.5 inches.

6. Where a hydrophilic waterstop is used in combination with PVC waterstop, the hydrophilic waterstop shall overlap the PVC waterstop for a minimum of 6 inches and shall be adhered to PVC waterstop with single component water-swelling sealant as recommended by MANUFACTURER.

7. The hydrophilic waterstop shall not be installed where the air temperature falls outside the MANUFACTURER's recommended range.

8. The concrete surface under the hydrophilic waterstop shall be smooth and uniform. The concrete shall be ground smooth if needed. Alternately, the hydrophilic waterstop shall be bonded to the surface using an epoxy grout which completely fills all voids and irregularities beneath the waterstop material. Prior to installation, the concrete surface shall be wire brushed to remove any laitance or other materials that may interfere with the bonding of epoxy.

9. The hydrophilic waterstop shall be secured in place with concrete nails and washers at 12-inch maximum spacing. This shall be in addition to the adhesive recommended by the MANUFACTURER

G. Retrofit Waterstop:

1. Retrofit waterstops shall be set in a bed of epoxy over a sandblasted surface with stainless steel batten bars and 1/4-inch diameter stainless steel anchors at 6 inches on center, staggered, and in accordance with the MANUFACTURER's written recommendations.

3.07 REMOVAL OF FORMS:

A. Careful procedures for the removal of forms shall be strictly followed, and this WORK shall be done with care so as to avoid injury to the concrete or workers. In the case of roof slabs and above-ground floor slabs, forms shall remain in place until test cylinders for the roof concrete attain a minimum compressive strength of 75 percent of the 28-day strength (0.75f'c) in SECTION 03300. No forms shall be disturbed or removed under an individual panel or unit before the concrete in all the adjacent panels or units have attained 0.75f'c strength and have been in place for a minimum of 7 days. The time required to establish said strength shall be determined by the DISTRICT, who will make several test cylinders for this purpose from concrete used in the first group of roof panels placed. If the time so determined is more than the 7-day minimum, then that time shall be used as the minimum length of time. Forms for vertical walls of waterholding structures shall remain in place at least 36 hours after the concrete has been placed.

B. Forms for parts of the WORK not specifically mentioned herein shall remain in place for periods of time as recommended in ACI 347.

3.08 FALSEWORK:

A. The CONTRACTOR shall be responsible for the design, engineering, construction, maintenance, and safety of all falsework, including staging, walkways, forms, ladders, and similar appurtenances, which shall equal or exceed the applicable requirements of the provisions of the OSHA Safety and Health Standards for Construction, and the requirements herein.

B. The CONTRACTOR shall design and construct falsework to provide the necessary rigidity and to support the loads. Falsework for the support of a superstructure shall be designed to support the loads that would be imposed if the entire superstructure were placed at one time.

C. The CONTRACTOR shall place falsework upon a solid footing, safe against undermining, and protected from softening. When the falsework is supported on timber piles, the maximum calculated pile loading shall be as recommended by the CONTRACTOR's geotechnical engineer and shall not exceed 20 tons. When falsework is supported on any portion of the structure which is already constructed, the load imposed by the falsework shall be spread, distributed, and braced in such a way as to avoid any possibility of damage to the structure.

3.09 TOLERANCES:

A. The variation from plumb, level and required lines shall not exceed 1/4-inch in any ten feet (10') of length, non cumulative, and there shall be no offsets or visible waviness in the finished surface. All other tolerances shall be within the tolerances of ACI 117 - Standard Tolerances for Concrete Construction and Materials.

END OF SECTION

SECTION 03200 CONCRETE REINFORCEMENT

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all labor, materials and equipment to provide and properly place all concrete reinforcement steel, welded wire fabric, couplers, and concrete inserts for use in the reinforced concrete and masonry construction and all appurtenant work, including all the wires, clips, supports, chairs, spacers, and other accessories as shown on the Drawings and as specified herein.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals
2. SECTION 03100 - Concrete Formwork and Accessories
3. SECTION 03300 - Cast-In-Place Concrete
4. SECTION 03600 - Grout

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Concrete Institute (ACI):
   a. 318 - Building Code Requirements for Reinforced Concrete
   b. SP-66 - Detailing Manual
2. American Society of Testing and Materials (ASTM):
   a. A82 - Standard Specification for Steel Wire, Plain, for Concrete Reinforcement
   b. A185 - Standard Specification for Steel Welded Wire Reinforcement, Plain, for Concrete
   c. A555 - Standard Specification for General Requirements for Stainless Steel Wire and Wire Rods]
   d. A615 - Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
   e. A775 - Standard Specification for Epoxy-Coated Steel Reinforcing Bars
   f. A955/A955M - Standard Specification for Deformed and Plain Stainless Steel Bars for Concrete Reinforcement]
3. Concrete Reinforcing Steel Institute (CRSI):
   a. Recommended Practice for Placing Reinforcing Bars
4. Florida Building Code, Latest Edition

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: Submittals shall be in accordance with SECTION 01300. The CONTRACTOR shall submit the following:

A. Mill Certifications of Grade 60 reinforcing steel or stainless steel, as required

B. Complete bar schedule, bar details and erection drawings in conformance with ACI SP-66

C. Mill certificates shall be delivered with each shipment of reinforcing bars.

1.05 QUALIFICATIONS: (Not Applicable)

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 FACTORY TESTING: (Not Applicable)

1.08 CERTIFICATIONS:

A. International Code Council Evaluation Service (ICC-ES) Certifications for mechanical couplers, if allowed

B. Mill Certifications of Grade 60 reinforcing steel

1.09 INSPECTION COORDINATION: The CONTRACTOR shall provide sufficient notice and opportunity to the DISTRICT to review the placement of the reinforcing steel before the concrete is placed. The CONTRACTOR shall provide access to the WORK for the DISTRICT as requested for inspection. The CONTRACTOR shall provide 48 hours advance notice of its intention to begin new WORK activities.

1.10 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 REINFORCING BARS:

A. Metal reinforcement shall be deformed type bars conforming to ASTM A615, Specifications for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement, Grade 60, unless otherwise specified. Reinforcing steel shall be fabricated for the shapes and dimensions indicated on the Drawings and in compliance with ACI 318. All bars shall be bent cold.

B. Replace all reinforcement with bends and kinks not shown on fabrication Shop Drawings. Remove from job Site all such reinforcing and replace with new fabricated steel. Field bending of reinforcement at the work Site is prohibited.

C. Welded wire fabric reinforcement shall conform to the requirements of ASTM A185, and the details indicated. Do not use fabric that has been rolled. Install flat sheets only.

D. Spiral reinforcement shall be cold-drawn steel wire conforming to the requirements of ASTM A82.

E. Mechanical couplers shall be provided where indicated and where approved by the DISTRICT. The couplers shall develop a tensile strength that exceeds 125 percent of the yield strength of the reinforcement bars being spliced at each splice. Where the type of coupler used is composed of more than one component, all components required for a complete splice shall be provided. This shall apply to all mechanical splices, including those splices intended for future connections. Reinforcement steel and coupler used shall be compatible for obtaining the required strength of the connection. Straight threaded type couplers shall require the use of the next larger size reinforcing bar or shall be used with reinforcing bars with specially forged ends which provide upset threads which do not decrease the basic cross section of the bar.

F. Epoxy for grouting reinforcing bars shall be specifically formulated for such application, for the moisture condition, application temperature, and orientation of the hole to be filled. Epoxy grout shall meet the requirements in SECTION 03600.

2.02 ACCESSORIES: All chairs and bolsters shall conform to ACI SP-66 and the CRSI Manual of Standard Practices and shall have galvanized or plastic legs.

PART 3 - EXECUTION

3.01 PLACEMENT AND ANCHORAGE:

A. Bar supports shall be spaced in accordance with CRSI.

1. Reinforcement steel shall be supported by concrete, plastic or metal supports, spacers or metal hangers that are strong and rigid enough to prevent any displacement of the reinforcement steel. Where concrete is to be placed on the ground, supporting concrete blocks (or dobies) shall be used in sufficient numbers to support the bars without settlement, but in no case shall such support be continuous. Concrete blocks used to support reinforcement steel shall be tied to the steel with wire ties that are embedded in the blocks. For concrete over formwork, the CONTRACTOR shall provide concrete, metal, plastic, or other acceptable bar chairs and spacers.

2. Limitations on the use of bar support materials shall be as follows.

a. Concrete Dobies: permitted at all locations except where architectural finish is required.

b. Wire Bar Supports: permitted only at slabs over dry areas, interior non-hydraulic wall surfaces, and exterior wall surfaces.

c. Plastic Bar Supports: permitted at all locations except on grade.

B. Reinforcement shall be accurately placed in accordance with the Drawings and shall be adequately secured in position with not less than 16-gauge annealed wire. The placement tolerances shall be in accordance with ACI 318, paragraph 7.5, Placing Reinforcement and the CRSI Manual of Standard Practices.

C. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.

D. Bars additional to those indicated which may be found necessary or desirable by the CONTRACTOR for the purpose of securing reinforcement in position shall be provided by the CONTRACTOR at its own expense.

E. Additional reinforcement around openings:

1. Place an equivalent area of steel around pipe or opening and extend on each side and top and bottom sufficiently to develop bond in each bar.

2. Refer to details on Drawings for bar extension length on each side of opening.

3. Where welded wire fabrics are used, provide extra reinforcing using fabric or deformed bars.

F. Unless otherwise indicated, reinforcement placing tolerances shall be within the limits in Section 7.5 of ACI 318 except where in conflict with the requirements of the Building Code.

G. Bars may be moved as necessary to avoid interference with other reinforcement steel continuously across the entire width of the reinforcement mat, and shall support the reinforcement mat in the plane indicated.

H. Welded wire fabric placed over the ground shall be supported on wired concrete blocks (dobies) spaced not more than three (3) feet on centers in any direction. Welded wire fabric shall not be placed on the ground and hooked into place in the freshly placed concrete.

I. Welded wire fabric reinforcement placed over horizontal forms shall be supported on slab bolsters. Slab bolsters shall be spaced not more than 30-inches on center. The construction practice of placing welded wire fabric on the ground and hooking it into place in the freshly placed concrete shall not be used.

3.02 CONCRETE COVER: The concrete cover over reinforcement shall conform to ACI 318, paragraph 7.7, Concrete Protection for Reinforcement, unless otherwise indicated. Tie wires shall be bent away from the forms in order to provide the required concrete coverage.

3.03 SPLICING:

A. All lap splices of bar reinforcement shall be as indicated and conform to Chapter 12 of ACI 318 or as otherwise approved by the DISTRICT. Unless otherwise indicated, dowels shall match the size and spacing of the spliced bar.

B. Laps of welded wire fabric shall be in accordance with ACI 318. Adjoining sheets shall be securely tied together with No. 14 tie wire, one tie for each two running feet. Wires shall be staggered and tied in such a manner that they cannot slip.

C. Splices in column spiral reinforcement, when necessary, shall be made by a lap of 1-1/2 turns.

D. Reinforcing shall not be straightened or rebent in a manner which will injure the material. Bars shall be bent or straight as indicated. Do not use bends different from the bends indicated. Bars shall be bent cold, unless otherwise permitted by the DISTRICT. No bars partially embedded in concrete shall be field-bent except as indicated or specifically permitted by the DISTRICT.

E. Couplers which are located at a joint face shall be a type which can be set either flush or recessed from the face as indicated. The couplers shall be sealed during concrete placement to completely eliminate concrete or cement paste from entering. Couplers intended for future connections shall be recessed a minimum of 1/2-inch from the concrete surface. After the concrete is placed, the coupler shall be plugged with plastic plugs which have an O-ring seal and the recess filled with sealant to prevent any contact with water or other corrosive materials. Threaded couplers shall be plugged.

3.04 CLEANING AND PROTECTION:

A. Unless indicated otherwise, mechanical coupler spacing and capacity shall match the spacing and capacity of the reinforcing indicated for the adjacent section.

B. Reinforcement shall be free of all materials that will reduce bond.

C. Reinforcement steel shall at all times be protected from conditions conducive to corrosion until concrete is placed around it.

D. The surfaces of reinforcement steel and other metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed. Where there is delay in depositing concrete, reinforcement shall be re-inspected and, if necessary, re-cleaned or sandblasted.

E. Properly cap all vertical reinforcement steel if area is subject to having workers above the reinforcement area.

3.05 INSTALLATION OF DRILLED REINFORCING STEEL DOWELS: For drilling and grouting information see SECTION 03600.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 SCOPE:

A. The WORK of this SECTION consists of furnishing all labor, equipment, supplies, and materials necessary for the proper placement, curing, finishing, protection, and repair of the cast-in-place concrete required by the Contract Documents.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 01410 – Testing and Quality Control
3. SECTION 03050 – Concrete Admixture Waterproofing
4. SECTION 03100 - Concrete Formwork and Accessories
5. SECTION 03200 - Concrete Reinforcement
6. SECTION 03600 – Grout

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the standards of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Concrete Institute (ACI)
    a. 117 - Specification for Tolerances for Concrete Construction and Materials
    b. 301 – Specifications for Structural Concrete for Buildings
    c. 304.2R - Recommended Practice for Measuring, Mixing, Transporting, and Placing Concrete
    d. 305 - Committee Report on Hot-Weather Concreting
    e. 306 - Committee Report on Cold-Weather Concreting
    f. 308 - Standard Practice for Curing Concrete
    g. 309 – Guide for Consolidation of Concrete
    h. 318 - Building Code Requirements for Reinforced Concrete
    i. 350 – Code Requirements for Environmental Engineering Concrete Structures
2. American Society for Testing and Materials (ASTM):
    a. C31 - Making and Curing Concrete compression and Flexure Test Specimens in the Field
    b. C33 – Standard Specification for Concrete Aggregates
    c. C39 – Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
    d. C94 - Standard Specification for Ready-Mixed Concrete
    e. C127 – Standard Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate

f. C128 – Standard Test Method for Relative Density (Specific Gravity) and Absorption of Fine Aggregate

g. C136 – Standard Test Method for Sieve Analysis of Fine and Coarse Aggregates

h. C143 – Standard Test Method for Slump of Hydraulic-Cement Concrete

i. C150 – Standard Specification for Portland Cement

j. C156 - Test Method for Water Retention by Concrete Curing Materials

k. C157 – Standard Test Method for Length Change of Hardened Hydraulic-Cement Mortar and Concrete

l. C173 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

m. C231 - Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

n. C260 – Standard Specification for Air Entraining Admixtures for Concrete

o. C309 - Standard Specification for Liquid Membrane-Forming Compounds for Curing Concrete

p. C494 - Standard Specification for Chemical Admixtures for Concrete

q. C566 – Standard Test Method for Total Evaporable Moisture Content of Aggregate by Drying

r. C618 - Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Concrete

s. C881 - Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete

t. C1077 - Practice for Laboratories Testing Concrete and Concrete Aggregates for use in Construction and Criteria for Laboratory Evaluation

u. C1157 – Standard Performance Specification for Hydraulic Cements

v. C1240 - Standard Specification for Silica Fume for Use as a Mineral Admixture in Hydraulic-Cement Concrete, Mortar, and Grout

w. D1751 - Standard Specification for Preformed Expansion Joint Filler for Concrete Paving and Structural Construction (Nonextruding and Resilient Bituminous Types)

x. D2419 – Standard Test Methods for Sand Equivalent Value of Soils and Fine Aggregate

y. E96 - Standard Test Methods for Water Vapor Transmission of Materials

z. E1643 - Standard Practice for Installation of Water Vapor Retarders Used in Contact with Earth or Granular Fill Under Concrete Slabs

3. Federal Specifications

a. UU-B-790A - Building Paper, Vegetable Fiber (Kraft, Waterproofed, Water Repellant and Fire Resistant)

4. Florida Building Code and Local Building Codes as appropriate

5. Florida Department of Transportation (FDOT)

a. Standard Specifications for Road and Bridge Construction, latest edition.

1.03 DEFINITIONS:

A. Structural Concrete: Concrete to be used in all cases except where indicated otherwise in the Contract Documents.

B. Pea Gravel Concrete: Concrete in thin sections and areas with congested reinforcing, at the option of the CONTRACTOR and with written approval of the DISTRICT for the specific location.

C. Sitework Concrete: Concrete to be used for curbs, gutters, catch basins, sidewalks, pavements, fence and guard post embedment, underground pipe encasement, underground duct bank encasement and all other concrete appurtenant to electrical facilities unless otherwise indicated.

D. Lean Concrete: Concrete to be used for thrust blocks, pipe trench cut-off blocks and cradles that are indicated on the Drawings as unreinforced. Lean concrete shall be used as protective cover for dowels intended for future connection.

E. Hydraulic Structure: A concrete structure for the containment, treatment, or transmission of water, wastewater, other fluids, or gases.

1.04 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Mix Designs:

1. Prior to beginning the WORK and within 30 days after issuance of the Notice to Proceed, the CONTRACTOR shall submit preliminary concrete mix designs which shall show the proportions and gradations of all materials proposed for each class and type of concrete. Mix designs shall be tested by an independent testing laboratory acceptable to the DISTRICT. All costs related to such testing shall be CONTRACTOR'S responsibility.

2. Test data relating to the cement, aggregate, and admixtures shall be less than six months old. Furnish the submittals in accordance with ACI 301 for the following:

a. Mill tests for cement

b. Admixture certification. Chloride ion content shall be included.

c. Aggregate gradation test results and certification

3. Where ready-mix concrete is used, the CONTRACTOR shall furnish delivery tickets at the time of delivery of each load of concrete. Each ticket shall show the state certified equipment used for measuring and the total quantities, by weight, of cement, sand, each class of aggregate, admixtures, and the amounts of water in the aggregate added at the batching plant, and the amount allowed to be added at the Site for the specific design mix. In addition, each ticket shall state the mix number, total yield in cubic yards, and the time of day, to the nearest minute, corresponding to the times when the batch was dispatched, when it left the plant, when it arrived at the Site, when unloading began, and when unloading was finished.

C. Other

1. The CONTRACTOR shall submit materials and methods for curing.

2. The CONTRACTOR shall submit product specifications, data, and installation instructions for all miscellaneous products called for in this specification.

1.05 QUALIFICATIONS: Truck mixers shall be equipped with electrically actuated counters by which the number of revolutions of the drum or blades may be readily verified. The counter shall be of the resettable, recording type, and shall be mounted in the driver's cab. The counters shall be actuated at the time of starting mixers at mixing speeds.

1.06 RESPONSIBILITIES: (Not Applicable)

1.07 CERTIFICATIONS AND TESTING:

A. General

1. Concrete and other materials for testing shall be furnished by the CONTRACTOR, and the CONTRACTOR shall assist the DISTRICT in obtaining samples, and disposal and cleanup of excess material.

2. The testing laboratory will meet or exceed the requirements of ASTM C1077.

3. The cost of trial batch, laboratory, and shrinkage tests on cement, aggregates, and concrete, will be the CONTRACTOR'S responsibility.

B. Trial Batch and Laboratory Tests

1. Tests for determining slump shall be in accordance with the requirements of ASTM C143.

2. Testing for aggregate shall include sand equivalence, reactivity, organic impurities, abrasion resistance, and soundness, according to ASTM C33.

3. A testing laboratory approved by the DISTRICT shall prepare a trial batch of each class of concrete, based on the preliminary concrete mixes submitted by the CONTRACTOR. During the trial batch the aggregate proportions may be adjusted by the testing laboratory using the two coarse aggregate size ranges to obtain the required properties. If one size range produces an acceptable mix, a second size range need not be used. Such adjustments will be considered refinements to the mix design and will not be the basis for extra compensation to the CONTRACTOR. Concrete shall conform to the requirements of this SECTION, whether the aggregate proportions are from the CONTRACTOR'S preliminary mix design, or whether the proportions have been adjusted during the trial batch process. The trial batch shall be prepared using the aggregates, cement, and admixture proposed for the Project. The trial batch materials shall be of a quantity such that the testing laboratory can obtain 3 drying shrinkage, and 6 compression test specimens from each batch.

4. The determination of compressive strength shall be made in accordance with ACI 318, Section 5.3.

5. A sieve analysis of the combined aggregate for each trial batch shall be performed according to the requirements of ASTM C136. Values shall be given for percent passing each sieve.

C. Field Tests

1. The responsibility to retain the services of an independent testing laboratory shall be as defined in SECTION 01410.

2. The CONTRACTOR shall pay the cost of any additional tests and investigation on WORK that does not meet the specifications.

3. Tests on pumped concrete shall be taken at the point of final placement.

4. Compressive Test: Compressive test specimens shall be taken during construction from the first placement of each class of concrete placed each day and for each 150 cubic yards or fraction thereof each day.

   a. Each set of test specimens shall consist of five (5) cylinders. Specimens shall be made in accordance with ASTM C31. Specimens shall be 6-inch diameter by 12-inch high cylinders.

   b. Compression tests shall be performed in accordance with ASTM C39. Two (2) cylinders shall be broken at seven (7) days and two (2) at 28 days, and the remaining cylinder shall be held to verify test results, if needed.

   c. The acceptance of the test results shall be the average of the strengths of the two specimens tested at 28 days as per ACI 318. Evaluation and acceptance of the concrete shall be per ACI 318, Chapter 5.

5. Slump Tests: One (1) slump test shall be taken per truckload in accordance with ASTM C143.

6. Air Content: Air content shall be determined for each compressive test taken in accordance with ASTM C231 or by ASTM C173.

7. Aggregate testing shall be made every 12 months during construction to insure continued compliance with these Specifications.

8. Concrete that fails to meet the ACI requirements and these Specifications is subject to removal and replacement.

9. Temperature: Concrete temperature shall be recorded in accordance with ASTM C1064.

1.08 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - MATERIALS

2.01 GENERAL:

A. All materials shall be classified as acceptable for potable water use according to NSF Standard 61.

B. Cement for concrete that will contact potable water shall not be obtained from kilns that burn metal rich hazardous waste fuel.

C. Materials shall be delivered, stored, and handled so as to prevent damage by water or breakage. Cement reclaimed from cleaning bags or leaking containers shall not be used. Cement shall be used in the sequence of receipt of shipments.

D. Materials shall comply with the requirements of Sections 201, 203, and 204 of ACI 301, as applicable.

E. Storage of materials shall conform to the requirements of Section 205 of ACI 301.

2.02 CEMENT:

A. Cement shall be standard Portland Cement Type II conforming to ASTM C150 and C1157

B. A minimum of 85 percent of cement by weight shall pass a 325 screen.

C. A single brand of cement shall be used throughout the WORK, and prior to its use, the brand shall be accepted by the DISTRICT.

D. Sacked cement shall be stored in such a manner so as to permit access for inspection and sampling. Certified mill test reports, including fineness, for each shipment of cement to be used shall be submitted to the DISTRICT, if requested, regarding compliance with these Specifications.

2.03 AGGREGATES:

A. Aggregates shall be obtained from pits acceptable to the DISTRICT, shall be non-reactive, and shall conform to the requirements of ASTM C33.

B. When tested in accordance with ASTM C33, the loss resulting after five (5) cycles of the soundness test, shall not exceed ten (10) percent for fine aggregate and twelve (12) percent for coarse aggregate, when using sodium sulfate.

C. When tested in accordance with ASTM C33, the ratio of silica released to reduction in alkalinity shall not exceed 1.0.

D. Course Aggregates:

1. Coarse aggregates shall be crushed stone, gravel or other approved inert material having clean, hard, durable, uncoated particles conforming to ASTM C33.

2. The coarse aggregates shall be prepared and handled in two (2) or more size groups for combined aggregates with a maximum size greater than 3/4-inch. When the aggregates are proportioned for each batch of concrete, the 2 size groups shall be combined.

3. When tested in accordance with ASTM C33, the coarse aggregate shall show a loss not exceeding 42 percent after 500 revolutions, or 10.5 percent after 100 revolutions.

E. Fine Aggregates:

1. Fine aggregates shall be clean sand conforming to ASTM C33.

2. When tested in accordance with ASTM D2419, the sand equivalency shall not be less than 75 percent for an average of three (3) samples, nor less than 70 percent for an individual test. Gradation of fine aggregate shall conform to ASTM C33 when tested in accordance with ASTM C136 for the fineness modulus of the sand used, including the optional grading in Section 6.2. The fineness modulus of sand used shall not be over 3.1.

3. When tested in accordance with ASTM C33, the fine aggregate shall produce a color in the supernatant liquid no darker than the reference standard color solution.

2.04 WATER:

A. The water used in the concrete mix and for curing shall be clean, potable, and in accordance with ACI 318. Water shall be free from objectionable quantities of silty organic matter, alkali, salts, and other impurities.

B. The water shall be considered potable, for the purposes of this SECTION only, if it meets the requirements of the local governmental agencies. Agricultural water with high total dissolved solids (over 1000 mg/l TDS) shall not be used.

2.05 ADMIXTURES:

A. General: All admixtures shall be compatible and be furnished by a single MANUFACTURER capable of providing qualified field service representation. Admixtures shall be used in accordance with MANUFACTURER's recommendations. If the use of an admixture is producing an inferior end result, the CONTRACTOR shall discontinue use of the admixture. Admixtures shall not contain thiocyanates or more than 0.05 percent chloride ion, and shall be non-toxic after 30 days.

B. Air Entraining Admixtures:

1. Air entraining admixture shall conform to ASTM C260. Air content shall be tested at the point of placement.

2. The air-entraining agent shall be added to the batch in a portion of the mixing water. The solution shall be batched by means of a mechanical batcher capable of accurate measurement.

3. Sufficient air-entraining agent shall be used to provide a total air content of 3 to 5 percent.

C. Set Controlling and Water Reducing Admixtures:

1. Admixtures may be added at the CONTRACTOR'S option, subject to the DISTRICT's approval, to control the set, effect water reduction, and increase workability. The cost of adding an admixture shall be the CONTRACTOR'S responsibility. Concrete containing an admixture shall be first placed at a location determined by the DISTRICT. Admixtures shall conform to the requirements of ASTM C494. The required quantity of cement shall be used in the mix regardless of whether or not an admixture is used.

2. The set retarding admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently greater than 80 degrees F, a set retarding admixture shall be used. The set retarding admixture shall conform to ASTM C494 Type D unless accepted otherwise by the District.

3. Set accelerating admixture may be either with or without water-reducing properties. Where the air temperature at the time of placement is expected to be consistently less than 40 degrees F, a non-corrosive set accelerating admixture shall be used. Set accelerating admixture shall conform to ASTM C494 Type C or E.

4. Normal range water reducer shall conform to ASTM C494, Type A. The quantity of admixture used and the method of mixing shall be in accordance with the MANUFACTURER's instructions and recommendations.

5. High range water reducer shall conform to ASTM C494 Type F. High range water reducer shall be added to the concrete after all other ingredients have been mixed and initial slump has been verified. No more than fourteen (14) ounces of water reducer per sack of cement shall be used. Water reducer shall be considered as part of the mixing water when calculating the water/cement ratio.

   a. If the high range water reducer is added to the concrete at the Site, it may be used in conjunction with the same water reducer added at the batch plant. Concrete shall have a slump of three (3) inches plus or minus 1/2-inch prior to adding the high range water reducing admixture at the Site. The high range water reducing admixture shall be accurately measured and pressure injected into the mixer as a single dose by an experienced technician. A standby system shall be provided and tested prior to each day's operation of the primary system.

   b. Concrete shall be mixed at mixing speed for a minimum of 70 mixer revolutions or five (5) minutes after the addition of the high range water reducer, unless recommended otherwise by the MANUFACTURER.

D. Crystalline Capillary Waterproofing Admixture:

1. All concrete for water control structures that will be underwater shall have Crystalline Capillary Waterproofing (CCW) admixture in accordance with SECTION 03050.

2.06 CURING MATERIALS:

A. Curing compound shall conform to ASTM C309, Type I. Curing compound shall be white pigmented, resin based and compliant with local VOC requirements. When curing compound must be removed for finishes or grouting, it shall be of a dissipating type. Sodium silicate compounds shall not be allowed.

B. Polyethylene sheet for use as concrete curing blanket shall be white and shall have a nominal thickness of 6 mils. The loss of moisture when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 grams per square centimeter of surface.

C. Polyethylene-coated waterproof paper sheeting for use as concrete curing blanket shall consist of white polyethylene sheeting free of visible defects, uniform in appearance, have a minimum thickness of two (2) mils, and be permanently bonded to waterproof paper conforming to the requirements of Federal Specification UU-B-790A. The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 gram per square centimeter of surface.

D. Polyethylene-coated burlap for use as concrete curing blanket shall be minimum 4-mil thick, white opaque polyethylene film impregnated or extruded into one side of the burlap. Burlap shall weigh not less than 9 ounces per square yard. The loss of moisture, when determined in accordance with the requirements of ASTM C156, shall not exceed 0.055 grams per square centimeter of surface.

E. Curing mats for use in Curing Method 6 below, shall be heavy shag rugs or carpets or cotton mats quilted at 4-inches on center. Curing mats shall weigh a minimum of 12 ounces per square yard when dry.

2.07 MISCELLANEOUS MATERIALS:

A. Damp proofing agent shall be an asphalt emulsion conforming to ASTM D1227, Type III, Class 1.

B. Evaporation retardant shall create a monomolecular film on the concrete. The retardant shall have no effect on cement hydration and shall meet local VOC requirements. Evaporation retardant shall not affect adhesion of curing compounds or other treatments and shall not affect the color of the concrete.

C. Reinforcement shall be per SECTION 03200.

D. Water Stops shall be per SECTION 03100.

E. Damp proofing agent shall be a waterborne emulsified-asphalt. Damp proofing shall be suitable for "green" or slightly damp surfaces and shall withstand normal expansion and contraction of the concrete. Damp proofing agent shall breath to allow vapors to escape. Damp proofing agent shall meet local VOC requirements.

F. Bonding agents shall be 100% solids, epoxy adhesives conforming to the following:

1. For bonding freshly-mixed, plastic concrete to hardened concrete, bonding agent shall be a medium viscosity adhesive conforming to ASTM C881 Type II, Grade 2, Class C,

2. For bonding hardened concrete or masonry to steel, bonding agent shall be a non-sagging gel adhesive conforming to ASTM C881 Type I or IV, Grade 3, Class C.

G. Vapor Barrier:

1. Vapor Barrier shall consist of a composite of heavy kraft paper, asphalt, fiberglass reinforcement, and polyethylene film. The composite shall be laminated under heat and pressure.

2. Vapor Barrier shall comply with federal specification UU-B-790A, Type I, Grade A, Style 4. Vapor Barrier shall have a water vapor permeance of less than 0.30 perms when tested per ASTM E96.

3. Vapor Barrier shall be installed under concrete slabs of all habitable spaces. Barrier shall be installed per the MANUFACTURER recommendations and per ASTM E1643.

H. Non-Waterstop Joint Material:

1. Preformed Joint Material: Preformed asphalt-impregnated fiber conforming to ASTM D1751.

2. Bond Breaker: All bond breakers shall be roofing felt or 15 mils minimum dry film thickness of bituminous paint as indicated.

2.08 CONCRETE DESIGN REQUIREMENTS:

A. General: Concrete shall be composed of cement, admixtures, aggregates, and water of the qualities indicated. The exact proportions in which these materials are to be used for different parts of the WORK will be determined during the trial batch process. In general, the mix shall be designed to produce a concrete capable of being deposited so as to obtain maximum density and minimum shrinkage, and, where deposited in forms, to have good consolidation properties and maximum smoothness of surface. The aggregate gradations shall be formulated to provide fresh concrete that will not promote rock pockets around reinforcing steel or embedded items. The proportions shall be changed whenever necessary or desirable to meet the required results. All changes shall be subject to review by the DISTRICT.

B. Fine Aggregate Composition:

1. In mix designs for structural concrete, the percentage of fine aggregate in total aggregate by weight shall be as indicated in the following table.

Fine Aggregate	
Fineness Modulus	**Maximum Percent**
2.7 or less	41

2.7 to 2.8	42
2.8 to 2.9	43
2.9 to 3.1	44

2. For other concrete, the maximum percentage of fine aggregate of total aggregate, by weight, shall not exceed 50.

C. Duct bank concrete shall contain an integral red-oxide coloring pigment. Concrete shall be dyed red throughout. Surface treatment to color duct banks will not be acceptable.

D. Water/Cement Ratio and Compressive Strength:

1. Water/cement ratio is given for aggregates in saturated-surface dry condition, and total moisture of all aggregates, calculated by ASTM C566, less the absorption of the aggregate as calculated by ASTM C127 and C128, shall represent total free moisture in the aggregate to determine the water/cement ratio. Total free moisture of aggregates shall be added to batch water to estimate water content of concrete. Concrete shall have the following minimum properties:

E. Concrete Proportions:

Type of Work	**Min 28-Day Compressive Strength (psi)**	**Maximum Size Aggregate (in)**	*** Cement Content per cubic yd (lbs)**	*** Maximum W/C Ratio (by weight)**
Structural Concrete				
12-inch and thicker walls, slabs on grade, and footings (optional)	**3000**	**3/4**	**400**	**0.45**

* The cement content and water cement ratio are based on total cementitious material including silica fume, slag or flyash.

NOTE: The CONTRACTOR is cautioned that the limiting parameters above are not a mix design. Admixtures may be required to achieve workability required by the CONTRACTOR'S construction methods and aggregates. The CONTRACTOR is responsible for providing concrete with the required workability and strength.

F. Adjustments to Mix Design: The CONTRACTOR may elect to decrease the water/cement ratio to achieve the strength and shrinkage requirements and/or add water reducers, as required to achieve workability. The mixes shall be changed whenever such change is necessary or desirable to secure the required strength, density, workability, and surface finish, and the CONTRACTOR shall be entitled to no additional compensation because of such changes. Any changes to the accepted concrete mix design shall be submitted to the DISTRICT for review and shall be tested again in accordance with these Specifications.

G. When using a floor hardener, the water/cement ratio shall not be greater than specified by the hardener MANUFACTURER.

2.09 CONSISTENCY: The quantity of water in a batch of concrete shall be just sufficient, with a normal mixing period, to produce a concrete which can be worked properly into place without segregation and which can be compacted by vibratory methods to give the desired density, impermeability, and smoothness of surface. The quantity of water shall be changed as necessary, with variations in the nature or moisture content of the aggregates, to maintain uniform production of a desired consistency. The consistency of the concrete in successive batches shall be determined by slump tests in accordance with ASTM C143. The slumps shall be as follows:

2.10 MEASUREMENT:

A. The amount of cement and of each separate size of aggregate entering into each batch of concrete shall be determined by direct weighing equipment furnished by the CONTRACTOR and acceptable to the DISTRICT.

B. Weighing tolerances:

Material	Percent of Total Weight
Cement	1
Aggregates	3
Admixtures	3

C. The quantity of water entering the mixer shall be measured by a suitable water meter or other measuring device of a type acceptable to the DISTRICT and capable of measuring the water in variable amounts within a tolerance of one percent. The water feed control mechanism shall be capable of being locked in position so as to deliver constantly any required amount of water to each batch of concrete. A positive quick-acting valve shall be used for a cut-off in the water line to the mixer. The operating mechanism shall prevent leakage when the valves are closed.

PART 3 - EXECUTION

3.01 PROPORTIONING AND MIXING:

A. Proportioning of the mix shall conform to the requirements of Chapter 3 "Proportioning" of ACI 301.

B. Mixing shall conform to the requirements of Chapter 7 of ACI 301.

C. Slumps shall be as indicated herein.

D. Retempering of concrete or mortar that has partially hardened shall not be permitted.

3.02 PREPARATION OF SURFACES FOR CONCRETING:

A. General: Earth surfaces shall be thoroughly wetted by sprinkling prior to the placing of any concrete, and these surfaces shall be kept moist by frequent sprinkling up to the time of placing concrete thereon. The surface shall be free from standing water, mud, and debris at the time of placing concrete.

B. Vapor Barrier

1. Vapor Barrier shall be installed under on-grade building floor slabs of occupiable (non-hydraulic) structures and at other locations indicated.

2. Base shall be leveled, compacted, and tamped per SECTION 02200. Remove sharp edges, projection materials and roughness that might penetrate vapor barrier. Install barrier with width parallel with the direction of the pour of the concrete.

3. Place, protect, and repair defects in sheet according to ASTM E1643, and the MANUFACTURER's written instructions. Seams shall be lapped and sealed in accordance with ASTM E1643.

4. The CONTRACTOR shall exercise care to avoid puncturing or tearing the vapor barrier during installation. Patch punctures and tears as they occur.

C. Joints in Concrete:

1. All joints shall be installed where indicated on the Drawings or where otherwise approved by the DISTRICT. The surface of the construction joint shall be rough and prior to placement shall be cleaned and moistened with water.

2. Concrete surfaces upon or against which new concrete is to be placed, where the placement of the concrete has been stopped or interrupted so that, as determined by the DISTRICT, the new concrete cannot be incorporated integrally with that previously placed, are defined as construction joints. The surfaces of horizontal joints shall be given a compacted, roughened surface for good bonding. Except where the Drawings call for joint surfaces to be coated, the joint surfaces shall be cleaned of all laitance, loose or defective concrete, foreign material, and be roughened to a minimum 1/4-inch amplitude. Such cleaning and roughening shall be accomplished by hydroblasting, sandblasting or chipping (exposing aggregate) followed by thorough washing. Pools of water shall be removed from the surface of construction joints before the new concrete is placed.

3. After the surfaces have been prepared, all approximately horizontal construction joints shall be covered with a 6-inch lift of a pea gravel mix. The mix shall be placed and spread uniformly. Wall concrete shall follow immediately and shall be placed upon the fresh pea gravel mix. If high range water reducer is used in the wall concrete, then the pea gravel joint topping does not need to be used.

D. Placing Interruptions: When placing of concrete is to be interrupted long enough for the concrete to take a set, the working face shall be given a shape by the use of forms or other means that will secure proper union with subsequent work; provided that construction joints shall be made only where acceptable to the DISTRICT.

E. Embedded Items:

1. No concrete shall be placed until all formwork, installation of parts to be embedded, reinforcement steel, and preparation of surfaces involved in the placing have been completed and accepted by the DISTRICT at least four (4) hours before placement of concrete. Surfaces of forms and embedded items that have become encrusted with dried grout from previous usage shall be cleaned before the surrounding or adjacent concrete is placed.

2. Inserts or other embedded items shall conform to the requirements herein.

3. Reinforcement, anchor bolts, sleeves, inserts, and similar items shall be set and secured in the forms at locations indicated on the Drawings or shown by Shop Drawings and shall be acceptable to the DISTRICT before any concrete is placed. Accuracy of placement is the responsibility of the CONTRACTOR.

F. Placing New Concrete Against Old: Where new concrete is to be placed against old concrete (any concrete which is greater than 60 days of age), the surface of the old concrete shall be thoroughly cleaned and roughened by hydroblasting, sandblasting or chipping to expose aggregate. The joint surface shall be coated with an epoxy bonding agent unless indicated otherwise by the DISTRICT.

G. No concrete shall be placed in any structure until all water entering the space to be filled with concrete has been properly cut off or has been diverted by pipes, or other means, and carried out of the forms, clear of the WORK. No concrete shall be deposited underwater nor shall the CONTRACTOR allow still water to rise on any concrete until the concrete has attained its initial set. Water shall not be permitted to flow over the surface of any concrete in such manner and at such velocity as will injure the surface finish of the concrete. Pumping or other necessary dewatering operations for removing ground water, if required, shall be the CONTRACTOR's responsibility and shall be subject to the review of the DISTRICT.

H. Corrosion Protection: Pipe, conduit, dowels, and other ferrous items required to be embedded in concrete construction shall be so positioned and supported prior to placement of concrete that there will be a minimum of 2-inches clearance between said items and any part of the concrete reinforcement. Securing such items in position by wiring or welding them to the reinforcement will not be permitted.

I. Openings for pipes, inserts for pipe hangers and brackets, and anchors shall, where practicable, be provided during the placing of concrete.

J. Anchor bolts shall be accurately set and shall be maintained in position by templates while being embedded in concrete.

K. Cleaning: The surfaces of metalwork to be in contact with concrete shall be thoroughly cleaned of all dirt, grease, loose scale and rust, grout, mortar, and other foreign substances immediately before the concrete is placed.

3.03 CONVEYING:

A. Concrete shall be conveyed from the mixer to the place of final deposit by methods that will prevent separation or loss of material.

B. No aluminum materials shall be used in conveying any concrete.

C. Ends of chutes, hopper gates, and all other points of concrete discharge throughout the CONTRACTOR'S conveying, hoisting, and placing system shall be designed and arranged so that concrete passing from them will not fall separated into whatever receptacle immediately receives it. Conveyor belts, if used, shall be of a type acceptable to the DISTRICT. Chutes longer than 50 feet will not be permitted. Minimum slopes of chutes shall be such that concrete of the indicated consistency will readily flow in them. If a conveyor belt is used, it shall be wiped clean by a device operated in such a manner that none of the mortar adhering to the belt will be wasted. All conveyor belts and chutes shall be covered.

D. Pumping:

1. If the pumped concrete does not produce satisfactory end results, the CONTRACTOR shall discontinue the pumping operation and proceed with the placing of concrete using conventional methods.

2. The pumping equipment shall have two (2) cylinders and be designed to operate with one cylinder in case the other one is not functioning. In lieu of this requirement, the CONTRACTOR may have a standby pump on the Site during pumping.

3. The minimum diameter of the hose conduits shall be in accordance with ACI 304.

4. Pumping equipment and hose conduits that are not functioning properly shall be replaced.

5. Aluminum conduits for conveying the concrete shall not be permitted.

6. Concrete samples for slump, air content, and test cylinders will be taken at the placement end of the hose.

3.04 DELIVERY:

A. Ready-mixed concrete shall be batched, mixed, transported and delivered in accordance with these specifications and ASTM C94 including the following supplementary requirements.

1. Concrete shall be discharged within 1-1/2 hours from the time concrete was mixed, if centrally mixed, or from the time the original water was added, if transit-mixed, or before the drum has been revolved 300 revolutions, whichever is first.

2. Truck mixers and their operation shall be such that the concrete throughout the mixed batch as discharged is within acceptable limits of uniformity with respect to consistency, mix, and grading. If slump tests taken at approximately the 1/4 and 3/4 points of the load during discharge give slumps differing by more than one-inch when the required slump is 3-inches or less, or if they differ by more than 2-inches when the required slump is more than 3-inches, the mixer shall not be used on the WORK unless the causative condition is corrected and satisfactory performance is verified by additional slump tests. Mechanical details of the mixer, such as water measuring and discharge apparatus, condition of the blades, speed of rotation, general mechanical condition of the unit, and clearance of the drum, shall be checked before a further attempt to use the unit will be permitted.

3. The use of non-agitating equipment for transporting ready-mixed concrete will not be permitted. The quality and quantity of materials used in ready-mixed concrete and in batch aggregates shall be subject to continuous inspection at the batching plant by the DISTRICT.

4. Each batch of concrete shall be mixed in a truck mixer for not less than 70 revolutions of the drum or blades at the rate of rotation designated by the MANUFACTURER of equipment. Additional mixing, if any, shall be at the speed designated by the MANUFACTURER of the equipment as agitating speed. All materials including mixing water shall be in the mixer drum before actuating the revolution counter for determining the number of revolution of mixing.

3.05 PLACING:

A. Non-Conforming Work or Materials: Concrete which during or before placing is found not to conform to the requirements indicated herein shall be rejected and immediately removed from the WORK. Concrete which is not placed in accordance with these Specifications, or which is of inferior quality, shall be removed and replaced.

B. Unauthorized Placement: No concrete shall be placed except in the presence of a duly authorized representative of the DISTRICT. The CONTRACTOR shall notify the DISTRICT in writing at least 24 hours in advance of placement of any concrete.

C. Concrete shall not be dropped more than four (4) feet without use of chutes or tremies. Concreting shall be a continuous operation until placement of the section is complete. All concrete shall be worked around reinforcement and embedded items. If vibrators are used, care shall be taken not to segregate concrete. Vibrators will not be allowed to move concrete within the form. All forms and subgrade shall be dampened prior to placement and excess water removed.

D. Placing of concrete shall conform to the applicable requirements of Chapter 8 of ACI 301 and the requirements of this SECTION.

E. Placement in Slabs: Concrete placed in sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement. As the WORK progresses, the concrete shall be vibrated and carefully worked around the slab reinforcement, and the surface of the slab shall be screeded in an up-slope direction.

F. Concrete shall not be dropped through reinforcement steel or into any deep form, nor shall concrete be placed in any form in such a manner as to leave accumulation of mortar on the form surfaces above the placed concrete. In such cases, means such as hoppers and, if necessary, vertical ducts of canvas, rubber, or metal shall be used for placing concrete in the forms in a manner that it may reach the place of final deposit without separation. Concrete shall be uniformly distributed during the process of depositing and in no case after depositing shall any portion be displaced in the forms more than 6-feet in horizontal direction. Concrete in wall forms shall be deposited in uniform horizontal layers not deeper than 2-feet; and care shall be taken to avoid inclined layers or inclined construction joints except where such are required for sloping members. Each layer shall be placed while the previous layer is still soft. The rate of placing concrete in wall forms shall not exceed 5-feet of vertical rise per hour. Sufficient illumination shall be provided in the interior of all forms so that the concrete at the places of deposit is visible from the deck or runway.

G. Concrete with hardener shall be placed per the hardener MANUFACTURERs written recommendations.

H. Placing New Concrete Against Old: Epoxy adhesive bonding agent shall be applied to the old surfaces according to the MANUFACTURER's written recommendations. This provision shall not apply to joints where waterstop is provided, see SECTION 03100.

I. Temperature of Concrete: The temperature of concrete when it is being placed shall be not more than 90 degrees F or less than 55 degrees F for sections less than 12-inches thick, nor less than 50 degrees for all other sections. The CONTRACTOR shall be entitled to no additional compensation on account of the temperature requirements.

J. Hot Weather Placement

1. Placement of concrete in hot weather shall conform to ACI 305 and the following:

2. When the temperature of the concrete is 85 degrees F or above, the time between the introduction of the cement to the aggregates and discharge shall not exceed 60 minutes.

3. If concrete is placed when the weather is such that the temperature of the concrete would exceed 90 degrees F, the CONTRACTOR shall employ effective means, such as pre-cooling of aggregates and mixing water using ice or placing at night, as necessary to maintain the temperature of the concrete below 90 degrees F as it is placed.

K. Cold Weather Placement

1. Placement of concrete in cold weather shall conform to ACI 306.1, and the following:

2. Concrete ingredients shall not be heated to a temperature higher than that necessary to keep the temperature of the mixed concrete, as placed, from falling below the minimum temperature.

3. Remove all ice and frost from the surfaces, including reinforcement, against which concrete is to be placed. Before beginning concrete placement, thaw the subgrade to a minimum depth of 6-inches. Reinforcement and embedded items shall be warmed to above 32 degrees F prior to concrete placement.

4. Maintain the concrete temperature above 50 degrees F for at least 72 hours after placement.

L. Order of Placing Concrete

1. The order of placing concrete in all parts of the WORK shall be acceptable to the DISTRICT. In order to minimize the effects of shrinkage, the concrete shall be placed in units as bounded by construction joints at the indicated locations. The placing of units shall be done by placing alternate units in a manner such that each unit placed shall have cured at least five (5) days for hydraulic structures and two (2) days for all other structures before the contiguous unit or units are placed, except that the corner sections of vertical walls shall not be placed until the two (2) adjacent wall panels have cured at least ten (10) days for hydraulic structures and 4 days for all other structures.

2. The surface of the concrete shall be level whenever a run of concrete is stopped. To insure a level, straight joint on the exposed surface of walls, a wood strip at least 3/4-inch thick shall be tacked to the forms on these surfaces. The concrete shall be carried about 1/2-inch above the underside of the strip. About one hour after the concrete is placed, the strip shall be removed and any irregularities in the edge formed by the strip shall be leveled with a trowel and laitance shall be removed.

3.06 TAMPING AND VIBRATING:

A. As concrete is placed in the forms or in excavations, it shall be thoroughly settled and compacted throughout the entire depth of the layer which is being consolidated, into a dense, homogeneous mass, filling all corners and angles, thoroughly embedding the reinforcement, eliminating rock pockets, and

bringing only a slight excess of water to the exposed surface of concrete. Vibrators shall be Group 3 per ACI 309, high speed power vibrators (8,000 to 12,000 rpm) of an immersion type in sufficient number and with at least one standby unit as required. Group 2 vibrators may be used only at specific locations when accepted by the DISTRICT.

B. Care shall be used in placing concrete around waterstops. The concrete shall be carefully worked by rodding and vibrating to make sure that all air and rock pockets have been eliminated. Where flat-strip type waterstops are placed horizontally, the concrete shall be worked under the waterstops by hand, making sure that air and rock pockets have been eliminated. Concrete surrounding the waterstops shall be given additional vibration over and above that used for adjacent concrete placement to assure complete embedment of the waterstops in the concrete.

C. Concrete in walls shall be internally vibrated and at the same time rammed, stirred, or worked with suitable appliances, tamping bars, shovels, or forked tools until it completely fills the forms or excavations and closes snugly against all surfaces. Subsequent layers of concrete shall not be placed until the layers previously placed have been worked thoroughly. Vibrators shall be provided in sufficient numbers, with standby units as required, to accomplish the required results within 15 minutes after concrete of the prescribed consistency is placed in the forms. The vibrating head shall not contact the surfaces of the forms. Care shall be taken not to vibrate concrete excessively or to work it in any manner that causes segregation of its constituents.

3.07 CURING AND DAMPPROOFING: Concrete shall be cured for a minimum of five (5) days after placement in accordance with the methods indicated below for the different parts of the WORK.

Surface to be Cured or Dampproofed	Method
Unstripped forms	1
Wall sections with forms removed	6
Construction joints between footings and walls, and between floor slab and columns	2
Encasement and ductbank concrete and thrust blocks	3
All concrete surfaces not specifically indicated in this Paragraph	4
Floor slabs on grade in hydraulic structures	5
Slabs on grade to receive an adhered floor finish	6 (Omit curing compound)
Slabs not on grade	6

A. Method 1: Wooden forms shall be wetted immediately after concrete has been placed and shall be kept wet with water until removal. If steel forms are used the exposed concrete surfaces shall be kept continuously wet until the forms are removed. If forms are removed within 7 days of placing the concrete, curing shall be continued in accordance with Method 6 below.

B. Method 2: The surface shall be covered with burlap mats which shall be kept wet with water for the duration of the curing period, until the concrete in the walls has been placed. No curing compound shall be applied to surfaces cured under Method 2.

C. Method 3: The surface shall be covered with moist earth not less than 4 hours or more than 24 hours after the concrete is placed. Earthwork operations that may damage the concrete shall not begin until at least 7 days after placement of concrete.

D. Method 4: The surface shall be sprayed with a liquid curing compound.

1. It shall be applied in accordance with the MANUFACTURER's printed instructions at a maximum coverage rate of 200 square feet per gallon and in such a manner as to cover the surface with a uniform film that will seal thoroughly.

2. Where the curing compound method is used, care shall be exercised to avoid damage to the seal during the 7-day curing period. If the seal is damaged or broken before the expiration of the

curing period, the break shall be repaired immediately by the application of additional curing compound over the damaged portion.

3. Wherever curing compound has been applied by mistake to surfaces against which concrete subsequently is to be placed and to which it is to adhere, compound shall be entirely removed by wet sandblasting just prior to the placing of new concrete.

4. Curing compound shall be applied as soon as the concrete has hardened enough to prevent marring on unformed surfaces and within two (2) hours after removal of forms. Repairs to formed surfaces shall be made within the two (2) hour period; provided, however, that any such repairs which cannot be made within the said two (2) hour period shall be delayed until after the curing compound has been applied. When repairs are to be made to an area on which curing compound has been applied, the area involved shall first be wet-sandblasted to remove the curing compound.

5. At locations where concrete is placed adjacent to a panel which has been coated with curing compound, the panel shall have curing compound reapplied to an area within 6-feet of the joint and to any other location where the curing membrane has been disturbed.

6. Prior to final acceptance of the WORK, all visible traces of curing compound shall be removed from all surfaces in such a manner that does not damage the surface finish.

E. Method 5:

1. Until the concrete surface is covered with curing compound, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed. The concrete shall be given a coat of curing compound in accordance with Method 4 above. Not less than one hour or more than four (4) hours after the curing compound has been applied, the surface shall be wetted with water delivered through a fog nozzle, and concrete-curing blankets shall be placed on the slabs. The curing blankets shall be polyethylene sheet, polyethylene-coated waterproof paper sheeting, or polyethylene-coated burlap. The blankets shall be laid with the edges butted together and with the joints between strips sealed with 2-inch wide strips of sealing tape or with edges lapped not less than 3-inches and fastened together with a waterproof cement to form a continuous watertight joint.

2. The curing blankets shall be left in place during the seven (7) day curing period and shall not be removed until after concrete for adjacent work has been placed. If the curing blankets become torn or otherwise ineffective, the CONTRACTOR shall replace damaged sections. During the first three (3) days of the curing period, no traffic of any nature and no depositing, temporary or otherwise, of any materials shall be permitted on the curing blankets. During the remainder of the curing period, foot traffic and temporary depositing of materials that impose light pressure will be permitted only on top of plywood sheets 5/8-inch minimum thickness, laid over the curing blanket. The CONTRACTOR shall add water under the curing blanket as often as necessary to maintain damp concrete surfaces at all times.

F. Method 6: This method applies to both walls and slabs.

1. The concrete shall be kept continuously wet by the application of water for a minimum period of at least seven (7) consecutive days beginning immediately after the concrete has reached final set or forms have been removed.

2. Until the concrete surface is covered with the curing medium, the entire surface shall be kept damp by applying water using nozzles that atomize the flow so that the surface is not marred or washed.

3. Heavy curing mats shall be used as a curing medium to retain the moisture during the curing period. The curing medium shall be weighted or otherwise held substantially in contact with the concrete surface to prevent being dislodged by wind or any other causes. Edges shall be continuously held in place.

4. The curing blankets and concrete shall be kept continuously wet by the use of sprinklers or other means both during and after normal working hours.

5. Immediately after the application of water has terminated at the end of the curing period, the curing medium shall be removed, the entire concrete surface shall be wetted, and curing compound shall be immediately applied to the entire surface in accordance with Method 4 above.

6. The CONTRACTOR shall dispose of excess water from the curing operation to avoid damage to the WORK.

G. Damp proofing:

1. The exterior surfaces of backfilled dry well walls and buried roof slabs shall be damp proofed as follows.

2. Immediately after completion of curing the surface shall be sprayed with a damp proofing agent consisting of an asphalt emulsion. Application shall be in 2 coats. The first coat shall be diluted to one-half strength by the addition of water and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon of dilute solution. The second coat shall consist of an application of the undiluted material, and shall be sprayed on so as to provide a maximum coverage rate of 100 square feet per gallon. Damp proofing material shall be as indicated above.

3. As soon as the material has taken an initial set, the entire area thus coated shall be coated with whitewash. Any formula for mixing the whitewash may be used if it produces a uniformly coated white surface and remains until placing of the backfill. If the whitewash fails to remain on the surface until the backfill is placed, the CONTRACTOR shall apply additional whitewash.

3.08 CONCRETE FINISHES:

A. General: Surfaces shall be free from fins, bulges, ridges, offsets, honeycombing, or roughness of any kind, and shall present a finished, smooth, continuous hard surface. Allowable deviations from plumb or level and from the alignment, profiles, and dimensions indicated are defined as tolerances and are indicated herein. These tolerances are to be distinguished from irregularities in finish as described herein. Aluminum finishing tools shall not be used.

B. Formed Surfaces: No tr treatment is required after form removal except for curing, repair of defective concrete, and treatment of surface defects. Where architectural finish is required, it shall be as indicated.

C. Unformed Surfaces:

After proper and adequate vibration and tamping, unformed top surfaces of slabs, floors, walls, and curbs shall be brought to a uniform surface with suitable tools. Immediately after the concrete has been screeded, it shall be treated with a liquid evaporation retardant. The retardant shall be used again after each WORK operation as necessary to prevent drying shrinkage cracks. The classes of finish for unformed concrete surfaces are designated and defined as follows:	
Area	**Finish**
Grade slabs and foundations to be covered with concrete or fill material	U1
Floors to be covered with grouted tile or topping grout	U2
Water bearing slabs with slopes 10 percent and less	U3
Water bearing slabs with slopes greater than 10 percent	U4
Slabs not water bearing	U4
Slabs to be covered with built-up roofing	U2

Interior slabs and floors to receive architectural finish	U3
Top surface of walls subject to foot traffic	U4
Top surface of walls not subject to foot traffic	U3
Floors to receive surface hardener	U5

1. Finish U1 - Sufficient leveling and screeding to produce an even, uniform surface with surface irregularities not to exceed 3/8-inch. No further special finish is required.
2. Finish U2 - (Float Finish)
    a. Compact, accurately screed and float to a true uniform surface.
    b. Surfaces shall be floated with wood or metal floats or a finishing machine using float blades. Excessive floating of surfaces while the concrete is plastic and dusting of dry cement and sand on the concrete surface to absorb excess moisture will not be permitted.
    c. Floating shall be the minimum necessary to produce a surface that is free from screed marks and is uniform in texture. Test surface with straightedge and eliminate high and low spots of more than 1/8-inch in ten (10) feet. Surface irregularities shall not exceed 1/4-inch.
    d. Joints and edges shall be tooled where indicated or as determined by the DISTRICT.
3. Finish U3 - (Hand-Troweled Finish)
    a. Finish surface as in Finish U2 - Float Finish and after the surface has hardened sufficiently to prevent excess of fine material from being drawn to the surface, trowel with steel trowel to obtain a smooth dense finish after concrete has hardened to ring under the trowel.
    b. The finish shall produce a smooth dense uniform surface free of all irregularities, blemishes, ripples, and trowel marks.
4. Finish U4 - (Nonskid Finish)
    a. Trowel the Finish U3 - Hand-trowel Finish surface to remove local depressions or high points. In addition, the surface shall be given a light broom finish with brooming perpendicular to drainage unless otherwise indicated.
    b. The resulting surface shall be rough enough to provide a nonskid finish.
5. Finish U5 - (Surface hardener)
    a. Immediately after screeding, shake on hardener shall be applied per the MANUFACTURER's written recommendations.
    b. Surface shall receive a minimum of two coats of a liquid hardener per the MANUFACTURER's written recommendations.
    c. CONTRACTOR shall notify hardener MANUFACTURER three (3) working days prior to hardened concrete floor being placed.
    d. Hardener MANUFACTURER shall provide continuous supervision of concrete and hardener placements, supplying DISTRICT with a report of each day's placement. Cost of supervision is to be borne by CONTRACTOR.

3.09 PROTECTION:

A. The CONTRACTOR shall protect concrete against damage until final acceptance.

B. Fresh concrete shall be protected from damage due to rain, hail, sleet, or snow. The CONTRACTOR shall provide such protection while the concrete is still plastic and whenever precipitation is imminent or occurring.

3.10 DEFECTIVE SURFACE TREATMENTS:

A. Patching Concrete:

1. Patch all tie holes, honeycombs or other defects with a Portland Cement and sand grout.

2. Defective surfaces to be repaired shall be cut back from trueline a minimum depth of 1/2-inch over the entire area. Feathered edges will not be permitted. Where chipping or cutting tools are not required in order to deepen the area properly, the surface shall be prepared for bonding by the removal of all laitance or soft material, plus not less than 1/32-inch depth of the surface film from all hard portions by means of an efficient sandblast.

3. After cutting and sandblasting, the surface shall be wetted sufficiently in advance of shooting with shotcrete or with cement mortar so that while the repair material is being applied, the surfaces underneath will remain moist but not so wet as to overcome the suction upon which a good bond depends.

4. Holes left by tie-rod cones shall be reamed with suitable toothed reamers so as to leave the surfaces of the holes clean and rough. Holes then shall be repaired in an approved manner with dry-packed cement grout. Holes left by form-tying devices having a rectangular cross-section and other imperfections having a depth greater than their least surface dimension shall not be reamed but shall be repaired in an approved manner with dry-packed cement grout.

5. The grout shall not be richer than one (1) part cement and three (3) parts sand with the amount of mixing water enough to produce a workable mix. For exposed walls, the cement shall contain such a proportion of white Portland cement as is required to make the color of the patch match the color of the surrounding concrete. The patch shall be finished in such a manner as to match the adjoining surfaces.

6. Surfaces of repairs shall receive the same kind and amount of curing treatment as required for the concrete in the repaired section.

B. Defective Concrete:

1. Any concrete which is not formed as shown on the Drawings or does not conform to the Contract tolerances or shows defects which reduce its structural adequacy, shall be removed from the job by the CONTRACTOR at his expense unless the DISTRICT grants written permission to patch the defective area.

C. Exposed Concrete Surfaces:

1. As soon as forms are removed, exposed surfaces shall be carefully examined and all ridges, ribs and other imperfections shall be rubbed with an abrasive stone or ground in a satisfactory manner in order to secure a smooth, uniform and continuous surface. Plastering or coating of surfaces to be smoothed will not be permitted

2. No repairs shall be made until after inspection by the DISTRICT.

3. In no case will extensive patching of honeycombed concrete be permitted

4. Concrete containing minor voids, pinholes, honeycombing, or similar depression defects shall be repaired as indicated below.

5. Concrete containing extensive voids, holes, honeycombing, or similar depression defects shall be completely removed and replaced. Repairs and replacements shall be performed promptly.

3.11 REINFORCEMENT: Reinforcement shall be in accordance with SECTION 03200, of these Specifications. Concrete protection for the reinforcement shall conform to the requirements ACI 318, paragraph 7.7.1.

3.12 CONSTRUCTION TOLERANCES:

A. The CONTRACTOR shall set and maintain concrete forms and perform finishing operations to ensure that the completed WORK is within tolerances. Surface defects and irregularities are defined as finishes and are to be distinguished from tolerances. Tolerance is the permissible variation from lines, grades, or dimensions indicated on the Drawings. Where tolerances are not stated in the specifications, permissible deviations will be in accordance with ACI 117.

B. The following non-cumulative construction tolerances apply to finished walls and slab unless otherwise indicated:

Item	Tolerance
Variation of the constructed linear outline from the established position in plan.	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation from the level or from the grades indicated.	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation from plumb	In 10-feet: 1/4-inch; In 20-feet or more: 1/2-inch
Variation in the thickness of slabs and walls.	Minus 1/4-inch; Plus 1/2-inch
Variation in the locations and sizes of slabs and wall openings	Plus or minus 1/4-inch

3.13 CARE AND REPAIR OF CONCRETE: The CONTRACTOR shall protect concrete against injury or damage from excessive heat, lack of moisture, overstress, or any other cause until final acceptance. Particular care shall be taken to prevent the drying of concrete and to avoid roughening or otherwise damaging the surface. Any concrete found to be damaged, or which may have been originally defective, or which becomes defective at any time prior to the final acceptance of the completed WORK, or which departs from the established line or grade, or which, for any other reason, does not conform to the requirements of the Contract Documents, shall be satisfactorily repaired or removed and replaced with acceptable concrete.

END OF SECTION

SECTION 03600 GROUT

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The CONTRACTOR shall furnish all equipment, labor and material for the proper placement and curing of grout as indicated on the Drawings and as specified herein.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 03100 - Concrete Formwork and Accessories
3. SECTION 03300 - Cast-in-Place Concrete

1.02 APPLICABLE STANDARDS AND PUBLICATIONS: The following standard specifications shall apply to the WORK of this SECTION:

A. American Society of Testing and Materials (ASTM)

1. C109 – Standard Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in or [50-mm] Cube Specimens)
2. C307 - Standard Test Method for Tensile Strength of Chemical-Resistant Mortar, Grouts, and Monolithic Surfacings
3. C496 - Standard Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens
4. C531 – Standard Test Method for Linear Shrinkage and Coefficient of Thermal Expansion of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
5. C579 – Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
6. C580 - Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacings, and Polymer Concretes
7. C827 – Standard Test Method for Change in Height at Early Ages of Cylindrical Specimens of Cementitious Mixtures
8. C881 – Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete
9. C882 - Standard Test Method for Bond Strength of Epoxy-Resin Systems Used with Concrete by Slant Shear
10. C939 - Standard Test Method for Flow of Grout for Preplaced-Aggregate Concrete (Flow Cone Method)
11. C1090 – Standard Test Method for Measuring Changes in Height of Cylindrical Specimens from Hydraulic-Cement Grout
12. C1107 - Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Non-Shrink)
13. C1339 - Standard Test Method for Flowability and Bearing Area of Chemical-Resistant Polymer Machinery Grouts
14. D648 – Standard Test Method for Deflection Temperature of Plastics Under Flexural Load in the Edgewise Position
15. D695 – Standard Test Method for Compressive Properties of Rigid Plastics

B. International Concrete Repair Institute (ICRI)

1. Technical Guide for Selecting and Specifying Concrete Surface preparation for Sealers, Coatings, and Polymer Overlays

C. American Institute of Steel Construction (AISC)

1. Manual of Steel Construction

D. American Concrete Institute (ACI)

1. Building Code Requirements for Structural Concrete (ACI 318, latest edition)

E. International Code Council (ICC), formerly the International Conference of Building Officials (ICBO)

1.03 DEFINITIONS: (Not Applicable)

1.04 SUBMITTALS: The CONTRACTOR shall submit the following:

A. Submittals shall be in accordance with SECTION 01300.

B. MANUFACTURER's literature containing instructions and recommendations on the mixing, handling, placement, curing, and appropriate uses for each type of grout used in the WORK, and location of use.

C. Name and telephone number of grout MANUFACTURER's representative, who will give on-site job service. The representative shall have at least one (1) year of experience with the chosen grouts.

1.05 QUALIFICATIONS:

A. Pre-installation Demonstration and Training:

1. The grout MANUFACTURER shall give a demonstration and training session for all the cement based non-shrink and epoxy grouts to be used on the Project, before any installation of grout is allowed.

2. Training session shall use a minimum of five (5) bags of Cement Based Non-Shrink Class I Grout mixed to fluid consistency. Tests shall be conducted for flow cone and bleed tests. Six (6) cubes for testing at 1, 3, and 28 days shall be made. The remaining grout shall be placed, and curing initiated on actual project placements such as baseplates and tie holes to provide on-the-job training for the CONTRACTOR and DISTRICT. The CONTRACTOR shall have the employees who will be doing the actual WORK participate in this training and demonstration session. The training session shall include methods for curing the grout.

3. The MANUFACTURER shall mix enough Cement Based Non-Shrink Class II Grout for a minimum of 15 tie holes and shall train the CONTRACTOR's employees in how to perform the WORK and cure the grout. The CONTRACTOR shall have the employees assisting in the mixing and sealing of the tie holes.

4. If the Project includes patching, throughbolt holes, epoxy anchors, and/or blockouts, the MANUFACTURER shall also train the CONTRACTOR's employees in the mixing and curing of the epoxy grouts for each of these applications.

5. The CONTRACTOR shall transport the test cubes to an independent test laboratory, obtain the test reports, and report these demonstration and training test cube strengths to the DISTRICT.

B. Adhesive anchor installers shall be trained and qualified at the Site by MANUFACTURER's representative before installing any adhesive anchors. Training and qualification for each installer shall include, but not be limited to:

1. Anchors installed in both the vertical and horizontal positions in a mock-up concrete panel of adequate size and thickness. Anchors shall be tested in tension and shear loading. A minimum of three anchors shall be tested for each installation position.

2. Anchors shall be tested at two times the published allowable load in tension and in shear as indicated by the AISC Manual of Steel Construction.

3. If any of the three test bolts in any installation position fail to reach the test loads, the installer shall be re-tested with the same procedure. Re-testing is required only for the failed installation position.

4. An installer who has three consecutive successful bolt tests in the first or second trial is considered qualified for adhesive anchor installation for this Project. The MANUFACTURER's representative shall issue a certificate to the qualified installer, and a copy of the certificate shall be filed with the CONTRACTOR and be submitted to the DISTRICT.

5. The test anchor size shall be the maximum size adhesive anchor used on the Project. The embedment length shall be long enough to develop the allowable steel strength per AISC Manual of Steel Construction and ACI 318, Appendix D.

6. Each installer shall be re-qualified every six (6) months for the duration of the Project, by the same qualifying procedure.
7. The certification of each qualified installer shall be available for verification at the Special Inspector's request.
8. All defective anchors noted by the Special Inspector shall be replaced and re-installed by the CONTRACTOR without any additional compensation.

1.06 RESPONSIBILITIES:

A. The CONTRACTOR shall assist the DISTRICT in obtaining specimens for testing and shall furnish all materials necessary for fabricating the test specimens.

B. The cost of laboratory tests on grout will be paid by the DISTRICT except where test results show the grout to be defective. In such case, the CONTRACTOR shall pay for the tests, removal and replacement of defective WORK, and re-testing all at no increased cost to the DISTRICT.

C. The MANUFACTURER of prepackaged grouts shall provide on-site technical assistance within 72 hours of request at no cost to the DISTRICT.

1.07 CERTIFICATIONS AND TESTING: The CONTRACTOR shall provide to the DISTRICT three (3) copies of certified test results for all tests required herein.

A. Test results and service report from the field tests and the demonstration and training session verifying the requirements indicated herein.

B. Certification that all grout used on the Project contains no chlorides or other chemicals that cause corrosion.

C. MANUFACTURER's certification that their non-shrink grout does not contain aluminum, zinc, or magnesium powers, used as a method of expansion.

D. ICC certifications for all adhesive anchors.

1.08 INSPECTION COORDINATION: All adhesive anchor installations shall have special inspections as recommended by the ICC report on the adhesive anchors and local codes.

1.09 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 APPLICATION:

A. Unless indicated otherwise, grouts shall be provided as listed below whether indicated on the Drawings or not:

TYPE OF GROUT	**APPLICATION**
Cement Grout	Surface repairs
Non-Shrink - Class I	All anchor bolts and reinforcing steel required to be set in grout in which the average working or operating temperature will be over 100 degrees F, or in high fire risk areas.
	Beam and column (1 or 2 story) base plates less than 16 inches in the least dimension.
	Storage tanks and other non-motorized equipment and machinery under 30 horsepower
	Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc. (Where placement time is less than 20 min.)
	Repair of holes and defects in concrete members which are not water bearing and not in contact with soil or other fill material

TYPE OF GROUT	APPLICATION
	Any application not listed, where grout is called for on the Drawings
Non-Shrink - Class II	Column base plates (greater than 2 story or larger than sixteen (16) inches in the least dimension)
	Filling blockout spaces for embedded items such as railing posts, gate guide frames, etc. (where placement time exceeds 20min.)
	Under precast concrete elements
	Repair of holes and defects in concrete members which are water bearing or in contact with soil or other fill materials
Non-Shrink Epoxy	Machinery over 30 horsepower and equipment under 30 horsepower but subject to severe shock loads and high vibration
Epoxy Anchor Grout	All anchor bolts and reinforcing steel required to be set in grout that are not in high temperature or high fire risk areas.
Topping Grout	Toppings and concrete/grout fill less than three (3) inches thick
Structural Concrete per 03300	Toppings and concrete/grout fill greater than three (3) inches thick

2.02 MATERIALS:

A. Cement Grout:

1. Cement grout shall be composed of one (1) part cement, three (3) parts sand, and the minimum amount of water necessary to obtain the desired consistency. Where needed to match the color of adjacent concrete, white portland cement shall be blended with regular cement as needed. The minimum compressive strength at 28 days shall be 4000 psi, unless indicated otherwise.
2. Cement grout materials shall be as indicated in SECTION 03300 – Cast-in-Place Concrete.

B. Non-Shrink Grouts (Cement Based):

1. General:
   a. Cement Based Non-shrink grout shall be a prepackaged, inorganic, fluid, non-gas-liberating, non-ferrous, grout, requiring only the addition of water.
   b. MANUFACTURER's instructions shall be printed on each bag or other container in which the materials are packaged. The specific formulation for each class of non-shrink grout indicated herein shall be that recommended by the MANUFACTURER for the particular application.
   c. Grout shall not contain chlorides or additives, which may contribute to corrosion.
   d. Grout shall be formulated to be used at any consistency from fluid to plastic.
   e. Non-Shrink grout shall have the following minimum properties when tested at a fluid consistency at 28 days:

Tensile Splitting Strength	ASTM C496	500 psi minimum
Flexural Strength	ASTM C580	1000 psi minimum
Bond Strength (concrete to grout)	ASTM C882 modified	1900 psi minimum

2. Class I Non-Shrink Grout:
   a. Class I Non-Shrink Grout shall have a minimum 28-day compressive strength of 5000 psi, when mixed at a fluid consistency.
   b. Class I Non-Shrink grout shall meet the requirements of ASTM C1107, Grade B or C, when mixed to fluid, flowable and plastic consistencies.

c. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827. The grout when tested shall not bleed or segregate at maximum allowed water.

d. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.

e. Provide certification together with independent test data that the expansion at 3 or 14 days does not exceed the 28-day expansion and that its non-shrink property is not based on gas production or gypsum expansion.

3. Class II Non-Shrink Grout:

a. Class II Non-Shrink grout shall be a high precision, fluid, extended working time grout. The minimum 28-day compressive strength shall be 7500 psi, when mixed at a fluid consistency.

b. Grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827.

c. Grout shall have no shrinkage (0.0 percent) and a maximum of 0.3 percent expansion in the hardened state when tested in accordance with ASTM C1090.

d. Class II grout shall have an extended working time of 30 minutes minimum when mixed to a fluid consistency as defined in ASTM C827 at temperature extremes of 45 to 90 degrees F in accordance with ASTM C1107.

e. Class II Non-Shrink grouts shall meet the requirements of ASTM C1107; Grade B or C when tested using the amount of water needed to achieve fluid consistency per ASTM C939.

f. The grout when tested shall not bleed or segregate at maximum allowed water.

g. Provide certification that its non-shrink property is not based on gas production or gypsum expansion.

C. Non-Shrink Epoxy Grout:

1. Non-Shrink Epoxy grout shall be a flowable, non-shrink, 100 percent solids system. The epoxy grout system shall have three components: resin, hardener, and specially blended aggregate, all premeasured and prepackaged. The resin component shall not contain any non-reactive diluents. Resins containing butyl glycidyl ether (BGE) or other highly volatile and hazardous reactive diluents are not acceptable. Variation of component ratios is not permitted unless specifically recommended by the MANUFACTURER. MANUFACTURER's instructions shall be printed on each container in which the materials are packaged.

2. Epoxy grout shall have a maximum early age height change of 4.0 percent expansion, and shall have no shrinkage (0.0 percent) in accordance with ASTM C827, (modified for epoxy grouts by using an indicator ball with a specific gravity between 0.9 and 1.1).

3. Epoxy grout shall have a negligible (less than 0.0006 in/in) length change after hardening, and a coefficient of thermal expansion less than 0.00003 in/in F when tested according to ASTM C531.

4. The epoxy grout shall develop a minimum compressive strength of 9000 psi in 24 hours and 13,000 psi in seven days when tested in accordance with ASTM C579, method B.

5. The mixed epoxy grout shall have a minimum working life of 90 to 120 minutes at 70 degrees F.

6. The effective bearing area shall be a minimum of 95% EBA in accordance with ASTM C1339.

7. The chemical formulation of the epoxy grout shall be that recommended by the MANUFACTURER for the particular application. Do not reduce aggregate loading or add solvents to increase flowability.

8. Non-Shrink Epoxy grout shall have the following minimum properties when tested at seven (7) days:

Bond Strength to Concrete	ASTM C882 modified	3000 psi minimum

Bond Strength to Steel	ASTM C882 modified	1700 psi minimum
Flexural Strength	ASTM C580	2500 psi minimum
Tensile Strength	ASTM C307	2000 psi minimum

D. Epoxy Anchor Grout:

1. Epoxy anchor grout shall be a non-sag paste conforming to ASTM C881 Type IV, Class C, Grade 3 with the exception of gel time.
2. Heat deflection temperature per ASTM D648 shall be a minimum 120 degrees F.
3. MANUFACTURER shall certify that the epoxy grout will maintain 90 percent of its strength up to a temperature of 125 degrees F.
4. Grout shall come in a two-chambered cartridge with a metering system that provides the proper ratio of hardener and resin. The grout shall also come with a static mixer nozzle to thoroughly mix the hardener and resin together.
5. Epoxy anchor grout shall be capable of being used in submersed applications once cured.
6. Compressive strength per ASTM D695 shall be 10,000-psi minimum.
7. In vertical and overhead locations, anchor seal plugs shall be used.
8. If the average working or operating temperature will be over 100° F or in a high fire risk area, use cement based non-shrink grout and oversized holes.
9. Embedment of adhesive anchors/rebar shall be deep enough to develop the anchor/rebar. Embedment shall not exceed 67% of the member depth.

E. Topping Grout and Concrete/Grout Fill:

1. Where fill is thicker than three (3) inches structural concrete, as specified in SECTION 03300, may be used if approved by the DISTRICT.
2. Grout for topping of slabs and concrete/grout fill for built-up surfaces of tank, channel, and basin bottoms shall be composed of cement, fine aggregate, coarse aggregate, water, and admixtures proportioned and mixed as specified herein. All materials and procedures indicated for normal concrete in SECTION 03300, shall apply unless indicated otherwise.
3. Topping grout and concrete/grout fill shall contain a minimum of 564 pounds of cement per cubic yard with a maximum water cement ratio of 0.45.
4. Coarse aggregate shall be graded as follows:

U.S. STANDARD SIEVE SIZE	PERCENT BY WEIGHT PASSING
1/2"	100
3/8"	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 30	0

5. Final mix design shall be as determined by trial mix design as indicated in SECTION 03300, except that drying shrinkage tests are not required.
6. Strength: Minimum compressive strength of topping grout and concrete/grout fill at 28 days shall be 4000 psi.

2.03 CURING: Curing materials shall be as specified in SECTION 03300, and as recommended by the MANUFACTURER of prepackaged grouts.

2.04 CONSISTENCY:

A. The consistency of grouts shall be that necessary to completely fill the space to be grouted for the particular application. Dry pack consistency is such that the grout is plastic and moldable but will not flow. Where "dry pack" is called for in the Contract Documents, it shall mean a grout of that consistency; the type of grout to be used shall be as indicated herein for the particular application.

B. The slump for topping grout and concrete/grout fill shall be adjusted to match placement and finishing conditions but shall not exceed four (4) inches.

2.05 MEASUREMENT OF INGREDIENTS:

A. Measurements for cement grout shall be made accurately by volume using containers. Shovel measurements shall not be allowed.

B. Prepackaged grouts shall have ingredients measured by means recommended by the MANUFACTURER.

PART 3 - EXECUTION

3.01 GENERAL:

A. Grout shall not be placed until base concrete or masonry has attained its design strength, unless authorized otherwise by the DISTRICT.

B. When cementitious grouts are used on concrete surfaces, the concrete surface shall be saturated with water for 24 hours prior to placement. Upon completion of saturation period excess water shall be removed with clean, oil free compressed air prior to grouting. Concrete substrate shall not be wet prior to placement of epoxy grouts.

C. Surface preparation, curing, and protection of cement grout shall be in accordance with SECTION 03300. The finish of the grout surface shall match that of the adjacent concrete unless otherwise indicated.

D. All surfaces that will be in contact with grout shall be free of dirt, loose rust, oil, wax, grease, curing compounds, laitance, loose concrete or other deleterious materials.

E. Shade the WORK Sites from sunlight for at least 24 hours before and 48 hours after grouting.

F. Contact the grout MANUFACTURER's representative for assistance on hot and cold weather grouting techniques and precautions if applicable.

3.02 GROUTING PROCEDURES:

A. General: All mixing, surface preparation, handling, placing, consolidation, curing, and other means of execution for prepackaged grouts shall be done according to the instructions and recommendations of the MANUFACTURER.

B. All structural, equipment, tanks, and piping support bases shall be grouted, unless indicated otherwise.

1. The original concrete shall be blocked out or finished off a sufficient distance below the plate to provide for a minimum one-inch thickness of grout, or a thickness as indicated on the Drawings.

2. After the base plate has been set in position at the proper elevation by steel wedges or double nuts on the anchor bolts, the space between the bottom of the plate and the original pour of concrete shall be filled with non-shrink-type grout. The mixture shall be of a fluid consistency and poured continuously into the space between the plate and the base concrete. Forms for grout shall be tight against all surfaces, and joints shall be sealed as recommended by the grout MANUFACTURER to be liquid-tight. Forms shall be coated as recommended by the grout MANUFACTURER for easy form release. Where this method of placement is not practical or where required by the DISTRICT, alternate grouting methods shall be submitted for acceptance by the DISTRICT.

C. Drilled anchors and Reinforcing Bars:

1. General: Drilled anchors and reinforcing bars shall be installed in strict accordance with the MANUFACTURER's instructions. Holes shall be roughened with a brush on a power drill, and cleaned. Drilled anchors shall not be installed until the concrete has reached the required 28-day compressive strength. Anchors shall not be loaded until the grout has reached its indicated strength in accordance with the MANUFACTURER's instructions.

2. Epoxy Adhesive Anchors:
    a. Grout shall be proportioned and mixed with automatic equipment.
    b. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the AISC Manual of Steel Construction and ACI 318, Appendix D., but shall not be less than eight (8) diameters for threaded rod, or 12 diameters for reinforcing or smooth bars.
    c. The hole diameter shall be as recommended by the epoxy MANUFACTURER but shall be no larger than 0.25 inch greater than the diameter of the outer surface of the bolt threads or the reinforcing bar deformations.
    d. Holes shall be drilled by methods that do not interfere with the proper bonding of the epoxy.
    e. Existing reinforcing steel in the vicinity of the proposed holes shall be located prior to drilling. The location of holes shall be adjusted to avoid drilling through or nicking any existing reinforcing bars.
    f. Holes shall be blown clean with clean, dry compressed air to remove all dust and loose particles. Holes shall be dry.
    g. Reinforcing bars and anchors shall be installed per the MANUFACTURER's written installation instructions.
3. Cement Based Non-Shrink Grout:
    a. In places of high temperature or fire hazard, anchor bolts shall be grouted in using Cement Based Non-Shrink Grout, Class I.
    b. Unless otherwise indicated, embedment shall be sufficient to develop the ultimate tensile strength of the anchor or reinforcing bar per the AISC Manual of Steel Construction and ACI 318, Appendix D., but shall not be less than 16 diameters for threaded rod, or 24 diameters for reinforcing or smooth bars.
    c. When the bolt diameter is one (1) inch or less, the hole diameter should be a minimum of two inches. When the bolt's diameter is greater than one inch, the hole diameter should be at least twice the bolt diameter.
    d. Drilled holes shall be saturated with water for not less than 24 hours before installation of anchor/rod/rebar.
    e. The non-shrink grout should be placed in the holes in a non-sag (trowellable) consistency. The grout should be placed in the holes before the anchor and then the anchor inserted and vibrated to ensure proper coverage.

D. Topping Grout and Concrete/Grout Fill:
1. All mechanical, electrical, and finish WORK shall be completed prior to placement of topping or concrete/grout fill. To ensure bonding to the base slab, the base slab shall be given an exposed aggregate finish. Alternatively, where accepted by the DISTRICT, the base slab shall be given a roughened textured surface by a close-spaced rake while the surface is green. After curing, high pressure washing shall expose the aggregates and produce not less than a 3/16-inch amplitude roughness. Jackhammers or chipping hammers shall not be used.
2. The minimum thickness of grout topping and concrete/grout fill shall be one inch. Where the finished surface of concrete/grout fill is to form an intersecting angle of less than 45 degrees with the concrete surface it is to be placed against, a key shall be formed in the concrete surface at the intersection point. The key shall be a minimum of 3-1/2-inches wide by 1-1/2-inches deep.
3. The base slab shall be thoroughly cleaned and wetted to saturated surface dry (SSD) condition per International Concrete Repair Institute Standards for Surface Preparations, prior to placing topping and fill. No topping concrete shall be placed until the slab is completely free from standing pools or ponds of water. A thin coat of neat cement grout shall be broomed into the surface of the slab just before topping or fill placement. The neat cement grout shall not be allowed to dry before topping placement. If it does dry, it must be immediately removed using

wet stiff brooms and reapplied. The topping and fill shall be compacted by rolling or thorough tamping, brought to established grade, and floated. Grouted fill for tank and basin bottoms where scraping mechanisms are to be installed shall be screeded by blades attached to the revolving mechanism of the equipment in accordance with the procedures outlined by the equipment MANUFACTURER after the grout is brought to the established grade. Coat surface with evaporation retardant as needed to prevent plastic shrinkage cracks.

4. Topping grout placed on sloping slabs shall proceed uniformly from the bottom of the slab to the top, for the full width of the placement.

5. The surface shall be tested with a straight edge to detect high and low spots, which shall be immediately eliminated. When the topping and/or fill have hardened sufficiently, it shall be steel troweled to a smooth surface free from pinholes and other imperfections. An approved type of mechanical trowel may be used as an assist in this operation, but the last pass over the surface shall be by hand troweling. During finishing, no water, dry cement, or mixture of dry cement and sand shall be applied to the surface.

6. As soon as topping or fill finishing is completed, coat surface with curing compound. After the topping is set and sufficiently hard in clarifiers and where required by the DISTRICT, the tank shall be filled with sufficient water to cover the entire floor for 14 days.

3.03 CONSOLIDATION: Grout shall be placed in such a manner, for the consistency necessary for each application, to assure that the space to be grouted is completely filled.

3.04 CURING: Cement based grouts shall be cured per SECTION 03300 and per the MANUFACTURER's recommendations.

3.05 FIELD TESTING:

A. Compression test specimens will be taken during construction from the first placement of each type of grout, and at intervals thereafter as selected by the DISTRICT to ensure continued compliance with these specifications. The specimens will be made by the DISTRICT or its representative.

B. Compression tests and fabrication of specimens for cement grout and cement based non-shrink grout will be performed in accordance with ASTM C109 (Using 2-in or 50 mm Cube Specimens), at intervals during construction selected by the DISTRICT. A set of three specimens will be made for testing at seven (7) days, 28 days, and each additional time period as appropriate.

C. Compression tests and fabrication of specimens for topping grout, and concrete/grout fill will be performed as specified in SECTION 03300, at intervals during construction as selected by the DISTRICT.

D. All material, already placed, which fails to meet the requirements of these specifications, is subject to removal and replacement at the cost of the CONTRACTOR.

E. The cost of all laboratory tests on mortar and grout will be borne by the DISTRICT, but the CONTRACTOR shall assist the DISTRICT in obtaining specimens for testing. However, the CONTRACTOR shall be charged for the cost of any additional tests and investigation on WORK performed which does not meet the specifications. The CONTRACTOR shall provide all services necessary to conduct the compression tests.

F. Compression tests and fabrication of specimens for epoxy grouts will be performed in accordance with ASTM C579, Method B, at intervals during construction as selected by the DISTRICT. A set of three specimens will be made for testing at seven (7) days, and each earlier time period as appropriate.

3.06 CONSTRUCTION TOLERANCES: Construction tolerances shall be as indicated in SECTION 03300, unless indicated otherwise.

END OF SECTION

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SECTION 05070 BOLTED FASTENERS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The WORK of this SECTION consists of furnishing all labor, materials and equipment necessary for installation of bolted fasteners as shown on the Drawings.

B. Related Work Specified Elsewhere:

1. SECTION 01300 - Submittals

1.02 SHOP DRAWINGS:

A. Shop Drawings shall include bolted connections and the type, size and length of bolts including washers.

1.03 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society of Testing Materials (ASTM)

a. A36 – Standard Specification for Carbon Structural Steel

b. A153 - Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware

c. A307 – Standard Specification for Carbon Steel Bolts and Studs, 60,000 psi (pounds per square inch) Tensile Strength

d. A325 – Standard Specification for Structural Bolts, Steel, Heat Treated, 120/105 ksi (kips per square inch) Minimum Tensile Strength.

e. A490 – Standard Specification for Structural Bolts, Alloy Steel, Heat Treated, 150 ksi Minimum Tensile Strength

f. A563 – Standard Specification for Carbon and Alloy Steel Nuts

g. F1554 - Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength

h. F436 – Standard Specification for Hardened Steel Washers

i. F593 - Standard Specification for Stainless Steel Bolts, Hex Cap Screws, and Studs

j. F594 - Standard Specification for Stainless Steel Nuts

2. American National Standards Institute (ANSI)

a. B18.2.1 - Square, Hex, Heavy Hex, and Askew Head Bolts and Hex, Heavy Hex, Hex Flange, Lobed Head, and Lag Screws (Inch Series)

b. B18.2.2 - Nuts for General Applications: Machine Screw Nuts, Hex, Square, Hex Flange, and Coupling Nuts (Inch Series)

c. B18.2.6 - Metric Fasteners for Use in Structural Applications

3. American Institute of Steel Construction (AISC)

4. Specifications for Structural Joints Using ASTM A325 of A490 bolts, approved April 1978, by the Research Council on Riveted and Bolted Structural Joints of the Engineering Foundation

1.04 WARRANTY:

A. The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

1.05 TEMPLATES:

A. Templates shall be furnished by the Fabricator to the job, together with instructions for the setting of anchors, anchor bolts and bearing plates.

1.06 INSPECTION AND TESTING:

A. Field inspections and tests shall include fit-up, preparation of surface and bolting.

PART 2 - MATERIALS

2.01 GENERAL

A. All bolts, nuts and washers not designated stainless steel shall comply with ASTM F1554, Grade 105 A325. Stainless steel connections shall be used for Aluminum.

B. All threaded rods shall comply with ASTM F1554, Grade 105.

C. All stainless steel bolts, nuts and washers shall comply with ASTM F593, F2281, F593 and F2281 as applicable.

D. ASTM F593 bolts shall be a group 2 alloy in the CW condition.

2.02 HIGH STRENGTH BOLTS:

A. High strength bolts not designated stainless steel shall conform to the requirements of ASTM A325. The bolt dimensions shall conform to the current requirements of ANSI B18.2.6 for heavy hex structural bolts.

B. Stainless Steel high strength bolts shall conform to the requirements of ASTM F593. All bolts shall be a group 2 alloy in the CW condition. The bolt dimensions shall conform to the current requirements of ANSI B18.2.1 for heavy hex structural bolts.

2.03 ALLOY STEEL BOLTS: Alloy steel bolts shall conform to the requirements of ASTM A490.

2.04 NUTS:

A. Nut dimensions shall conform to ANSI B18.2.2 for heavy hex nuts.

B. Nuts for bolts not designated stainless steel shall conform to ASTM A563.

C. Nuts for stainless steel bolts shall conform to ASTM F594. ASTM F594 nuts alloy group shall match the stainless steel bolt alloy group.

2.05 WASHERS:

A. Flat, circular and square washers for bolts not designated stainless steel shall conform to ASTM F436, Type 1.

B. Compressible-washer type direct tension indicators for all connections shall conform to ASTM A959, Type 325.

C. Flat, circular and square washers for stainless steel bolts shall conform to ASTM F593 F2281 and meet the dimensional requirements of ASTM F436. ASTM F593 F2281 washers alloy group shall match the stainless steel bolt alloy group.

2.06 TAMPER RESISTANT FASTENERS:

A. Fasteners removable only by use of a special tool.

2.07 ANCHOR BOLTS:

A. Anchor bolts for equipment and machinery, where permanently anchored into concrete, shall be stainless steel, unless otherwise shown. The diameter, length, and any bend dimensions shall be as required by the equipment or machinery MANUFACTURER. Unless otherwise required, use 3/4 inch minimum diameter and other geometry shown on the Drawings. Furnish a minimum of two (2) nuts and a washer of the same material for each bolt. Provide sleeves as required or as shown for location adjustment.

B. Submerged use is defined as any connection to concrete from a point one (1) foot six (6) inches above the maximum water surface in a water-holding basin and any connection below that point.

C. Anchor bolts for other uses to anchor fabricated metalwork or structural building, or structural frame components in areas of wet use or washdown areas shall be stainless steel. Furnish two (2) nuts and one (1) washer per bolt of the same material as the bolt, unless otherwise shown.

2.08 STAINLESS STEEL FASTENERS LUBRICANT (ANTI-SEIZING):

A. Where stainless steel nuts and machined bolts, anchor bolts, concrete anchors, and all other threaded fasteners are used, the CONTRACTOR shall apply an anti-seizing lubricant to the threads prior to making up the connections. The lubricant shall contain substantial amounts of molybdenum disulfide, graphite, mica, talc, or copper.

2.09 ANCHORING SYSTEMS FOR CONCRETE:

A. Expansion (Wedge) Anchors:

1. Expansion anchors shall not be used except in dry areas, unless otherwise indicated on the Drawings.

2. Provide 316 stainless steel anchors; sizes as shown on the Drawings.

3. Expansion anchors shall be: ITW Trubolt Wedge Anchors, manufactured by ITW Redhead, Michigan City, IN; Hilti Kwik Bolt 3, manufactured by Hilti Corporation, Tulsa, OK; Wej-It Anchors, manufactured by Wej-It Fastening Systems, Norwalk, CT; or DISTRICT approved equal.

4. Provide ICC or other similar building code organization recommendations regarding safe allowable design loads.

B. Adhesive Anchors:

1. Adhesive anchors shall be used for anchoring metal components in damp, below grade or submerged locations and where indicated on the Drawings.

2. Adhesive anchors shall be Hilti HIT-RE 500 epoxy anchoring system with 316 stainless steel threaded rod, nuts and washers, as manufactured by Hilti Corporation, Tulsa, OK, or DISTRICT approved equal.

2.10 BOLTS AND FASTENERS:

A. Bolts and fasteners not permanently embedded in concrete, but located outdoors in areas subject to the weather; chemical handling areas; equipment rooms subject to drainage, leakage, and washdown; and in galleries and trenches, shall be Type 316 stainless steel as hereinbefore specified.

B. Bolts for flanges of piping, valves, and other similar connections shall be as specified in other sections or as shown on the Drawings.

2.11 FABRICATION:

A. Structural material shall be fabricated and assembled in the shop. Assembled pieces shall be taken apart for the removal of burrs and shavings produced by the reaming operation. Parts not connected in the shop shall be secured by bolts to prevent damage in shipment and handling.

B. Surfaces of joints for bolted connections shall be clean, bright metal. Fit-up of the parts shall be inspected and approved by the laboratory inspector prior to making final connection.

1. Holes for bolts shall be 1/16 inch larger than the diameter of the bolt.

2. ASTM A307 bolts transmitting shear shall be threaded to such a length that no more than one thread will be within the grip of the metal. The bolts shall be of the length that will extend through, but no more than 1/4 inch beyond the nut. Nuts shall be tightened while bolt heads are tapped with a hammer. Tightening shall progress outward from the center of the joint. Nuts shall be locked after final tightening.

3. Bolted connections using ASTM A325 bolts shall conform to the Specifications for Structural Joints using ASTM A325 or A490 bolts. Bolt threads shall be excluded from the shear planes of the contact surfaces between the connected parts and the bolts shall be tightened by the "Turn-of-Nut" method.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Fasteners shall be tightened in properly aligned holes to provide, when all fasteners in the joint are tight, at least the minimum tension required by AISC Specification for Bolted Connections. The turn-of-the-nut method shall be utilized for all high-strength bolts as defined by AISC Specification for Bolted Fasteners.

B. Anchor Bolts:

1. Anchor bolts and anchors shall be located and built into connecting work. All anchor bolts shall be accurately located and held in place with templates at the time the concrete is poured.

C. Concrete Anchors:

1. Installation shall not begin until the concrete or masonry receiving the anchors has attained its design strength. An anchor shall not be installed closer than six (6) times its diameter to either an edge of the concrete or masonry, or to another anchor, unless specifically detailed otherwise on the Drawings. Install in strict accordance with MANUFACTURER’s written instructions. Use MANUFACTURER’s recommended drills and equipment.

3.02 REUSE:

A. A490 bolts and galvanized A325 bolts shall not be reused. Other A325 bolts may be reused, if approved by the DISTRICT.

3.03 BOLTED PARTS:

A. The slope of the bolted parts in contact with the bolt head and nut shall not exceed 1:20 with respect to a plane normal to the bolt axis. Holes shall be punched and reamed, or drilled, and shall have a diameter nominally 1/16 inch in excess of the nominal bolt diameter. Over-size, short slotted and long slotted holes shall conform to the requirements of AISC Specifications for Structural Joints.

3.04 GALVANIZING:

A. The galvanizing of the bolts, nuts and washers shall conform to the requirements of ASTM A153.

END OF SECTION

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SECTION 05140 ALUMINUM FRAMING AND WELDING

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The WORK of this SECTION shall consist of furnishing all the labor, materials, and equipment necessary for installation of shop-fabricated aluminum framing, aluminum components and the connections of these items as shown on the Drawings and as specified herein. The requirements included in this SECTION apply to load-carrying members and connections.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 03600 – Grout
3. SECTION 05070 – Bolted Connections

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

B. Standards and Codes:

1. The Aluminum Association (AA)
   a. Aluminum Design Manual
   b. Specification for Aluminum Structures
2. American Welding Society (AWS)
   a. A2.4 – Standard Symbols for Welding, Brazing and Nondestructive Examination
   b. A5.10 – Welding Consumables–Wire Electrodes, Wires and Rods for Welding of Aluminum and Aluminum Alloys Classification
   c. B5.1 – Specification for the Qualification of Welding Inspectors – www.aws.org/store/page/bookstore-free-downloads
   d. D1.2 – Structural Welding Code–Aluminum
   e. QC1 – Specification for AWS Certification of Welding Inspectors – www.aws.org/store/page/bookstore-free-downloads
   f. QC7 – Standard for AWS Certified Welders – www.aws.org/store/page/bookstore-free-downloads
3. American Society for Testing and Materials (ASTM)
   a. B209 – Standard Specification for Aluminum and Aluminum-Alloy Sheet and Plate
   b. B221 – Standard Specification for Aluminum and Aluminum-Alloy Extruded Bars, Rods, Wire, Profiles, and Tubes
   c. B308 – Standard Specification for Aluminum-Alloy 6061-T6 Standard Structural Profiles
   d. B429 – Standard Specification for Aluminum-Alloy Extruded Structural Pipe and Tube
   e. E164 – Standard Practice for Contact Ultrasonic Testing of Weldments
   f. E165 – Standard Practice for Liquid Penetrant Examination for General Industry

g. E329 – Agencies Engaged in Construction Inspection, Testing, or Special Inspection

4. Florida Building Commission, Florida Building Code: Building (FBC) – https://floridabuilding.org

C. Unless otherwise indicated on the Drawings or specified herein, AA Specification for Aluminum Structures and AWS D1.2 shall govern the aluminum work.

1.03 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. The CONTRACTOR shall submit:

1. Shop and erection drawings shall include all required details for fabrication and erection. All welds shall be indicated by standard welding symbols as noted by AWS A2.4 with the size, length and type of each weld included.

2. Fabrication plant certification or a copy of the fabricator's quality control manual is required. Certification is required in order to have only quality control inspections in the fabrication plant without also having quality assurance inspections.

3. Welding procedure specifications and qualification records shall contain a notation that they have been reviewed by an AWS certified welding inspector, and they shall be signed, dated and stamped accordingly.

4. Welding personnel qualification records shall include the name of the welder, name of the testing facility or other certifier, tested processes and positions, date of the testing and the results of the testing for each welder.

5. Continuity records shall be submitted for each welder and welding operator having a qualification record older than six months.

6. The procedure and acceptance criteria report for ultrasonic testing of weldments, when required, shall indicate the entire length of the applicable welds are to be tested unless specified otherwise in this SECTION.

7. Documentation for the shop and erection quality control inspector qualification shall state the inspector has the training and experience required by AWS QC1 and this specification. The documentation shall also include the name of the inspector's employer.

C. The dimensioned Drawings are provided to convey the quantity and complexity of the components to be fabricated. The CONTRACTOR shall be responsible for proper checking and coordination of dimensions, details, member sizes and fit-up, and quantities of materials as required to facilitate the preparation of Shop Drawings that are complete and accurate. All details, notes and schedules appearing on the Drawings and giving information for fabrication or erection shall also be shown on the shop or erection drawings with dimensions either verified or with proposed dimensions needed for accurate fit-up of all components. Shop Drawings shall include all required member sizes, member shapes, member lengths, connections, cuts, copes and holes for all shop fabricated metal items.

D. Valid fabricator certification includes active American Institute of Steel Construction fabrication plant certification, AWS welding fabricator certification, or being included on the Florida Department of Transportation's production facility listing. The fabrication category shall match the category indicated on the certification.

E. The DISTRICT will waive the requirement for quality assurance inspections in the fabrication shop by an inspector appointed by the DISTRICT if valid fabricator certification is submitted. This waiver shall not eliminate any required quality control inspection or test. The CONTRACTOR shall pay for the quality assurance inspections in the fabrication shop by a DISTRICT appointed inspector if fabrication plant certification is not submitted. The DISTRICT's quality assurance inspection waiver shall not relieve the CONTRACTOR's responsibility to meet all inspection requirements of other permit providers and authorities having jurisdiction.

F. No waiver for the inspection of the erected aluminum by the quality assurance inspector shall be permissible.

1.04 RESPONSIBILITY FOR ERRORS:

A. The CONTRACTOR shall be responsible for all errors of detailing, fabrication, and for correct fitting measurements in the field to verify or supplement dimensions shown on the Drawings and shall assume responsibility for fitting new WORK to existing work.

B. The acceptance of Shop Drawings shall not relieve the CONTRACTOR of the responsibility for either the accuracy of the detailed dimensions in the Shop Drawings or the general fit-up of parts that are to be assembled in the field.

1.05 QUALIFICATIONS:

A. Fabrication shop and erection personnel shall have fabricated and erected projects of similar size and complexity for at least five (5) years.

B. Fabrication must be completed in a certified fabrication shop except as specified in this SECTION.

C. Welding personnel qualifications:

1. All welding personnel, including tack welders, shall be qualified in accordance with AWS D1.2. Qualification documentation shall be in accordance with one of the two below options.

a. The qualification test record shall be from a testing facility listed on the AWS Accredited Test Facilities Listing located at www.aws.org/certification/page/atf-domestic-listing as specified in AWS QC7.

b. The qualification test record shall have all of the applicable information indicated on the AWS supplied form located at app.aws.org/technical/sample_forms.

2. The test record for welders and welding operators showing a successful result for all applicable welding positions shall be no more than six (6) months old, or continuity records shall show no gap exceeding six (6) months without performing the applicable welding process.

3. A welder shall not weld in positions and conditions other than what the welder used in the qualification procedure except as specifically allowed in AWS D1.2.

D. Quality control inspector qualifications:

1. The quality control inspector shall be qualified to the satisfaction of the fabricator's or erector's quality control program, as applicable.

2. The quality control welding inspector shall be an associate welding inspector, welding inspector, or a senior welding inspector as defined in AWS B5.1.

E. Inspector qualification documentation for the quality assurance inspector will be submitted directly to the DISTRICT by the inspector's employer. The documentation will include the name of the inspector's employer and the inspector's contact information. The documentation will be processed by the DISTRICT as a submittal with a review stamp signed by the engineer who reviews submittals by the CONTRACTOR. The CONTRACTOR shall be responsible for providing a minimum of 24 hours advanced notification to the quality assurance inspector prior to the commencement of WORK. Quality assurance inspector qualifications:

1. The quality assurance inspector shall be qualified to the satisfaction of the agency's written practice.

2. The quality assurance welding inspector shall be an AWS certified welding inspector or a senior certified welding inspector as defined in AWS QC1.

3. A certified associate welding inspector is permitted to be used only under the direct supervision of a certified welding inspector, who is on the premises and available when quality assurance inspections are being conducted.

4. The quality assurance inspector shall not be employed by or affiliated with the Contractor, fabricator or erector.

5. The quality assurance welding inspector shall be listed on the American Welding Society's directory of certified inspectors available at www.aws.org/certification/onlinecertificationverification.

1.06 INSPECTIONS AND TESTING:

A. Inspections by the quality control inspector shall be implemented by the fabricator or erector, as applicable. All inspections by the quality control inspector shall be paid for by the CONTRACTOR.

B. Inspections and tests for quality assurance shall be performed by an independent agency complying with ASTM E329. The DISTRICT will select, coordinate, and pay for quality assurance inspections, except all required quality assurance inspections and tests in the fabrication shop shall be paid for by the CONTRACTOR. All material to be furnished shall be subject to inspections and tests in the shop and field.

C. Quality assurance reports shall be submitted to the DISTRICT on a weekly basis.

D. Inspection tasks shall be in accordance with AA Aluminum Design Manual Chapter N, AWS D1.2, and as specified herein. All welds shall be visually inspected.

E. Inspection tasks prior to welding:

1. Material identification
2. WPS available
3. Welding equipment
4. Welder qualification records and continuity records
5. Connecting elements size, thickness, and section types, as applicable
6. Welder identification system
7. Manufacturer certifications for welding consumables available
8. Fit-up of groove welds, as applicable, including joint geometry, including joint preparation, dimensions, cleanliness, tack welds, and backing type and fit
9. Fit-up of CJP groove welds of HSS T-, Y- and K-joints without backing, as applicable, including joint geometry, joint preparation, dimensions, cleanliness, and tack welds
10. Configuration and finish of access holes, as applicable
11. Fit-up of fillet welds, including dimensions, cleanliness, and tack welds

F. Inspection tasks during welding:

1. No welding over cracked tack welds
2. Environmental conditions, including wind speed within limits, rain and temperature
3. WPS followed, including equipment settings, travel speed, welding materials, shielding gas type and flow, preheat, interpass temperature, and proper position
4. Welding techniques, including interpass and final cleaning, profile limits, and quality
5. Placement and installation of headed stud anchors

G. Inspection tasks after welding:

1. Welds cleaned
2. Size, contour, length and location of welds

3. Welds meet visual acceptance criteria, including no cracks, fusion, crater section, profile, size, undercut, and porosity
4. Arc strikes
5. No fillet weld returned through weld access hole
6. Backing removed and weld tabs removed where required
7. Repair activities
8. No unspecified welds have been added without acceptance
9. Document acceptance or rejection of welded joint and connecting elements

H. The CONTRACTOR shall not request a substantial completion inspection until the quality assurance inspector provides notice to the DISTRICT that all aluminum components have been installed in accordance with the Contract Documents.

I. The DISTRICT will retain the services for and pay for the testing of field welds indicated below when applicable. The CONTRACTOR shall pay the cost for the testing of welds performed in the fabrication shop indicated below, and the testing services shall be retained by the DISTRICT. The CONTRACTOR shall pay the cost of any additional tests and investigation on WORK that does not meet the specified requirements. Any weld – including welds that are not initially applicable for testing – that is rejected by inspection and any corrective welding shall be subject to testing coordinated by the DISTRICT and paid for the CONTRACTOR.

J. All shop and field welds shall be tested in accordance with AWS D1.2 where indicated below and as specified. All testing documentation shall be submitted to the DISTRICT. The DISTRICT will waive the required shop quality assurance testing indicated below as specified in this SECTION. When quality assurance testing is waived, the testing shall be completed as part of the quality control program, and the results shall be reviewed by the quality assurance inspector.

K. Nondestructive Testing:

1. Ultrasonic testing may be required to be performed on the entire length of all complete-joint-penetration groove welds welded from one side without backing and inaccessible for visual inspection of the backside.
2. Visible discontinuities near an edge shall be ultrasonically tested prior to the edge being welded. The acceptability criteria shall be as specified in AWS D1.2.
3. When ultrasonic testing of a weldment is required, the base aluminum adjacent to the welded edge shall be ultrasonically tested within a minimum of one inch from the weld along the tested length on both sides of the weld. Discontinuities within one inch of the edge shall be repaired or the element shall be replaced in accordance with AWS D1.2.
4. Ultrasonic testing shall be performed on 25% of complete-joint-penetration groove welds subject to transversely applied tension loading as indicated on the Drawings and as otherwise applicable.
5. Ultrasonic testing may be required to be performed on all complete-joint-penetration groove welds subjected to cyclic loading.
6. The ultrasonic testing rate may be reduced where accepted by the DISTRICT. If the project has no more than 20 complete-joint-penetration welds, there shall be no reduction in the ultrasonic testing rate. Where the initial ultrasonic testing rate is 100%, the ultrasonic testing rate may be reduced to 25%, provided the rejection rate is less than 5%. The sample size shall be a minimum of 20 completed welds for the rejection rate determination.
7. Where the rate of ultrasonic testing is less than 100%, the testing rate for an individual welder or welding operator shall be increased to 100% if and while the rejection rate is 5% or more.

8. The required liquid penetrant examination rate of fillet welds shall be increased from **[none]** to 100% if a fillet weld is rejected by visual inspection. Where the examination rate is 100%, the rate may be reduced to 25%, provided the rejection rate is less than 5% based on a minimum sample size of 20 completed welds. Where a liquid penetrant examination of fillet welds is required, the examination shall be performed on a minimum of 50% of the weld length unless specified otherwise. The examination shall be in accordance with AWS D1.2 and ASTM E165.

L. When ultrasonic testing is required, the CONTRACTOR shall submit a procedure and acceptance criteria report for review in accordance with AWS D1.2 and ASTM E164 which is signed and sealed by a professional engineer licensed in Florida.

M. Nondestructive testing personnel shall be qualified for Level II and the qualification shall conform to the American Society for Nondestructive Testing Recommended Practice SNT-TC-1A, as applicable. The testing service provider may optionally be listed on www.asnt.org.

1.07 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - MATERIALS

2.01 GENERAL:

A. All items shall be of domestic manufacture, within trade tolerances, new, undamaged, without splices, and of the best commercial quality for the intended purposes unless accepted otherwise by the DISTRICT.

B. Provide handling and transportation methods that prevents damage and facilitates subsequent inspections in a safe manner.

C. All items shall be stored above the ground upon platforms, skids or supports. Material shall be kept free of dirt, grease and foreign matter and shall be protected from corrosion.

D. Like items of material provided shall be the end products of one MANUFACTURER in order to achieve standardization for appearance, maintenance, and replacement.

E. Dress exposed edges and ends of fabricated aluminum smooth, with no sharp edges and with corners slightly rounded.

F. Provide all brackets, straps, plates, bolts, nuts, washers, and similar items, as required for fabrication and erection.

G. Provide holes required for the connection of adjacent or adjoining work wherever noted on the Drawings. Locate holes for bolting to supports to a tolerance of 1/16-inch of exact dimensions indicated on the Drawings or accepted shop drawings.

2.02 FABRICATION:

A. All aluminum items shall be fabricated and preassembled in the shop. Assembled pieces shall be taken apart for the removal of burrs and shavings produced by the reaming operation. Welding shall be completed in the shop except where field welding is indicated on the Drawings.

B. I-beams, H-beams, channels, angles, tees and zees shall be manufactured using extruded alloy 6061 temper T6 in accordance with ASTM B308.

C. Pipes and tubes shall be manufactured using extruded alloy 6061 temper T6 in accordance with ASTM B429.

D. Member profiles other than those indicated above shall be fabricated using extruded alloy 6061 temper T6 in accordance with ASTM B221.

E. Sheets less than 0.25 inches thick shall be manufactured using rolled alloy 6061 temper T6 in accordance with ASTM B209.

F. Plates 0.25 inches and thicker shall be manufactured using rolled alloy 6061 temper T651 in accordance with ASTM B209.

G. The yield strength outside of weld affected zones, as determined in accordance with the ASTM specifications indicated, shall not be less than 35 ksi for all items indicated above.

H. The deflection limits shall be as specified in FBC Chapter 16 and AA Specification for Aluminum Structures.

I. After the applicable hot extrusion and elevated temperature manufacturing processes, the temperature of the aluminum outside of the portions heated by welding shall not exceed 150^{o} F except as specified in AA Specification for Aluminum Structures. Weldments shall not be heated above 150^{o} F after the welding process except as specified in AA Specification for Aluminum Structures.

J. Cutting shall be by shearing, sawing or another method listed in AA Specification for Aluminum Structures. Oxygen cutting is prohibited. Edges which have been arc or laser cut shall be planed to remove edge cracks. Cut edges shall be true, smooth, and free from excessive burrs or ragged breaks.

K. Holes shall be punched or drilled with no burrs or ragged edges. Punching shall not be used if the metal thickness is greater than the diameter of the hole.

L. Fabricated members shall not vary form straight or the specified curvature by more than the member length divided by 960.

M. Drainage holes must be provided to eliminate all standing and entrapped water as shown on the Drawings.

2.03 CONNECTIONS:

A. All connections shall be as indicated on the Drawings and as specified. Shop welded connections may be used in lieu of bolted connections only where accepted by the DISTRICT.

B. Bolts, nuts and washers shall be stainless steel Type 316 and in accordance with SECTION 05070.

C. Holes shall be punched or drilled at right angles to the surface of the aluminum and shall not be made or enlarged by burning. Holes shall be clean-cut without torn or ragged edges. Outside burrs resulting from drilling or reaming operation shall be removed.

D. Permanent bracing, openings in components for other trades, connections to existing construction, and all other special details shall be as indicated on the Drawings. Development of the Shop Drawings for connections and members shall account for all special details indicated. The CONTRACTOR shall be responsible for verifying all necessary field measurements.

E. Bolts shall be tightened to the snug-tight condition with all plies in firm contact.

2.04 WELDING:

A. Aluminum elements shall be welded with an inert-gas-shielded arc or resistance welding process. No welding process that requires a welding flux shall be used.

B. Filler alloys shall be produced in accordance with AWS A5.10. Use filler alloys only as indicated in AA Specification for Aluminum Structures. Use filler alloy 5356 for welding alloy 6061 to alloy 6061 with the GTAW or GMAW process unless accepted otherwise by the DISTRICT. The filler alloy may be 5183 or 5556 if accepted by the DISTRICT for welding alloy 6061 to alloy 6061.

PART 3 - EXECUTION

3.01 GENERAL:

A. Workmanship and finish of all metalwork specified under this SECTION shall be of the highest grade and equal to the best practice of modern shops for the respective WORK.

B. Provide all necessary connection hardware and brackets so that the WORK can be assembled in a neat, substantial manner. Conceal fastenings where practical. Drill metalwork and countersink holes as required for attaching hardware or other materials.

C. Avoid dissimilar metal contact. Clean metal shavings deposited from construction activities from all surfaces at the end of each work day.

D. Aluminum shall not be in contact with concrete or treated wood.

3.02 ERECTION AND INSTALLATION:

A. During erection, structural aluminum shall be adequately braced and fastened to resist dead, wind and erection loads.

B. Splices and field connections shall be made as shown or noted on the Drawings. Errors in shop fabrication or deformation resulting from handling and transportation that prevent the assembly and fitting of parts shall be reported immediately to the DISTRICT for directions as to the method of correction. Corrections shall be made at no additional cost to the DISTRICT.

C. Holes shall not be drifted for alignment in a manner that distorts the metal.

D. Column bases and bearing plates shall be attached as shown on the Drawings. Plates shall be supported and aligned on steel wedges, shims, or leveling nuts and washers. After the supported members have been plumbed, positioned and the anchor nuts set, the entire bearing area under the plate shall be dry-packed solidly with non-shrink grout. Cementitious grout shall not be in direct contact with aluminum. If wedges or shims are used, they shall be cut off flush with the edge of column base and bearing plates and left in place.

E. Install all items in accordance with the Shop Drawings, the Drawings, and these specifications. Install fabricated metalwork plumb or level as applicable. The complete installations shall, in all cases, be rigid, substantial, and neat in appearance.

F. All aluminum shall, when placed in the work, have a clean, uniform and silvery appearance that is free of dark streaks and discoloration.

3.03 WELDING:

A. Do not weld at an ambient temperature below 32^{o} F. Verify the minimum temperature of the metals in the area of welding is 50^{o} F.

B. When the ambient conditions are such that the normal temperature of the base metal is below 50^{o} F, preheat the area surrounding the joint to provide a base metal temperature of 100^{o} F for a distance of at least three (3) inches in all directions from the joint to be welded.

C. In a multi pass weld, ensure the interpass temperature is the temperature of the weld metal before the next pass is started.

D. Post weld heating of heat-treatable alloys for the purpose of stress relief shall not be acceptable. No post weld heat treatment of weldments shall be acceptable unless noted in the approved welding procedure specification.

3.04 COATING: Coat aluminum in accordance with SECTION 09900.

END OF SECTION

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SECTION 05521 HANDRAILS, RAILINGS, AND BOLLARDS

PART 1 - GENERAL

1.01 SCOPE:

A. Summary of Work: The WORK of this SECTION shall consist of furnishing all labor, material, and equipment necessary for the installation of handrails, railings, and bollards as shown on the Drawings and specified herein.

B. Related Work Specified Elsewhere:

1. SECTION 01300 – Submittals
2. SECTION 03600 – Grout

1.02 APPLICABLE STANDARDS AND PUBLICATIONS:

A. Standards or Codes: The edition of the publications of the organizations listed below in effect at the time of the advertisement for bids form a part of this specification to the extent referenced. See the various paragraphs for the specified standard. In the case of a conflict between the requirements of this SECTION and those of the listed document, the requirements of this SECTION shall prevail.

1. American Society for Testing and Materials (ASTM)
   a. B221-14 – Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes
   b. B210-12 - Standard Specification for Aluminum and Aluminum Alloy Drawn Seamless Tubes
2. American Welding Society (AWS)
   a. D1.2 – Structural Welding Code – Aluminum
3. Florida Fire Prevention Code

1.03 SUBMITTALS:

A. Submittals shall be in accordance with SECTION 01300.

B. Submit Shop Drawings, signed and sealed by a Professional Engineer registered and active in the State of Florida, for all handrails and railings showing materials, configurations, dimensions, accessories, anchorage, etc.

1.04 WARRANTY: The CONTRACTOR shall warrant the WORK against defects for one (1) year from the date of Substantial Completion and as described in Article 13 of Section 00700 - General Terms and Conditions.

PART 2 - PRODUCTS

2.01 MATERIALS: Comply with the requirements of the indicated specification.

A. Standard Specification for Aluminum and Aluminum Alloy Extruded Bars, Rods, Wire, Profiles and Tubes: American Society for Testing and Materials ASTM B221-14

B. Standard Specification for Aluminum and Aluminum Alloy Drawn Seamless Tubes: ASTM B210-12

C. Non-shrink, Nonferrous Grout: SECTION 03600

D. Bollards: ASTM 53 Grade B, galvanized steel pipe filled with concrete

2.02 FABRICATION:

A. General:

1. Form exposed work true to line and level with accurate angles and surfaces and straight sharp edges. Ease exposed edges to a radius of approximately 1/32-inch, unless otherwise shown.

2. Form bent-metal corners to the smallest radius possible without causing grain separation or otherwise impairing the WORK.

B. Non-welded Connections: When acceptable to the DISTRICT, intermediate post-to-rail connections may be made using internal pipe sleeve locks and Allen screw fasteners. Locking devices that do not produce flush, smooth, rigid, hairline joints will not be acceptable. Weld other connections.

C. Welded Connections: Cope intersections of rails and posts, weld joints and grind smooth. Butt weld end-to-end joints of railings or use welding connectors, at fabricator's option.

1. At connections to aluminum supports, weld post directly to supports, unless otherwise indicated.

2. Other methods of welding may be used when acceptable to the DISTRICT.

3. Weld corners and seams continuously and in accordance with the recommendations of American Welding Society (AWS). Grind exposed welds smooth and flush, to match and blend with adjoining surfaces. Discoloration of finished surfaces will not be acceptable.

4. Form exposed connections with flush, smooth, hairline joints, using concealed fasteners wherever possible. Use exposed fasteners of the type shown, or if not shown, use Phillips Flathead (countersunk) screws or bolts.

5. Provide for anchorage of the type shown, coordinated with the supporting structure. Fabricate and space anchoring devices as shown and as required to provide adequate support.

D. Brackets, Flanges, and Anchors:

1. Furnish cast brackets, flanges, and exposed anchors of the same material and finish as supported rails, unless otherwise indicated.

2. Furnish all fastenings as required for anchorage of railings to concrete or masonry work.

PART 3 - EXECUTION

3.01 INSTALLATION:

A. Fastening to In-Place Construction: Provide anchorage devices and fasteners where necessary for securing handrails and railing items to in-place construction; including, threaded fasteners for concrete and masonry inserts, toggle bolts, through bolts, lag bolts and other connectors as required. Use railing manufacturer's standard method of installation when acceptable to the DISTRICT.

B. Cutting, Fitting and Placement: Perform cutting, drilling and fitting required for installation. Set the work accurately in location, alignment and elevation, plumb, level, true and free of rack, measured from established lines and levels. Fit exposed connections accurately together to form tight hairline joints. Weld connections that are not to be left as exposed joints, but cannot be shop-welded because of shipping size limitations. Grind joints smooth and touch up shop paint coat. Do not weld, cut or abrade the surfaces of units that have been coated or finished after fabrication, and are intended for field connections. Adjust railings prior to securing in place to ensure proper matching at butting joints and correct alignment throughout their length. Space posts not more than four (4) feet on centers, unless otherwise shown on the Drawings. Plumb posts in each direction. Secure posts and rail ends to building construction as follows:

C. Secure handrails to walls with wall brackets and end fittings. Provide brackets with not less than 1-1/2 inches clearance from inside face to handrail to the finish wall surface. Drill wall plate portion of the bracket to receive one bolt, unless otherwise indicated for concealed anchorage. Locate brackets as indicated or, if not indicated, at not more than eight (8) feet on center. Provide flush-type wall return fittings with the same projection as that specified for wall brackets. Secure wall brackets and wall return fittings to building construction as follows:

1. For concrete and solid masonry anchorage, use stainless steel epoxy-set anchors.

2. For hollow masonry anchorage, use Hilti HIT-HY 20 for Masonry Anchoring System, manufactured by Hilti Corporation, Tulsa, OK.

3. For drywall anchorage, provide horizontal wood blocking connecting consecutive studs, use toggle bolts having square heads.

D. Bollards:

1. Refer to the Drawings for pipe diameters.

a. Erect bollards plumb and aligned and located as shown on civil drawings, footings as shown on the Drawings. Fill steel pipes with 2,500 pounds per square inch (psi) concrete and finish top smooth and convex. Paint and finish as required by the DISTRICT.

END OF SECTION