

INVITATION FOR BID
CONSTRUCTION
NO. 23-TA004431JH
MISSIONARY VILLAGE LIFT
STATION REHABILITATION
PROJECT NO. 6022386
NOVEMBER 02, 2022

Manatee County BCC
Procurement Division
1112 Manatee Avenue West Ste 803
Bradenton, FL 34205
purchasing@mymanatee.org



ADVERTISEMENT

**INVITATION FOR BID CONSTRUCTION NO. 23-TA004431JH
MISSIONARY VILLAGE LIFT STATION REHABILITATION**

Manatee County, a political subdivision of the State of Florida (hereinafter referred to as County), will receive sealed bids from individuals, corporations, partnerships, and other legal entities authorized to do business in the State of Florida, to provide Missionary Village Lift Station Rehabilitation, as specified in this Invitation for Bid Construction to include Lift Station Rehabilitation.

DATE, TIME AND PLACE DUE:

The Due Date and Time for submission of Bids in response to this Invitation for Bid Construction (IFBC) is **December 7, 2022 at 11:00 A.M ET**. Bids must be delivered to the following location: Manatee County Administration Building, 1112 Manatee Ave. W., Suite 803, Bradenton, FL 34205 prior to the Due Date and Time.

SOLICITATION INFORMATION CONFERENCE:

No Solicitation Information Conference will be conducted for this solicitation.

DEADLINE FOR QUESTIONS AND CLARIFICATION REQUESTS:

The deadline to submit all questions, inquiries, or requests concerning interpretation, clarification or additional information pertaining to this Invitation for Bid Construction to the Manatee County Procurement Division is November 16, 2022. Questions and inquiries should be submitted via email to the Designated Procurement Contact shown below.

Important: A prohibition of lobbying is in place. Review Section A.13 carefully to avoid violation and possible sanctions.

DESIGNATED PROCUREMENT CONTACT: Jeb Hayter, Procurement Agent
(941) 749-3055, Fax (941) 749-3034
Email: jeb.hayter@mymanatee.org
Manatee County Financial Management Department
Procurement Division

AUTHORIZED FOR RELEASE: _____

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SECTION A, INFORMATION FOR BIDDERS

To receive consideration, entities who submit a response to this Invitation for Bid Construction (Bidders) must meet the minimum qualification requirements and comply with the following instructions. Bid responses (Bids) will be accepted from single business entities, joint ventures, partnerships or corporations.

A.01 BID DUE DATE

The Due Date and Time for submission of Bids in response to this Invitation for Bid Construction (IFBC) is **December 7, 2022 at 11:00 A.M. ET**. Bids must be delivered to the following location: Manatee County Administration Building, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205 and time stamped by a Procurement representative prior to the Due Date and Time.

Bids received after the Due Date and Time will not be considered. It will be the sole responsibility of the Bidder to deliver its Bid to the Manatee County Procurement Division for receipt on or before the Due Date and Time. If a Bid is sent by U.S. Mail, courier or other delivery services, the Bidder will be responsible for its timely delivery to the Procurement Division. Bids delayed in delivery will not be considered, will not be opened at the public opening, and arrangements will be made for their return at the Bidder's request and expense.

A.02 SOLICITATION INFORMATION CONFERENCE AND SITE VISIT:

No Solicitation Information Conference will be conducted for this solicitation. No County escorted site visit will be conducted for this solicitation; however, it is a minimum qualification requirement that the Bidder, or its representative(s) has made an inspection of the construction site for work specified in this IFBC.

Attendance to mandatory information conferences and/or site visits are required to meet the minimum qualification requirements of the IFBC. Attendance to non-mandatory information conferences and/or site visit is not required, but is strongly encouraged.

A.03 PUBLIC OPENING OF BIDS

Bids will be opened immediately following the Due Date and Time at the Manatee County Administration Building, Suite 803 in the presence of County officials. Bidders or their representatives may attend the Bid opening.

Manatee County will make public at the opening the names of the business entities which submitted a Bid and the total bid price submitted. No review or analysis of the Bids will be conducted at the Bid opening.

A.04 SUBMISSION OF BIDS

The contents of the Bid sealed package must include:

- One (1) bound original clearly identifying Bidder and marked "ORIGINAL".
- One (1) electronic format copy clearly identifying Bidder.

Electronic format copy should be submitted on a Universal Serial Bus (USB) portable flash memory drive or compact disc (CD) in Microsoft Office® or Adobe Acrobat® portable document format (PDF) in one continuous file. Do not password protect or otherwise encrypt electronic Bid copies. Electronic copies must be searchable and contain an identical Bid to the original.

Submit the Bid package in a sealed container with the following information clearly marked on the outside of the package: IFBC NO. 23-TA004431JH, Missionary Village Lift Station Rehabilitation, Bidder's name, and Bidder's address. Bids must be delivered to the Manatee County Procurement Division prior to the Due Date and Time at the following address:

Manatee County Procurement Division
1112 Manatee Avenue West, Suite 803
Bradenton, FL 34205

A.05 DISTRIBUTION OF SOLICITATION DOCUMENTS

All documents issued pursuant to this IFBC are distributed electronically and available for download at no charge at www.mymanatee.org > *Bids and Proposals*. Documents may be viewed and downloaded for printing using Adobe Reader® software.

At its sole discretion, the County may utilize third-party providers to distribute proposals. Visit the third-party's website for more information regarding this service. Participation in the third-party system is not a requirement for doing business with Manatee County.

Additionally, the IFBC and all related documents are available for public inspection at the Manatee County Procurement Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205. Call (941) 749-3014 to schedule an appointment. Documents are available between the hours of 8:00 A.M. and 5:00 P.M., Monday through Friday, with the exception of County holidays.

As a courtesy, Manatee County notifies the Manatee County Chamber of Commerce and the Manatee County Black Chamber of Commerce of all active solicitations, who then distributes the information to its members.

A.06 EXAMINATION OF BID DOCUMENTS AND SITE(S)

It is the responsibility of each bidder before submitting a bid, to (a) examine the IFBC documents thoroughly; (b) visit the Project Site(s) to become familiar with local conditions that may affect cost, progress, performance, or furnishing of the Work; (c) consider federal, state, and local codes, laws, and regulations that may affect costs, progress, performance, or furnishing of the Work; (d) study and carefully correlate bidder's observations with the IFBC documents; and (e) notify County in writing of all conflicts, errors, or discrepancies in the IFBC documents.

Each bidder may, at bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests and studies, and obtain any additional information and

data which pertain to the physical conditions at or contiguous to the Project Site(s) or otherwise which may affect cost, progress, performance or furnishing of the Work and which bidder deems necessary to determine his bid for performing and furnishing the Work in accordance with the time, price and other terms and conditions of the IFBC documents. County will provide each bidder access to the site(s) to conduct such explorations and tests.

Bidder shall fill all holes, clean up and restore the Project Site(s) to its former condition upon completion of such explorations. The lands upon which the Work is to be performed, rights-of-way and easements for access thereto, and other lands designated for use by successful bidder in performing the Work are identified in the IFBC documents.

All additional lands and access thereto required for temporary construction facilities or storage of materials and equipment are to be provided by successful bidder. Easements for permanent structures or permanent changes in existing structures are to be obtained and paid for by County unless otherwise provided in the IFBC documents.

Inspection of the Project Site(s) is a requirement to be considered for award of this bid. Prior to submitting a bid, each bidder shall examine the Project Site(s) and all conditions thereon fully familiarizing themselves with the full scope of the Work. Failure to become familiar with Project Site conditions will in no way relieve the successful bidder from the necessity of furnishing any materials or performing any Work that is required to complete the Project in accordance with the Project Plans and Specifications. Bidder shall acknowledge inspection of the Project Site(s) on his/her signed, submitted Bid Form.

A.07 ADDENDA

Any interpretations, corrections or changes to this IFBC will be made by addenda. Addenda will be posted on the Procurement Division's web page of the County website at <http://www.mymanatee.org/purchasing> > *Bids and Proposals*. For those solicitations that are advertised on a third-party website, addenda will also be posted on the third-party's distribution system on the 'Planholders' link.

All addenda are a part of the IFBC and each Bidder will be bound by such addenda. It is the responsibility of each Bidder to read and comprehend all addenda issued. Failure of any Bidder to acknowledge an issued addendum in its Bid will not relieve the Bidder from any obligation contained therein.

A.08 BID FORMS

Bids must include the forms provided in this IFBC. If needed, additional pages may be attached to a form. Bidders must fully complete and execute all Bid Forms. Bid Forms must be executed by an authorized official of the company who has the legal authority to bind the company.

A.09 BID EXPENSES

All costs incurred by Bidder in responding to this IFBC will be the sole responsibility of

the Bidder.

A.10 QUESTION AND CLARIFICATION PERIOD

Each Bidder shall examine all IFBC documents and will judge all matters relating to the adequacy and accuracy of such documents. Any questions or requests concerning interpretation, clarification or additional information pertaining to this IFBC, including the sample Agreement, shall be made in writing via email to the Manatee County Procurement Division to the Designated Procurement Contact or to purchasing@mymanatee.org. All questions received and responses given will be provided to potential bidders via an addendum to this IFBC.

Manatee County will not be responsible for oral interpretations given by other sources including County staff, representative, or others. The issuance of a written addendum by the Procurement Division is the only official method whereby interpretation, clarification or additional information will be given.

A.11 FALSE OR MISLEADING STATEMENTS

Bids which contain false or misleading statements, or which provide references which do not support an attribute or condition claimed by the Bidder, may be rejected. If, in the opinion of the County, such information was intended to mislead the County in its evaluation of the Bid, and the attribute, condition or capability is a requirement of this IFBC. Such Bidder will be disqualified from consideration for this IFBC and may be disqualified from submitting a response on future solicitation opportunities with the County.

A.12 CONFIDENTIALITY OF SECURITY RELATED RECORDS

- a. Pursuant to Florida Statutes § 119.071(3), the following records (hereinafter referred to collectively as “the Confidential Security Records”) are confidential and exempt from the disclosure requirements of Florida Statutes § 119.07(1):
 - i. A Security System Plan or portion thereof for any property owned by or leased to County or any privately owned or leased property held by County.
 - ii. Building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout and structural elements of a building, arena, stadium, water treatment facility, or other structure owned or operated by County.
 - iii. Building plans, blueprints, schematic drawings, and diagrams, including draft, preliminary, and final formats, which depict the internal layout or structural elements of an attractions and recreation facility, entertainment or resort complex, industrial complex, retail and service development, office development, or hotel or motel development in the possession of, submitted to County.
- b. Successful Bidder agrees that, as provided by Florida Statute, it shall not, as a result of a public records request, or for other reason disclose the contents of, or release or provide copies of the Confidential Security Records to any other party absent the express written authorization of County’s Property Management Director or to comply

with a court order requiring such release or disclosure. To the extent successful Bidder receives a request for such records, it shall immediately contact the County's designated Contract administrator who shall coordinate County's response to the request.

A.13 LOBBYING

After the issuance of any IFBC, prospective bidders, bidders, or their agents, representatives or persons acting at the request of such bidder shall not contact, communicate with or discuss any matter relating to the IFBC with any officer, agent or employee of Manatee County other than the Purchasing Official or the contact identified in this IFBC, pursuant to the Manatee County Code of Laws. This prohibition includes copying such persons on all written communication, including email correspondence. This requirement begins with the issuance of an IFBC and ends upon execution of the final Agreement or when the IFBC has been cancelled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Code of Laws.

A.14 UNBALANCED BIDDING PROHIBITED

County recognizes that large and/or complex projects will often result in a variety of methods, sources, and prices. However, where in the opinion of the County such variation does not appear to be justified given bid requirements and industry and market conditions, the Bid will be presumed to be unbalanced. Examples of unbalanced Bids will include:

- a. Bids showing omissions, alterations of form, additions not specified, or required conditional or unauthorized alternate bids.
- b. Bids quoting prices that substantially deviate, either higher or lower, from those included in the Bids of competitive Bidders for the same line item unit costs.
- c. Bids where the unit costs offered are in excess of, or below reasonable cost analysis values.

In the event County determines that a Bid is presumed unbalanced, it will request the opportunity to and reserves the right to, review all source quotes, bids, price lists, letters of intent, and other supporting documentation which the Bidder obtained and upon which the Bidder relied upon to develop its Bid. County reserves the right to deem any presumptive unbalanced Bid where the Bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs as non-responsive.

A.15 FRONT LOADING OF BID PRICING PROHIBITED

Prices offered for performance and/or acquisition activities which occur early in the Project Schedule, such as mobilization; clearing and grubbing; or maintenance of traffic; that are substantially higher than pricing of competitive bidders within the same portion of the Project Schedule, will be presumed to be front loaded. Front loaded bids could reasonably appear to be an attempt to obtain unjustified early payments creating a risk of insufficient incentive for the bidder to complete the Work or otherwise creating an appearance of an undercapitalized bidder.

In the event County determines that a bid is presumed to be front loaded, it will request the opportunity to, and reserves the right to, review all source quotes, bids, price lists, letters of intent, and other documents which the bidder obtained and upon which the bidder relied upon to develop the pricing or acquisition timing for these bid items. County reserves the right to reject as nonresponsive any presumptive front-loaded bids where the bidder is unable to demonstrate the validity and/or necessity of the front-loaded costs.

A.16 WITHDRAWAL OR REVISION OF BIDS

Bidders may withdraw Bids under the following circumstances:

- a. If Bidder discovers a mistake(s) prior to the Due Date and Time. Bidder may withdraw its Bid by submitting a written notice to the Procurement Division. The notice must be received in the Procurement Division prior to the Due Date and Time for receiving Bids. A copy of the request shall be retained, and the unopened Bid returned to the Bidder; or
- b. After the Bids are opened but before a contract is signed, Bidder alleges a material mistake of fact if:
 1. The mistake is clearly evident in the solicitation document; or
 2. Bidder submits evidence which clearly and convincingly demonstrates that a mistake was made in the Bid. Request to withdraw a Bid must be in writing and approved by the Purchasing Official.

A.17 IRREVOCABLE OFFER

Any Bid may be withdrawn up until the Due Date and Time. Any Bid not so withdrawn shall, upon opening, constitute an irrevocable offer for a period of one hundred twenty (120) days to provide the goods or services set forth in this IFBC or until one or more of the Bids have been duly accepted by County, whichever occurs first.

A.18 RESERVED RIGHTS

County reserves the right to accept or reject any and/or all bids, to waive irregularities and minor technicalities, and to request resubmission. Also, County reserves the right to accept all or any part of the bid and to increase or decrease quantities to meet additional or reduced requirements of County. Any sole response received by the first submission date may or may not be rejected by County depending on available competition and current needs of County. For all items combined, the bid of the lowest, responsive, responsible bidder will be accepted, unless all bids are rejected.

The lowest, responsible bidder shall mean that Bidder who makes the lowest Bid to sell goods and/or services of a quality which meets or exceeds the quality of goods and/or services set forth in the IFBC documents or otherwise required by County.

To be responsive, a Bidder shall submit a Bid which conforms in all material respects to the requirements set forth in the IFBC.

To be a responsible bidder, the bidder shall have the capability in all respects to perform fully the bid requirements, and the tenacity, perseverance, experience, integrity, reliability, capacity, facilities, equipment, and credit which will assure good faith performance.

Also, County reserves the right to make such investigation as it deems necessary to determine the ability of any bidder to furnish the service requested. Information County deems necessary to make this determination shall be provided by the bidder. Such information may include, but shall not be limited to current financial statements, verification of availability of equipment and personnel, and past performance records.

A.19 APPLICABLE LAWS

Bidder must be authorized to transact business in the State of Florida. All applicable laws and regulations of the State of Florida and ordinances and regulations of Manatee County will apply to any resulting Agreement. Any involvement with the Manatee County Procurement Division shall be in accordance with the Manatee County Procurement Ordinance as amended.

A.20 COLLUSION

By submitting a bid in response to this IFBC, Bidder certifies that it has not divulged, discussed or compared its bid with any other bidder, and has not colluded with any other bidder or parties to this bid whatsoever. Further, Bidder, and in the case of a joint bid each party thereto, certifies as to their own organization, that in connection with this IFBC that:

- a. All prices and/or cost data submitted have been arrived at independently, without consultation, communication, or agreement, for the purpose of restricting competition, as to any matter relating to such prices and/or cost data, with any other bidder or with any competitor;
- b. All prices and/or cost data quoted for this bid have not been knowingly disclosed by the Bidder and will not knowingly be disclosed by the Bidder, prior to the scheduled opening, directly or indirectly to any other bidder or to any competitor;
- c. No attempt has been made, or will be made, by Bidder to induce any other person or firm to submit or not to submit a bid for the purpose of restricting competition;
- d. The only person or persons interested in this bid is/are named in Bidder's Bid and that no person other than those identified has any interest in the Bid or in the resulting Agreement to be entered into.
- e. No person or agency has been employed or retained to solicit or secure the resulting Agreement upon an agreement or understanding or a commission, percentage, brokerage, or contingent fee except bona fide employees or established commercial agencies maintained by Bidder for purpose of doing business.

A.21 CODE OF ETHICS

With respect to this and any bid, if a Bidder violates, directly or indirectly, the ethics provisions of the Manatee County Procurement Code and/or Florida criminal or civil laws related to public procurement, including but not limited to Florida Statutes Chapter 112, Part II, Code of Ethics for Public Officers and Employees, such Bidder will be ineligible for award to perform the work described in this IFBC, and may be disqualified from submitting on any future quote or bid requests to supply goods or services to Manatee County. By submitting a bid, the Bidder represents to County that all statements made, and materials submitted are truthful, with no relevant facts withheld.

A.22 PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES

A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime, as that term is defined in Section 287.133, Florida Statutes, may not submit a bid to provide any goods or services to a public entity; may not submit a bid with a public entity for the construction or repair of a public building or public work; may not submit bids on leases of real property to a public entity; may not be awarded or perform Work as a contractor, supplier, Subcontractor, or consultant under an agreement with any public entity; and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, Florida Statutes, for CATEGORY TWO for a period of thirty-six (36) months following the date of being placed on the convicted list.

In addition, the Manatee County Code of Laws prohibits the award of any bid to any person or entity who/which has, within the past five (5) years, been convicted of, or admitted to in court or sworn to under oath, a public entity crime or of any environmental law that, in the reasonable opinion of the Purchasing Official, establishes reasonable grounds to believe the person or business entity will not conduct business in a responsible matter.

To ensure compliance with the foregoing, the Code requires all persons or entities desiring to do business with County to execute and file with the Purchasing Official an affidavit, executed under the pain and penalties of perjury, confirming that person, entity and any person(s) affiliated with the entity, does not have such a record and is therefore eligible to seek and be awarded business with County. In the case of a business entity other than a partnership or a corporation, such affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, such affidavit shall be executed by the general partner(s). A Public Contracting and Environmental Crimes Certification form is attached herein for this purpose.

A.23 SCRUTINIZED COMPANIES

Florida Statutes § 287.135, as amended from time to time, may contain limitations on the part of a company to conduct business with the County. Submission of a response to this solicitation shall be subject to all procedural requirements contained within that statute including the submission of any required certification of eligibility to contract with the County. It shall be the responsibility of the company responding to this solicitation to concurrently review the current version of the statute and ensure it is compliant. To the

extent a certification is required, it shall be provided on the form located at Appendix F *Vendor Certification Regarding Scrutinized Companies Lists*.

A.24 AGREEMENT

The successful Bidder will be required to execute the Agreement, a sample of which is attached hereto and made a part hereof. The County will transmit the Agreement to the successful Bidder for execution. The successful Bidder agrees to deliver the required number of duly executed copies of the Agreement, with any other required documents, to the County within ten calendar days of receipt.

A.25 LEGAL NAME

Bidders shall clearly indicate the full legal name, including any d/b/a, address, email address, and telephone number on the Bid Form. Bid Forms shall be signed above the typed or printed name and title of the signer. The signer must be an official of the organization and have the authority to bind the bidder to the submitted bid.

When bidder is a partnership, the Bid Form shall be signed in the name of the firm and by all partners required under the terms of the partnership agreement. When a corporation is a bidder, the authorized corporate officers shall sign.

Bidders who are corporations or limited partnerships shall provide a certified copy of their permit to transact business in the State of Florida, preferably along with the Bid Form, or within forty-eight (48) hours after request by County.

When submitting a bid as a joint venture, it must have filed paper documents with the Division of Profession's Construction Industry Licensing Board prior to submitting a bid.

A.26 DISCOUNTS

All discounts must be incorporated in the prices contained in the bid and not shown separately. Unless otherwise specified in this IFBC, pricing must be all inclusive, including delivery costs. The prices indicated on the Pricing Form shall be the prices used in determining award.

A.27 TAXES

Manatee County is exempt from Federal Excise and State Sales Taxes. (F.E.T. Cert. No. 59-78-0089K; Florida Sales Tax Exempt Cert. No. 85-8012622206C-6). Therefore, the Bidder is prohibited from delineating a separate line item in its bid for any sales or service taxes.

The successful Bidder will be responsible for the payment of taxes of any kind, including but not limited to sales, consumer, use, and other similar taxes payable on account of the work performed and/or materials furnished under the award in accordance with all applicable laws and regulations.

A.28 QUALITY

Unless otherwise specifically provided in the IFBC documents, all goods provided shall

be new, the latest make or model, of the best quality, of the highest grade of workmanship, and of the most suitable for the purpose intended.

Unless otherwise specifically provided in the IFBC documents, reference to any equipment, material, article or patented process, by trade name, brand name, make or catalog number, shall be regarded as establishing a standard of quality and shall not be construed as limiting competition.

A.29 AUTHORIZED PRODUCT REPRESENTATION

Bidder, by virtue of submitting the name and specifications of a manufacturer's product, will be required to furnish the named manufacturer's product. Failure to do so may, in the County's sole discretion, be deemed a material breach of the resulting agreement and shall constitute grounds for County's immediate termination of the resulting agreement.

A.30 ROYALTIES AND PATENTS

The successful Bidder shall pay all royalties and license fees for equipment or processes in conjunction with the equipment and/or services being furnished. Successful Bidder shall defend all suits or claims for infringement of any patent, trademark or copyright, and shall save County harmless from loss on account thereof, including costs and attorney's fees.

A.31 AMERICANS WITH DISABILITIES ACT

Manatee County does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of County's functions including one's access to participation, employment, or treatment in its programs or activities. Anyone requiring reasonable accommodation for an information conference or bid opening should contact the person named on the cover page of this document at least twenty-four (24) hours in advance of either activity.

A.32 EQUAL EMPLOYMENT OPPORTUNITY

In accordance with Title VI of the Civil Rights Act of 1964, Title 15, Part 8 of the Code of Federal Regulations and the Civil Rights Act of 1992, Manatee County hereby notifies all Bidders that it will affirmatively ensure minority business enterprises are afforded full opportunity to participate in response to this IFBC and will not be discriminated against on the grounds of race, color, national origin, religion, sex, age, handicap, or marital status in consideration of award.

A.33 MINORITY AND/OR DISADVANTAGED BUSINESS ENTERPRISES

The State of Florida Office of Supplier Diversity provides the certification process and maintains the database of certified MBE/DBE firms. Additional information may be obtained at https://www.dms.myflorida.com/agency_administration/office_of_supplier_diversity_osd or by calling (850) 487-0915.

A.34 DELIVERY

Unless otherwise specified, all prices shall include all delivery cost (FOB Destination).

A.35 MATHEMATICAL ERRORS

- a. Bid pricing forms without imbedded mathematical formulas: In the event of multiplication/extension error(s), the unit price shall prevail. In the event of addition error(s) the extension totals will prevail. In the event the dollar amount for contract contingency is omitted, it will be added to the total price of the Bid.
- b. Bid pricing forms with imbedded mathematical formulas: Interactive bid pricing forms that contain mathematical formulas may be provided to automate lengthy and complex bid forms. In the event bid pricing forms with imbedded formulas are used and a multiplication/extension error(s) is discovered in the formula, the unit price entered by the Bidder shall prevail.
- c. Bidder shall assume the responsibility and accuracy of the information input in the bid pricing form and therefore shall verify that the calculations are correct before submitting its Bid.
- d. Regardless of the type of bid pricing form used, all Bids shall be reviewed mathematically by the County using these standards.

A.36 SUBCONTRACTORS

The successful bidder will obtain prior written approval from the County for any subcontractor(s) and the work each will perform. A subcontractor is defined as any entity performing work within the scope of the project who is not an employee of the successful Bidder.

Bidders subcontracting any portion of the work shall include a list of subcontractors along with their bid. The list shall include: name and address of subcontractor, type of work to be performed and the percent of the contract amount to be subcontracted.

A.37 E-Verify

Prior to the employment of any person under this contract, the successful Bidder shall utilize the U.S. Department of Homeland Security's E-Verify system to verify the employment eligibility of (a) all persons employed during the contract term by the successful Bidder to perform employment duties within Florida and (b) all persons, including subcontractors, assigned by the successful Bidder to perform work pursuant to the contract with Manatee County. For more information on this process, please refer to United States Citizenship and Immigration Service site at: <http://www.uscis.gov/>.

Only those individuals determined eligible to work in the United States shall be employed under this contract.

By submission of a bid in response to this IFBC, the successful Bidder commits that all employees and subcontractors will undergo e-verification before placement on this contract.

The successful Bidder shall maintain sole responsibility for the actions of its employees

and subcontractors. For the life of the contract, all employees and new employees brought in after contract award shall be verified under the same requirement stated above.

A.38 DISCLOSURE

Upon receipt, all inquiries and responses to inquiries related to this IFBC become “Public Records,” and shall be subject to public disclosure consistent with Florida Statutes, Chapter 119.

Bids become subject to disclosure thirty (30) days after the opening or if a notice of intent to award decision is made earlier than this time as provided by Florida Statutes § 119.071(1)(b). No announcement or review of the bids shall be conducted at the public opening.

Based on the above, County will receive bids at the time and date stated and will make public at the opening the names of the business entities of all that submitted a bid.

If County rejects all bids and concurrently notices its intent to reissue the solicitation, the rejected bids are exempt from public disclosure until such time as County provides notice of an intended decision concerning the reissued solicitation or until County withdraws the reissued solicitation. A bid is not exempt for longer than twelve (12) months after the initial notice rejecting all bids.

Pursuant to Florida Statutes 119.0701, to the extent successful Bidder is performing services on behalf of the County, successful Bidder must:

- a. Keep and maintain public records required by public agency to perform the service.
- b. Upon request from the public agency’s custodian of public records, provide the public agency with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Florida Statutes, Chapter 119, or as otherwise provided by law.
- c. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of the contract term and following completion of the contract if the successful Bidder does not transfer the records to the public agency.
- d. Upon completion of the contract, transfer, at no cost, to the public agency all public records in possession of contractor or keep and maintain public records required by the public agency to perform the service. If the successful Bidder transfers all public records to the public agency upon completion of the contract, the successful Bidder shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the successful Bidder keeps and maintains public records upon completion of the contract, the successful Bidder shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the public agency, upon request from public

agency's custodian of public records, in a format that is compatible with the information technology systems of the public agency.

IF THE SUCCESSFUL BIDDER HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE SUCCESSFUL BIDDER'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO ANY RESULTING CONTRACT, CONTACT COUNTY'S CUSTODIAN OF PUBLIC RECORDS AT:

Phone: (941) 742-5845

Email: debbie.scaccianoce@mymanatee.org

Mail: Manatee County BCC

Attn: Records Manager

1112 Manatee Ave W.

Bradenton, FL 34205.

A.39 LOCAL PREFERENCE

Local business is defined as a business legally authorized to engage in the sale of the goods and/or services, and which certifies within its Bid that for at least six (6) full months prior to the advertisement of this IFBC it has maintained a physical place of business in Manatee, Desoto, Hardee, Hillsborough, Pinellas or Sarasota County with at least one full-time employee at that location.

Local preference shall not apply to the following categories of agreements:

- a. Purchases or agreements which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions governing the funds prohibit the preference.
- b. Any bid announcement which specifically provides that local preference, as set forth in this section, is suspended due to the unique nature of the goods or services sought, the existence of an emergency as found by either the County Commission or County Administrator, or where such suspension is, in the opinion of the County Attorney, required by law.
- c. For a competitive solicitation for construction services in which fifty percent (50%) or more of the cost will be paid from state.
- d. To qualify for local preference under this section, **a local business must certify to County** by completing an "**Affidavit as to Local Business Form**," which is available for download at www.mymanatee.org/vendor. Click on "Affidavit for Local Business" to access and print the form. Complete, notarize, and mail the notarized original to the following address: Manatee County Procurement Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205.
- e. It is the responsibility of the bidder to ensure accuracy of the Affidavit as to Local Business and notify County of any changes affecting same.

A.40 VENDOR REGISTRATION

Registering your business will provide Manatee County a sourcing opportunity to identify suppliers of needed goods and services and identify local businesses. To register as a supplier with the County go to www.mymanatee.org/vendor. For assistance with supplier

registration, call the Procurement Division main number at (941) 749-3014. Office hours are Monday – Friday, 8:00 A.M. to 5:00 P.M., excluding County holidays.

A link to Vendor Registration is listed on the Procurement Division’s web page at <http://www.mymanatee.org/home/government/departments/financial-management/purchasing.html>. Click on “*Register as a Vendor*”, then “*Vendor Registration Form*”. Registration is not mandatory to submit a Bid.

A.41 ENVIRONMENTAL SUSTAINABILITY

All bidders are encouraged to use as many environmentally preferable "green" products, materials, as supplies, as possible to promote a safe and healthy environment. Environmentally preferable are products or services that have a reduced adverse effect on the environment.

Bidder shall acknowledge in its Bid if Bidder has an environmental sustainability initiative. In addition, Bidder shall submit with its Bid a brief summary of Bidder’s environmental sustainability initiative. This information will be used as a determining factor in the award decision when all other factors, including local preference, are otherwise equal.

A.42 ePAYABLES

Manatee County Board of County Commissioners and the Manatee County Clerk of the Circuit Court have partnered to offer the ePayables program, which allows payments to be made to vendors via credit cards.

The Clerk of the Circuit Court will issue a unique credit card number to vendor after goods are delivered or services rendered, vendors submit invoices to the remit to address on the purchase order. When payments are authorized, an email notification is sent to the vendor. The email notification includes the invoice number(s), invoice date(s), and amount of payment. There is no cost for vendors to participate in this program; however, there may be a charge by the company that processes your credit card transactions.

If Bidder is interested in participating in this program, complete the ePayables Application attached herein and return the completed form via email to tina.mancini@manateeclerk.com.

A.43 BASIS OF AWARD

County will not make award to a Bidder who is delinquent in payment of any taxes, fees, fines, contractual debts, judgments, or any other debts due and owed to the County, or is in default on any contractual or regulatory obligation to the County. By submitting this solicitation response, Bidder attests that it is not delinquent in payment of any such debts due and owed to the County, nor is it in default on any contractual or regulatory obligation to the County. In the event the Bidder’s statement is discovered to be false, bidder will be subject to suspension and/or debarment and the County may terminate any award it has with bidder.

Award shall be to the lowest, responsive, responsible bidder(s) meeting specifications which includes delivery time requirements, qualification requirements, and having the lowest total offer for requirements listed on the Bid Form for the Work as set forth in this IFBC. Bid prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work to the County's satisfaction, in accordance with and in the manner set forth and described in the IFBC documents and within the prescribed time.

Multiple schedules for completion of Work shall be considered. Two (2) bids shall be submitted and considered, Bid 'A' based on 360 calendar days completion time and Bid 'B' based on 400 calendar days completion time. County, at its sole discretion, shall select either Bid 'A' or Bid 'B', whichever is in the best interest of the County. Only one (1) award will be made.

In evaluating Bids, County shall consider the qualifications of the Bidders; and if required, may also consider the qualifications of the subcontractors, suppliers, and other persons and organizations proposed. County may also consider the operating costs, maintenance requirements, performance data and guarantees of major items of materials and equipment proposed for incorporation in the Work.

Whenever two or more responsive, responsible bids which are equal with respect to price and all other evaluation factors are received, the bid from the local business shall be given preference in award.

Whenever two or more responsive, responsible bids which are equal with respect to price are received, and both or neither of these bids are from a local business, the award shall be determined by a chance drawing, coin toss, or similar tie-breaking method conducted by the Procurement Division and open to the public.

Bidder acknowledges that County has, or may hire, others to perform work similar to or the same as that which is within the scope of work of this IFBC. In the event that the successful Bidder cannot meet the delivery time or availability requirements of materials, the County, at its sole discretion can obtain the goods and services from other sources.

A.44 SCOPE OF WORK

The successful Bidder shall furnish and install all materials, equipment and labor which is reasonably inferable and necessary for the proper completion of the Work specified in this IFBC, whether specifically indicated in the IFBC or not.

The successful Bidder shall furnish all shop drawings, work drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all Work required by these Specifications.

The successful Bidder shall perform the Work complete, in place and ready for continuous service and shall include any repairs, replacements, and / or restoration required as a result of damages caused prior to acceptance by the County.

Evaluate and upsize wet well and pumps. Convert the station to a Master Lift Station (MLS) by installing three new pumps, variable frequency drive (VFDs), a building or enclosure for electrical components, back-up power generator or auxiliary pump, flow meter, and new piping and valving associated with the wetwell and valve assembly. Convert the existing generator into a mobile backup generator by mounting it on a trailer. Wetwell sizing and configuration and pump size should be determined by the project design engineer.

A.45 COMPLETION OF WORK

The Work will be completed and ready for final inspection within the specified calendar days from the date the Contract Time commences to run. Completion time shall be based on Bid 'A' for 360 calendar days or Bid 'B' based on 400 calendar days time at the County's sole discretion.

A.46 LIQUIDATED DAMAGES

If the successful Bidder fails to achieve substantial completion of the Work within the contract time and as otherwise required by the Agreement (to include not only the entire Work but any portion of the Work as set forth therein), the County shall be entitled to retain or recover from the successful Bidder, as liquidated damages and not as a penalty, the sum of \$1,168.00 per calendar day, commencing upon the first day following expiration of the contract time and continuing until the actual date of substantial completion.

Such liquidated damages are hereby agreed to be a reasonable estimate of damages the County will incur because of delayed completion of the Work. The County may deduct liquidated damages as described in this paragraph from any unpaid amounts then or thereafter due the successful bidder under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the successful bidder shall be payable to the County at the demand of the County, together with interest from the date of the demand at the maximum allowable rate.

A.47 CONTRACT CONTINGENCY WORK

Contract contingency is a monetary allowance used solely at County's discretion to handle unexpected conditions as required to satisfactorily complete the Work in accordance with the IFBC documents. A Field Directive must be issued by an authorized County representative to authorize use of contract contingency funds.

The percentage for contract contingency is listed on the Bid Form. Bidder shall enter the dollar amount for contract contingency based on the percentage of the total base bid. The total contract award will include contract contingency.

Appropriate uses of contract contingency include increases to existing bid item quantities that do not change the initial Scope of Work, which may be directed by County staff; modification items not originally bid which were unforeseen yet necessary during the Work to provide a safe, complete Project and that do not change the initial Scope of Work; and unanticipated conflicts and/or design changes required during construction

which are necessary to provide a safe, complete Project and that do not change the initial Scope of Work.

Inappropriate uses of contract contingency include anything that changes the initial Scope of Work, including the Contract Sum and Contract Time, and adding bid items not previously contemplated that change the initial Scope of Work.

A.48 LICENSES AND PERMITS

The successful Bidder shall be solely responsible for obtaining all necessary license and permit fees, including, but not limited to, all license fees, permit fees, impact fees, or inspection fees, and responsible for the costs of such fees. Successful Bidder is solely responsible for ensuring all work complies with all Federal, State, local, and Manatee County ordinances, orders, codes, laws, rules, regulations, directives, and guidelines.

A.49 PROTEST

Any actual bidder, proposer, or contractor who is aggrieved in connection with the notice of intent to award of a contract with a value greater than \$250,000 where such grievance is asserted to be the result of a violation of the requirements of the Manatee County Procurement Code or any applicable provision of law by the officers, agents, or employees of the County, may file a protest to the Purchasing Official.

Protest must be in writing and delivered via email at purchasing@mymanatee.org or by hand delivery to the Procurement Division at 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205 by 5:00 p.m. on the fifth business day following the date of posting of the Notice of Intent to Award on the County website. There is no stay of the procurement process during a protest. The Purchasing Official shall have the authority to settle and resolve a protest concerning the intended award of a contract.

For additional information regarding the County protest process, visit the Procurement Division webpage on the County website.

A.50 ACCESSIBILITY

The County is committed to making its documents and information technologies accessible to individuals with disabilities by meeting the requirements of Section 504 of the Rehabilitation Act and best practices (W3C WCAG 2). **For assistance with accessibility regarding this solicitation, contact the Manatee County Procurement Division via email at purchasing@mymanatee.org or by phone at 941-748-4501 X3014.**

Successful Bidder shall ensure all its electronic information, documents, applications, reports, and deliverables required under this Agreement are in a format that meets the requirements of Section 504 of the Rehabilitation Act and best practices (W3C WCAG 2).

Where not fully compliant with these requirements and best practices, Successful Bidder shall provide clear points of contact for each document and information technology to direct users in how to obtain alternate formats. Further, successful Bidder shall develop accommodation strategies for those non-compliant resources and implement strategies to resolve the discrepancies.

A.51 SOLICITATION SCHEDULE

The following schedule has been established for this Solicitation process. Refer to the County’s website (www.mymanatee.org > Business > *Bids & Proposals*) for meeting locations and updated information pertaining to any revisions to this schedule.

Scheduled Item	Scheduled Date
Question and Clarification Deadline	November 16, 2022
Final Addendum Posted	November 23, 2022
Bid Response Due Date and Time	December 7, 2022, 11:00 A.M., ET
Projected Award	January, 2023

NOTE: Any statements contained in the Scope of Work, Bid Summary, Construction Agreement, General Conditions of the Construction Agreement and/or Exhibits which vary from the information in Section A, Information for Bidders, shall have precedence over the Information for Bidders.

END OF SECTION A

SECTION B, BID FORMS

(To be completed and returned with Bid)

APPENDIX A, MINIMUM QUALIFICATIONS

IFBC No. 23-TA004431JH

Bidders must submit the information and documentation requested in this Attachment that confirms Bidder meets the following minimum qualification requirement(s):

1. Must have been registered with the State of Florida, Division of Corporations to do business in Florida.

No documentation is required. The County will verify registration.

2. Bidder, or its representative(s), has made an inspection of the construction site for work specified in this IFBC on or after the date of advertisement of this IFBC and prior to the Due Date and Time.

Bidder must submit a statement on company letterhead and signed by an authorized official of Bidder that Bidder, or its representative(s), has made an inspection of the construction site, listing the date of the inspection and the individuals, by name, who conducted the inspection.

3. Bidder must possess a General Contractors License issued by the Florida Department of Business and Professional Regulation for a period of at least five (5) consecutive years since November 1, 2017. License must be current and valid through the Due Date for submission of bids for this IFBC.

Bidder to provide a copy of the license, issued by the Florida Department of Business and Professional Regulation and documentation confirming Bidder or Bidders has been licensed and or certified for the period of November 1, 2017 through the date of submission of the bid.

4. Bidder has provided Lift Station Rehabilitation for at least Three (3) projects since November 1, 2017 in which each project included lift station rehabilitation. Project clients must be agreeable to responding to an inquiry by the County.

Provide the following information for the Three (3) qualifying project references.

- a) Name of client
- b) Project name
- c) Location (City/State)
- d) Client contact name
- e) Contact phone
- f) Contact email
- g) Service dates (Start/End)

5. Bidder, on the day the bid is submitted, has a certified or registered Qualifying Agent, as required by Section 489.119, Florida Statutes, and that Qualifying Agent has been the same Qualifying Agent of Bidder for a period of at least two (2) consecutive years, since November 1, 2020.

Submit a copy of Bidder's Qualifying Agent's registration or certification along with supporting documentation confirming Qualifying Agent has been the Qualifying Agent for Bidder for two years, since November 1, 2020.

6. Bidder is not on the Florida Department of Management Services Suspended, Debarred, Convicted Vendor Lists.

No documentation is required. The County will verify.

7. If Bidder is submitting as a joint venture must file the required documents with the Florida Department of Business and Professional Regulation as required by Florida Statute Section 489.119, prior to the Due Date and Time.

If Bidder is a joint venture, provide a copy of Bidder's approved filing with the Florida Department of Business and Professional Regulation.

8. Bidder has no reported conflict of interests in relation to this IFBC.

If no conflicts of interests are present, Bidder must submit a fully completed copy of Appendix J.

If there is a potential conflict of interest, on a separate page submit a statement to that affect and disclose the name of any officer, director or agent who is an employee of the County. Disclose the name of any County employee who owns, directly or indirectly, any interest in Bidder's firm or any of its branches.

END OF APPENDIX A

APPENDIX B, BIDDER'S QUESTIONNAIRE

IFBC No. 23-TA004431JH

Bidder must fully complete and return this form with its Bid. Bidder warrants the truth and accuracy of all statements and answers herein contained. (Attach additional pages if necessary.)

THIS QUESTIONNAIRE MUST BE COMPLETED AND SUBMITTED WITH YOUR BID

1. Contact Information:

FEIN #: _____
License #: _____
License Issued to: _____
Date License Issued (MM/DD/YR): _____
Company Name: _____
Physical Address: _____
City: _____ State of Incorporation: _____ Zip Code: _____
Phone Number: () _____ Fax Number: () _____
Email address: _____

2. Bidding as: an individual __; a partnership __; a corporation __; a joint venture __

3. If a partnership, list names and addresses of partners; if a corporation, list names of officers, directors, shareholders, and state of incorporation; if joint venture, list names and address of ventures' and the same if any venture are a corporation for each such corporation, partnership, or joint venture:

4. Bidder is authorized to do business in the State of Florida: Yes No

For how many years? _____

5. Your organization has been in business (under this firm's name) as a

Is this firm in bankruptcy? _____

6. Attach a list of projects where this specific type of Work was performed.

BIDDER: _____

7. Is this firm currently contemplating or in litigation? Provide summary details.

8. Have you ever been assessed liquidated damages under a contract during the past five (5) years? If so, state when, where (contact name, address and phone number) and why.

9. Have you ever failed to complete Work awarded to you? Or failed to complete projects within contract time? If so, state when, where (contact name, address, phone number) and why.

10. Have you ever been debarred or prohibited from providing a bid to a governmental entity? If yes, name the entity and describe the circumstances.

11. Will you subcontract any part of this Work? If so, describe which portion(s) and to whom.

12. If any part of work will be subcontracted, list MBE/DBE/WBE/VETERAN to be utilized. Include the estimated dollar amount of the portion of Work each will perform.

BIDDER: _____

13. What equipment do you own to accomplish this Work? (A listing may be attached)

14. What equipment will you purchase/rent for the Work? (Specify which)

15. If applicable to the Work for this IFBC, Drilling Supervisor Qualifications: Contractor shall provide a boring specialist who shall remain on the project site during the entirety of the directional boring operation. This includes, but is not limited to, drilling fluid preparation, seaming, boring and pulling. The boring specialist shall have a minimum of five (5) years' experience in supervising directional bores of similar nature, diameter, materials and lengths. (Reference: Specification Section 02619, Horizontal Directional Drilling).

Provide the contact information for a minimum of three (3) projects wherein the boring specialist has performed this type of work, diameter, materials and lengths.

Boring specialist's name: _____

Boring specialist's years of experience in supervising directional bores _____

Provide contact name, and contact number for projects:

16. If applicable to the Work for this IFBC, Pipe Fusion Qualifications: All boring and fusing equipment shall be certified for operation. The Contractor responsible for thermal butt fusing pipe and fittings shall have manufacturer certification for performing such work or a minimum of five (5) years of experience performing this type of work.

Thermal butt fusing pipe and fittings contractor or subcontractor's name: _____

Attach a copy of contractor's/subcontractor's manufacturer certification to this Questionnaire

OR

Provide contractor's/subcontractor's years of experience in thermal butt fusing pipe and fittings

If manufacturer certification is not provided, include contact name, and contact number for projects that confirms five years of experience:

BIDDER: _____

17. If applicable to the Work for this IFB, Pipe Bursting Qualifications: The Contractor shall be certified by the manufacturer of the pipe bursting system that they are fully trained licensed installer of the manufacturer's pipe bursting system. Contractor shall provide a letter to the County documenting this requirement. (Reference: Specification Section 02619A, Pipe Bursting (PB) of Existing Mains).

18. List the following regarding the surety which is providing the bond(s):

Surety's Name: _____

Address: _____

Name, address, phone number and email of surety's resident agent for service of process in Florida:

Agent's Name: _____

Address: _____

Phone: _____

Email: _____

19. Is Bidder a local business as defined in Section A.38, Local Preference?

Yes

No

If yes, by signing below Bidder certifies that for at least six months prior to the advertisement date of this IFB it has maintained a physical place of business in Manatee, Desoto, Hardee, Hillsborough, Pinellas or Sarasota counties with at least one full-time employee at that location.

BIDDER: _____

BY: _____

PRINTED NAME: _____

TITLE/DATE: _____

PHYSICAL ADDRESS OF QUALIFYING LOCAL LOCATION: _____

NAME OF QUALIFYING EMPLOYEE AT LOCAL LOCATION: _____

20. Confirm if Bidder has an environmental sustainability initiative as defined in Section A.41.

Yes No

If yes, submit a brief summary (2-3 paragraphs) of the environmental sustainability initiative.

BIDDER: _____

APPENDIX C, ENVIRONMENTAL CRIMES CERTIFICATION

IFBC No. 23-TA004431JH

SWORN STATEMENT PURSUANT TO ARTICLE V, MANATEE COUNTY PROCUREMENT CODE

Bidder must fully complete and return this form with its Bid. This form must be signed and sworn to in the presence of a notary public or other official authorized to administer oaths.

This sworn statement is submitted to the Manatee County Board of County Commissioners by

_____ [Print individual's name and title]

for _____ [Print name of entity submitting sworn statement]

whose business address is _____

and (if applicable) its Federal Employer Identification Number (FEIN) is _____. If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement: _____.

I understand that no person or entity shall be awarded or receive an Owner’s Agreement for public improvements, procurement of goods or services (including professional services) or an Owner’s lease, franchise, concession or management agreement, or shall receive a grant of Owner’s monies unless such person or entity has submitted a written certification to Owner that it has not:

- (1) been convicted of bribery or attempting to bribe a public officer or employee of Manatee County, the State of Florida, or any other public entity, including, but not limited to the Government of the United States, any state, or any local government authority in the United States, in that officer's or employee's official capacity; or
- (2) been convicted of an agreement or collusion among bidders or prospective bidders in restraint of freedom of competition, by agreement to bid a fixed price, or otherwise; or
- (3) been convicted of a violation of an environmental law that, in the sole opinion of Owner’s Purchasing Official, reflects negatively upon the ability of the person or entity to conduct business in a responsible manner; or
- (4) made an admission of guilt of such conduct described in items (1), (2) or (3) above, which is a matter of record, but has not been prosecuted for such conduct, or has made an admission of guilt of such conduct, which is a matter of record, pursuant to formal prosecution. An admission of guilt shall be construed to include a plea of nolo contendere; or

(5) where an officer, official, agent or employee of a business entity has been convicted of or has admitted guilt to any of the crimes set forth above on behalf of such an entity and pursuant to the direction or authorization of an official thereof (including the person committing the offense, if he is an official of the business entity), the business shall be chargeable with the conduct herein above set forth. A business entity shall be chargeable with the conduct of an affiliated entity, whether wholly owned, partially owned, or one which has common ownership or a common Board of Directors. For purposes of this Form, business entities are affiliated if, directly or indirectly, one business entity controls or has the power to control another business entity, or if an individual or group of individuals controls or has the power to control both entities. Indicia of control shall include, without limitation, interlocking management or ownership, identity of interests among family members, shared organization of a business entity following the ineligibility of a business entity under this Article, or using substantially the same management, ownership or principles as the ineligible entity.
(Continued)

Any person or entity who claims that this Article is inapplicable to him/her/it because a conviction or judgment has been reversed by a court of competent jurisdiction shall prove the same with documentation satisfactory to Owner's Purchasing Official. Upon presentation of such satisfactory proof, the person or entity shall be allowed to contract with Owner.

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR MANATEE COUNTY IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IT IS FILED. I ALSO UNDERSTAND THAT ANY AGREEMENT OR BUSINESS TRANSACTION SHALL PROVIDE FOR SUSPENSION OF PAYMENTS, OR TERMINATION, OR BOTH, IF THE CONTRACTING OFFICER OR COUNTY ADMINISTRATOR DETERMINES THAT **SUCH** PERSON OR ENTITY HAS MADE FALSE CERTIFICATION.

[Signature]

STATE OF _____
COUNTY OF _____

Sworn to and subscribed before me this _ day of _____, 20____
by _____

Who is personally known / has produced _____ as
identification

[Type of identification]

My commission expires _____

Notary Public Signature

[Print, type or stamp Commissioned name of Notary Public]

Signatory Requirement - In the case of a business entity other than a partnership or a corporation, this affidavit shall be executed by an authorized agent of the entity. In the case of a partnership, this affidavit shall be executed by the general partner(s). In the case of a corporation, this affidavit shall be executed by the corporate president.

APPENDIX D, FLORIDA TRENCH SAFETY ACT

Bidder must fully complete and return this form with its Bid. This form must be signed in the presence of a notary public or by an officer authorized to administer oaths.

1. This Sworn Statement is submitted with **IFBC NO. 23-TA004431JH**
2. This Sworn Statement is submitted by _____ whose business address is _____ and, if applicable, its Federal Employer Identification Number (FEIN) is _____. If the entity has no FEIN, include the Social Security Number of the individual signing this sworn statement _____.
3. Name of individual signing this Sworn Statement is: _____, Whose relationship to the above entity is: _____.
4. The Trench Safety Standards that will be in effect during the construction of this project shall include, but are not limited to: Laws of Florida, Chapters 90-96, TRENCH SAFETY ACT, and OSHA RULES AND REGULATIONS 29 CFR 1926.650 Subpart P, effective October 1, 1990.
5. The undersigned assures that the entity will comply with the applicable Trench Safety Standards and agrees to indemnify and hold harmless the County and Engineer of Record, and any of their agents or employees from any claims arising from the failure to comply with said standard.

6. The undersigned has appropriated the following costs for compliance with the applicable standards:

Trench Safety Measure (Description)	Units of Measure (LF, SY)	Unit Quantity	Unit Cost	Extended Cost
a. _____	_____	_____	\$ _____	_____
b. _____	_____	_____	\$ _____	_____
c. _____	_____	_____	\$ _____	_____
d. _____	_____	_____	\$ _____	_____

7. The undersigned intends to comply with these standards by instituting the following procedures:

THE UNDERSIGNED, in submitting this bid, represents that they have reviewed and considered all available geotechnical information and made such other investigations and tests as they may deem necessary to adequately design the trench safety system(s) to be utilized on this project.

(Authorized signature / Title)

SWORN to and subscribed before me this _____ day of _____, 20____.
(Impress official seal)

Notary Public, State of _____ : _____

My commission expires: _____



Angelina M. Colonnese

CLERK OF THE CIRCUIT COURT AND COMPTROLLER OF MANATEE COUNTY

1115 Manatee Avenue West, Bradenton, Florida 34205 - Phone (941) 749-1800 Fax (941) 741-4082, P.O. Box 25400, Bradenton, Florida 34206 - www.manateeclerk.com

Bidder must fully complete and return this form with its Bid.

APPENDIX E: ePAYABLES APPLICATION

Company name _____

Contact person _____

Phone number _____

Email Address _____

FINANCE USE ONLY

.....

Open orders: YES or NO

PEID _____

CREATE DATE _____

CONFIRMED _____ WITH _____

Name and phone number

IFAS _____

BANK _____

INITIALS _____

Return completed form Via email to:

tina.mancini@manateeclerk.com

Via fax to: (941) 741-4011

Via mail:

PO Box 1000

Bradenton, FL 34206

Revised: September 30, 2015

“Pride in Service with a Vision to the Future”

Clerk of the Circuit Court – Clerk of Board of County Commissioners – County Comptroller – Auditor and Recorder

APPENDIX F, SCRUTINIZED COMPANY CERTIFICATION
IFBC No. 23-TA004431JH

This certification is required pursuant to Florida State Statute Section 287.135.

As of July 1, 2011, a company that, at the time of bidding or submitting a proposal for a new contract or renewal of an existing contract, is on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List is ineligible for, and may not bid on, submit a proposal for, or enter into or renew a contract with an agency or local governmental entity for goods or services of \$1 million or more.

Bidder must fully complete and return this form with its Bid.

Company _____ FID _____ or EIN _____ No. _____

Address _____

City _____ State _____ Zip _____

I, _____, as a representative of _____ certify and affirm that this company is not on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List.

Signature Title

Printed Name Date

APPENDIX G, MANATEE COUNTY, A POLITICAL SUBDIVISION OF THE STATE OF FLORIDA INDEMNITY AND HOLD HARMLESS

IFBC No. 23-TA004431JH

Bidder must fully complete and return this form with its Bid.

Bidder shall defend, indemnify and hold harmless the County and all of the County’s officers, agents, employees, and volunteers from and against all claims, liability, loss and expense, including reasonable costs, collection expenses, attorneys’ fees, and court costs which may arise because of the negligence (whether active or passive), misconduct, or other fault, in whole or in part (whether joint, concurrent, or contributing), of Respondent, its officers, employees, representatives and agents in performance or non-performance of its obligations under the Contract/Agreement. Bidder recognizes the broad nature of this indemnification and hold harmless clause, as well as the provision of a legal defense to the County when necessary, and voluntarily makes this covenant and expressly acknowledges the receipt of such good and valuable consideration provided by the County in support of these indemnification, legal defense and hold harmless contractual obligations in accordance with the laws of the State of Florida. This clause shall survive the termination of this Contract/Agreement. Compliance with any insurance requirements required elsewhere within this Contract/Agreement shall not relieve Bidder of its liability and obligation to defend, hold harmless and indemnify the County as set forth in this article of the Contract/Agreement.

Nothing herein shall be construed to extend the County’s liability beyond that provided in section 768.28, Florida Statutes.

PROJECT NUMBER AND/OR NAME	
INSURANCE AGENT	
RESPONDENT SIGNATURE	DATE

Acknowledgement:

STATE OF _____ COUNTY OF _____

The foregoing instrument was acknowledged before me this ____ day of _____,

20__ by _____ [FULL LEGAL NAME], who is

personally known to me / has produced _____ as identification.

Notary Signature _____

Print Name _____

APPENDIX H, INSURANCE STATEMENT

IFBC No. 23-TA004431JH

Bidder must fully complete and return this form with its Bid.

THE UNDERSIGNED has read and understands the insurance requirements of this IFBC applicable to any contract resulting from this solicitation and shall provide the insurances required by this Appendix within ten (10) days from the date of Notice of Intent to Award.

Bidder Name: _____ Date: _____

Signature
(Authorized
Official): _____

Printed
Name/Title: _____

Insurance Agency: _____

Agent Name: _____ Agent Phone: _____

APPENDIX I, ACKNOWLEDGMENT OF ADDENDA

IFBC No. 23-TA004431JH

The undersigned acknowledges receipt of the following addenda:

Addendum No. _____	Date Received:

Print or type Bidder’s information below:

_____	_____
Name of Bidder	Telephone Number
_____	_____
Street Address	City/State/Zip
_____	_____
Email Address	
_____	_____
Print Name & Title of Authorized Officer	Signature of Authorized Official Date

APPENDIX J, AFFIDAVIT OF NO CONFLICT

IFBC No. 23-TA004431JH

COUNTY OF _____
STATE OF _____

BEFORE ME, the undersigned authority, this ____ day of _____, 20__ personally appeared, _____, a principal with full authority to bind _____ (hereinafter the "Affiant"), who being first duly sworn, deposes and says:

(a) is not currently engaged or will not become engaged in any obligations, undertakings or contracts that will require the Affiant to maintain an adversarial role against the County or that will impair or influence the advice, recommendations or quality of work provided to the County; and

(b) has provided full disclosure of all potentially conflicting contractual relationships and full disclosure of contractual relationships deemed to raise a question of conflict(s); and

(c) has provided full disclosure of prior work history and qualifications that may be deemed to raise possible question of conflict(s).

Affiant makes this affidavit for the purpose of inducing Manatee County, a political subdivision of the State of Florida, to enter into an Agreement for Missionary Village Lift Station Rehabilitation.

If applicable, on a separate page Bidder shall disclose the name of any officer, director or agent of Bidder who is also an employee of the County and the name of any County employee who owns, directly or indirectly, any interest in the Bidder's firm or any of its branches. If no conflicts of interest are present, submit a statement to that affect.

Signature

Print Name

SUBSCRIBED to and sworn before me this ____ day of _____, 20__.

[Notary Seal]

Notary Public

My commission expires: _____

Notary Signature

Print Name

Personally known OR produced identification. Type of identification produced _____
_____.

APPENDIX K, BID PRICING FORM

IFBC No.23-TA004431JH, Missionary Village Lift Station Rehabilitation

Total Bid Price/Offer for Bid "A": \$ _____ Complete. Base on a completion time of 360 calendar days.

Total Bid Price/Offer for Bid "B": \$ _____ Complete. Based on a completion time of 400 calendar days.

We, the undersigned, hereby declare that we have carefully reviewed the IFBC Documents in their entirety and with full knowledge and understanding of the Bid information and all its requirements, submit this Bid, which is complete in meeting each specification, term, and condition contained therein.

As Bidder, we understand that the IFBC documents, including but not limited to, all specifications, terms, and conditions shall be made a part of any resulting Agreement between County and the successful Bidder. Failure by successful Bidder to comply with such specifications, terms and conditions shall result in Agreement default, whereupon, the defaulting successful Bidder shall be required to pay for all re-procurement costs, damages, and attorney fees as incurred by County, and agrees to forfeit its bid bond.

Authorized Signature(s): _____

**Name and Title of Above
Signer(s):**

Date: _____

APPENDIX K, BID PRICING FORM IFBC NO. 22-TA004431JH PROJECT NAME: MISSIONARY VILLAGE LIFT STATION REHABILITATION PROJECT NUMBER: 6022386 Bidders must provide prices for each line item for their bid to be considered responsive.				BID A 360 CALENDAR DAYS		BID B 400 CALENDAR DAYS	
ITEM	DESCRIPTION	U/M	EST. QUANTITY	UNIT PRICE BID A 360 CALENDAR DAYS	EXTENDED PRICE BID A	UNIT PRICE BID B 400 CALENDAR DAYS	EXTENDED PRICE BID B
1	MOBILIZATION/DEMOBILIZATION	LS	1				
2	Mechanical Improvements						
2.01	Traffic Control	LS	1				
2.02	10" Check Valve	EA	3				
2.03	10" Gate Valve	EA	3				
2.04	10" DR 11 HDPE 90 DEG Bend	EA	3				
2.05	10" PE X Flanged HDPE	EA	6				
2.06	10" HDPE Riser	LF	66				
2.07	12" DI FM	LF	26				
2.08	12" MAG Flow Meter	EA	1				
2.09	12" Gate Valve	EA	4				
2.10	12" Restrained C900 DR-18 PVC FM	LF	120				
2.11	10" SCH 80 PVC Odor Control Suction Pipe	LF	40				
2.12	12" SDR 26 PVC Gravity Sewer, Incl. Connection to MH S2	LF	58				
2.13	12" Force Main Drop Connection	EA	1				
2.14	16' Dia. Polymer Concrete Wetwell	EA	1				
2.15	Core Wet Well & Install Connection Boot for 10" Pipe	EA	2				
2.16	Core Wet Well & Install Connection Boot for 12" Pipe	EA	1				
2.17	Core Wet Well & Install Connection Boot for 20" Pipe	EA	1				
2.18	5' Diameter Polymer Manhole	EA	1				
2.19	Core Manhole & Install Connection Boot for 12" Pipe	EA	3				
2.20	Core Manhole & Install Connection Boot for 20" Pipe	EA	1				
2.21	2" SCH 80 PVC Pipe	LF	125				
2.22	2" Service Tap	LF	1				
2.23	20" C900 DR18 PVC Gravity Sewer	LF	5				
2.24	6" Cam Lock and Cap	EA	1				
2.25	6" Gate Valve	EA	1				
2.26	6' Chainlink Fence	LF	240				
2.27	6' Tall X 15' Long Cantilever Slide Gates for Fence Opening	EA	2				
2.28	Connection to Existing 12" Valve	EA	2				
2.29	Demolition	LS	1				
2.30	DI Fittings	TON	2.3				
2.31	Hose Bib and Rack	EA	1				
2.32	Rehab Existing Manhole	EA	1				
2.33	Relocate Generator off-site	EA	1				
2.34	SS Pipe Supports	EA	13				
2.35	Pumps, Discharge Connections, Guide Rails and Upper Guide Rail Brackets	EA	3				
2.36	Pump Access Hatches W/Fall Protection Grates	EA	3				
2.37	Cable Holder	EA	1				
2.38	Water Meter Assembly	EA	1				
2.39	2" Backflow Preventor Assembly	EA	1				
2.40	2" X 2" Combination Air and Vacuum Release Valve	EA	1				

3	Structural					
3.01	Concrete Slab-On-Grade	CY	5			
3.02	6" Thick Concrete Driveway	SY	125			
3.03	Excavate Useable Soil (0 to 18 ft deep)	CY	380			
3.04	Excavate Unuseable Clay Soil (18 to 22 ft deep), Including Disposal	CY	74			
3.05	Excavate Unuseable Limestone (22 ft and deeper), Including Disposal	CY	67			
3.06	Construct Leveling Course	CY	240			
3.07	Backfill and Compact Useable Soil	CY	266			
3.08	Backfill and Compact Imported Soil	CY	35			
3.09	Mill Existing Asphalt Pavement	SY	105			
3.10	Roadway Base Restoration	SY	35			
3.11	Local Road SIII Asphaltic Concrete	SY	105			
3.12	Dewatering (Pipe and Structures)	Day	52			
4	Electrical Equipment Building					
4.01	Excavation	CY	25			
4.02	Backfill and Compaction	CY	15			
4.03	Concrete Slabs-On-Grade	CY	15			
4.04	Concrete Masonry Walls	SF	730			
4.05	Steel Beams	LF	205			
4.06	Steel Plates	SF	50			
4.07	Steel Deck	SF	255			
4.08	CIP Anchor Bolts	EA	30			
4.09	1/2" Plywood	SF	255			
4.10	Rigid Insulation Boards	SF	255			
4.11	Underlayment	SF	255			
4.12	Standing Seam Metal Roof	SF	255			
4.13	Alum Doors w/ Hardware	EA	3			
4.14	Alum Frames	EA	3			
4.15	Caulk & Sealant	LF	125			
4.16	Paint Interior Walls	SF	730			

5	Instrumentation & Controls						
5.01	Relocate tower, RTU, startup, and commissioning services	EA	1				
6	Electrical						
6.01	Main Service Entrance Breaker	EA	1				
6.02	VFD's	EA	3				
6.03	Automatic Transfer Switch	EA	1				
6.04	Power Distribution Panel	EA	1				
6.05	450KW Generator	EA	1				
6.06	120 V Power Distribution	EA	1				
6.07	Low Voltage Receptacles	EA	1				
6.08	Outlet Boxes	EA	1				
6.09	Rigid Conduit	LF	1055				
6.10	Low Voltage Cables	LF	2448				
6.11	Instrumentation Cable	LF	770				
6.12	Flexible Conduits & Fittings	EA	105				
6.13	Sealing Fitting	EA	5				
6.14	Hangers and Supports for Electrical Systems	EA	6				
6.15	Underground Ductbank	CY	50				
6.16	Manholes and Handholes	EA	1				
6.17	AC Unit Split System	EA	2				
6.18	Manual Transfer Switch	EA	1				
6.19	Disconnect	EA	6				
	Grounding and Bonding						
6.20	Grounding Rods	EA	6				
6.21	Grounding Cable	LF	265				
6.22	Exothermic Mold, Weld and Bonding	LS	20				
7	Civil						
7.01	Erosion and Sediment Control	LS	1				
7.02	Temporary Bypass Pumping for Installation of 12" Gravity Sewer	LS	1				
7.03	Stone Surface 4" Thick W/Polypropylene Weed Barrier	SQ YD	219				
7.04	Wood Type Mulch 4" Thick W/Polypropylene Weed Barrier	SQ YD	23				
7.05	Site Restoration	LS	1				
8	Permit Allowance	1 LS	1	\$2,000.00	\$2,000.00	\$2,000.00	\$2,000.00
9	Record Drawings	1 LS	1				
SUB-TOTAL BASE BID							
10	CONTRACT CONTINGENCY (Used with prior County Approval)	10%	1				
TOTAL BID							

Bidders Name _____

Bidders Signature _____

*To be considered responsive, it is the sole responsibility of the bidder to correctly calculate and manually enter all sub-total, contingency, and total bid price fields.

SECTION C, BID ATTACHMENTS

BID ATTACHMENT 1, INSURANCE AND BOND REQUIREMENTS

The CONTRACTOR will not commence work under the resulting Agreement until all insurance coverages indicated by an “X” herein have been obtained. The CONTRACTOR shall obtain and submit to the Procurement Division within ten (10) calendar days from the date of notice of intent to award, at its expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy): Work under this Agreement cannot commence until all insurance coverages indicated herein have been obtained on a standard ACORD form (inclusive of any amounts provided by an umbrella or excess policy):

Automobile Liability Insurance Required Limits

Coverage must be afforded under a per occurrence policy form including coverage for all owned, hired and non-owned vehicles for bodily injury and property damage of not less than:

- \$2,000,000 Combined Single Limit; OR
- \$ 1,000,000 Bodily Injury and \$1,000,000 Property Damage
- \$10,000 Personal Injury Protection (No Fault)
- \$1,000,000 Hired, Non-Owned Liability
- \$10,000 Medical Payments

This policy shall contain severability of interests’ provisions.

Commercial General Liability Insurance Required Limits (per Occurrence form only; claims-made form is not acceptable)

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name ‘Manatee County, a political subdivision of the State of Florida’ as an Additional Insured, and include limits not less than:

- \$1,000,000 Single Limit Per Occurrence
- \$2,000,000 Aggregate
- \$2,000,000 Products/Completed Operations Aggregate
- \$1,000,000 Personal and Advertising Injury Liability
- \$100,000 Fire Damage Liability
- \$10,000 Medical Expense, and
- \$1,000,000, Third Party Property Damage
- \$ Project Specific Aggregate (Required on projects valued at over \$10,000,000)

This policy shall contain severability of interests’ provisions.

Employer’s Liability Insurance

Coverage limits of not less than:

- \$100,000 Each Accident
- \$500,000 Disease Each Employee
- \$500,000 Disease Policy Limit

- Worker’s Compensation Insurance**
- US Longshoremen & Harbor Workers Act**
- Jones Act Coverage**

Coverage limits of not less than:

- Statutory workers’ compensation coverage shall apply for all employees in compliance with the laws and statutes of the State of Florida and the federal government.
- If any operations are to be undertaken on or about navigable waters, coverage must be included for the US Longshoremen & Harbor Workers Act and Jones Act.

Should ‘leased employees’ be retained for any part of the project or service, the employee leasing agency shall provide evidence of Workers’ Compensation coverage and Employer’s Liability coverage for all personnel on the worksite and in compliance with the above Workers’ Compensation requirements. NOTE: Workers’ Compensation coverage is a firm requirement. Elective exemptions are considered on a case-by-case basis and are approved in a very limited number of instances.

Aircraft Liability Insurance Required Limits

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name ‘Manatee County a political subdivision of the State of Florida’ as an Additional Insured, and include limits not less than:

- \$ Each Occurrence Property and Bodily Injury with no less than \$100,000 per passenger each occurrence or a ‘smooth’ limit.
- \$ General Aggregate.

Un-Manned Aircraft Liability Insurance (Drone)

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name ‘Manatee County a political subdivision of the State of Florida’ as an Additional Insured, and include limits not less than:

- \$ Each Occurrence Property and Bodily Injury; Coverage shall specifically include operation of Unmanned Aircraft Systems (UAS), including liability and property damage.
- \$ General Aggregate

Installation Floater Insurance

When the contract or agreement **does not** include construction of, or additions to, above ground building or structures, but does involve the installation of machinery or equipment, Installation Floater Insurance shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- 100% of the completed value of such addition(s), building(s), or structure(s)

Professional Liability and/or Errors and Omissions (E&O) Liability Insurances

Coverage shall be afforded under either an occurrence policy form or a claims-made policy form. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

- \$ 1,000,000 Bodily Injury and Property Damage Each Occurrence
- \$ 2,000,000 General Aggregate

Builder's Risk Insurance

When the contract or agreement includes the construction of roadways and/or the addition of a permanent structure or building, including the installation of machinery and/or equipment, Builder's Risk Insurance shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- An amount equal to 100% of the completed value of the project, or the value of the equipment to be installed
- The policy shall not carry a self-insured retention/deductible greater than \$10,000

Coverage shall be for all risks and include, but not be limited to, storage and transport of materials, equipment, supplies of any kind whatsoever to be used on or incidental to the project, theft coverage, and Waiver of Occupancy Clause Endorsement, where applicable.

Cyber Liability Insurance

Coverage shall comply with Florida Statute 501.171, shall be afforded under a per occurrence policy form, policy shall be endorsed and name 'Manatee County, a political subdivision of the State of Florida' as an Additional Insured, and include limits not less than:

- \$ Security Breach Liability
- \$ Security Breach Expense Each Occurrence
- \$ Security Breach Expense Aggregate
- \$ Replacement or Restoration of Electronic Data
- \$ Extortion Threats
- \$ Business Income and Extra Expense
- \$ Public Relations Expense

NOTE: Policy must not carry a self-insured retention/deductible greater than \$25,000.

Hazardous Materials Insurance (As Noted Below)

Hazardous materials include all materials and substances that are currently designated or defined as hazardous by the law or rules of regulation by the State of Florida or federal government.

All coverage shall be afforded under either an occurrence policy form or a claims-made policy form, and the policy shall be endorsed and name 'Manatee County, a political subdivision of the

State of Florida' as an Additional Insured. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

Pollution Liability

Amount equal to the value of the contract, subject to a \$1,000,000 minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.

Asbestos Liability (If handling within scope of Contract)

Amount equal to the value of the contract, subject to a \$1,000,000 minimum, for Bodily Injury and Property Damage to include sudden and gradual release, each claim and aggregate.

Disposal

When applicable, CONTRACTOR shall designate the disposal site and furnish a Certificate of Insurance from the disposal facility for Environmental Impairment Liability Insurance covering liability.

- Amount equal to the value of the contract, subject to a \$1,000,000 minimum, for Liability for Sudden and Accidental Occurrences, each claim and an aggregate.
- Amount equal to the value of the contract, subject to a \$1,000,000 minimum, for Liability for Non-Sudden and Accidental Occurrences, each claim and an aggregate.

Hazardous Waste Transportation Insurance

CONTRACTOR shall designate the hauler and have the hauler furnish a Certificate of Insurance for Automobile Liability insurance with Endorsement MCS-90 for liability arising out of the transportation of hazardous materials. EPA identification number shall be provided.

All coverage shall be afforded under either an occurrence policy form or a claims-made policy form and the policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured. If the coverage form is on a claims-made basis, then coverage must be maintained for a minimum of three years from termination of date of the contract. Limits must not be less than:

- Amount equal to the value of the contract, subject to a \$1,000,000 minimum, per accident.

Liquor Liability Insurance

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name "Manatee County, a political subdivision of the State of Florida" as an Additional Insured, and include limits not less than:

- \$1,000,000 Each Occurrence and Aggregate

Garage Keeper’s Liability Insurance

Coverage shall be required if the maintenance, servicing, cleaning or repairing of any County motor vehicles is inherent or implied within the provision of the contract.

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- Property and asset coverage in the full replacement value of the lot or garage.

Bailee’s Customer Liability Insurance

Coverage shall be required for damage and/or destruction when County property is temporarily under the care or custody of a person or organization, including property that is on, or in transit to and from the person or organization’s premises. Perils covered should include fire, lightning, theft, burglary, robbery, explosion, collision, flood, earthquake and damage or destruction during transportation by a carrier.

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- Property and asset coverage in the full replacement value of the County asset(s) in the CONTRACTOR’S care, custody and control.

Hull and Watercraft Liability Insurance

Coverage shall be afforded under a per occurrence policy form, policy shall be endorsed and name “Manatee County, a political subdivision of the State of Florida” as an Additional Insured, and include limits not less than:

- \$ Each Occurrence
- \$ General Aggregate
- \$ Fire Damage Liability
- \$10,000 Medical Expense, and
- \$ Third Party Property Damage
- \$ Project Specific Aggregate (Required on projects valued at over \$10,000,000)

Other [Specify]

BOND REQUIREMENTS

Bid Bond

A Bid Bond in the amount of \$ _____ or 5% of the total offer. Bid bond shall be submitted with the sealed response and shall include project name, location, and / or address and project number. In lieu of the bond, the bidder may file an alternative form of security in the amount of \$ _____ or 5% of the total offer. in the form of a money order, a certified check, a cashier's check, or an irrevocable letter of credit issued to Manatee County. NOTE: A construction project over \$200,000 requires a Bid Bond in the amount of 5% of the total bid offer.

Payment and Performance Bond

A Payment and Performance Bond shall be submitted by Successful Bidder for 100% of the award amount and shall be presented to Manatee County within ten (10) calendar days of issuance of the notice of intent to award. NOTE: A construction project over \$200,000 requires a Payment and Performance Bond.

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INSURANCE REQUIREMENTS

I. THE POLICIES BELOW ARE TO CONTAIN, OR BE ENDORSED TO CONTAIN, THE FOLLOWING PROVISIONS:

1. Commercial General Liability and Automobile Liability Coverages

- a. **“Manatee County, a Political Subdivision of the State of Florida,” is to be named as an Additional Insured in respect to:** Liability arising out of activities performed by or on behalf of the successful Bidder, his agents, representatives, and employees; products and completed operations of the successful Bidder; or automobiles owned, leased, hired or borrowed by the successful Bidder. The coverage shall contain no special limitation(s) on the scope of protection afforded to the County, its officials, employees or volunteers.

In addition to furnishing a Certificate of Insurance, the successful Bidder shall provide the endorsement that evidences Manatee County being listed as an Additional Insured. This can be done in one of two ways: (1) an endorsement can be issued that specifically lists “Manatee County, a Political Subdivision of the State of Florida,” as Additional Insured; or, (2) an endorsement can be issued that states that all Certificate Holders are Additional Insured with respect to the policy.

- b. The successful Bidder's insurance coverage shall be primary insurance with respect to the County, its officials, employees and volunteers. Any insurance or self-insurance maintained by the County, its officials, employees or volunteers shall be excess of successful Bidder's insurance and shall be non-contributory.
- c. The insurance policies must be on an occurrence form.

2. Workers' Compensation and Employers' Liability Coverages

The insurer shall agree to waive all rights of subrogation against the County, its officials, employees and volunteers for losses arising from work performed by the successful Bidder for the County.

II. GENERAL INSURANCE PROVISIONS APPLICABLE TO ALL POLICIES:

1. Prior to the execution of contract, or issuance of a Purchase Order, and then annually upon the anniversary date(s) of the insurance policy's renewal date(s) for as long as this contract remains in effect, successful Bidder shall furnish the County with a Certificate(s) of Insurance (using an industry accepted certificate form, signed by the Issuer, with applicable endorsements, and containing the solicitation or contract number, and title or description) evidencing the coverage set forth above and naming “Manatee County, a Political Subdivision of the State of Florida” as an Additional Insured on the applicable coverage(s) set forth above.

2. If the policy contains an aggregate limit, confirmation is needed in writing (letter, email, etc.) that the aggregate limit has not been eroded to procurement representative when supplying Certificate of Insurance.

In addition, when requested in writing from the County, successful Bidder will provide the County with a certified copy of all applicable policies. The address where such certificates and certified policies shall be sent or delivered is as follows:

Manatee County, a Political Subdivision of the State of Florida
Attn: Risk Management Division
1112 Manatee Avenue West, Suite 969
Bradenton, FL 34205

3. The project's solicitation number and title shall be listed on each certificate.
4. successful Bidder shall provide thirty (30) days written notice to the Risk Manager of any cancellation, non-renewal, termination, material change, or reduction in coverage of any insurance policies to procurement representative including solicitation number and title with all notices.
5. successful Bidder agrees that should at any time successful Bidder fail to meet or maintain the required insurance coverage(s) as set forth herein, the County may terminate this contract.
6. The successful Bidder waives all subrogation rights against Manatee County, a Political Subdivision of the State of Florida, for all losses or damages which occur during the contract and for any events occurring during the contract period, whether the suit is brought during the contract period or not.
7. The successful Bidder has sole responsibility for all insurance premiums and policy deductibles.
8. It is the successful Bidder's responsibility to ensure that his agents, representatives and subcontractors comply with the insurance requirements set forth herein. successful Bidder shall include his agents, representatives, and subcontractors working on the project or at the worksite as insured under its policies, or successful Bidder shall furnish separate certificates and endorsements for each agent, representative, and subcontractor working on the project or at the worksite. All coverages for agents, representatives, and subcontractors shall be subject to all of the requirements set forth to the procurement representative.
9. All required insurance policies must be written with a carrier having a minimum A.M. Best rating of A- FSC VII or better. In addition, the County has the right to review the successful Bidder's deductible or self-insured retention and to require that it be reduced or eliminated.

- III.** Successful Bidder understands and agrees that the stipulated limits of coverage listed herein in this insurance section shall not be construed as a limitation of any potential liability to the County, or to others, and the County's failure to request evidence of this insurance coverage shall not be construed as a waiver of successful Bidder's obligation to provide and maintain the insurance coverage specified.
- IV.** The enclosed Hold Harmless Agreement shall be signed by the successful Bidder and shall become a part of the contract.
- V.** Successful Bidder understands and agrees that the County does not waive its immunity, and nothing herein shall be interpreted as a waiver of the County's rights, including the limitation of waiver of immunity, as set forth in Florida Statutes 768.28, or any other statutes, and the County expressly reserves these rights to the full extent allowed by law.
- VI.** No award shall be made until the Procurement Division has received the Certificate of Insurance and Hold Harmless Agreement in accordance with this section.

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BID ATTACHMENT 2, CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

MISSIONARY VILLAGE LIFT STATION REHABILITATION

**Prepared for
BOARD OF COUNTY COMMISSIONERS
COUNTY OF MANATEE, FLORIDA
COUNTY PROJECT NO. 6022386**



ISSUE FOR BID

OCTOBER 2022

Prepared by



**1365 Hamlet Ave
Clearwater, Florida 33756
Ph: 727/442-7196
Fax: 727/461-3827**

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ISSUE FOR BID
COUNTY PROJECT NO. 6022386

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APPENDICES

- Appendix A - Geotechnical Engineering Report - Terracon - May 26, 2021
- Appendix B - Temporary Easement - Hyatt Survey Services, Inc - 08/2021
- Appendix C - Utility Easement - Hyatt Survey Services, Inc - 08/2021

This specification includes by reference the Manatee County Public Works Standards, Part I Utilities Standards Manual approved February 2020

All items and/or materials furnished and installed shall conform to the Manatee County Approved Products List. All items listed in the submittal requirements under each section shall be required to be submitted for review and/or acceptance.

END OF TOC

SECTION 00005 - CERTIFICATION PAGES

PROFESSIONAL ENGINEER'S CERTIFICATION FOR BLAKE PETERS, PE

PROJECT NAME: MISSIONARY VILLAGE LIFT STATION REHABILITATION

The following sections of the Technical Specifications in the Issued for Bid submittal for the above referenced project were prepared under my direction and supervision.

DIVISION 1 - GENERAL REQUIREMENTS

- 01005 General Requirements
- 01010 Summary of Work
- 01015 Control of Work
- 01030 Special Project Procedures
- 01045 Cutting and Patching
- 01050 Field Engineering and Surveying
- 01090 Reference Standards
- 01150 Measurement and Payment
- 01152 Requests for Payment
- 01153 Change Order Procedures
- 01200 Project Meetings
- 01310 Construction Schedule & Project Restraints
- 01340 Shop Drawings, Project Data and Samples
- 01370 Schedule of Values
- 01380 Construction Photographs
- 01410 Testing and Testing Laboratory Services
- 01510 Temporary and Permanent Utilities
- 01570 Traffic Regulation
- 01580 Project Identification and Signs
- 01590 County's Field Office
- 01600 Material and Equipment
- 01620 Storage and Protection
- 01700 Contract Closeout
- 01710 Cleaning
- 01720 Project Record Documents
- 01730 Operations and Maintenance Data
- 01740 Warranties and Bonds
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DIVISION 2 - SITE WORK

- 02010 Subsurface Investigation
- 02050 Demolition
- 02064 Modifications to Existing Structures, Piping and Equipment

- 02100 Site Preparation
- 02220 Excavation, Backfill, Fill and Grading for Structures
- 02221 Trenching, Bedding and Backfill for Pipe
- 02223 Excavation Below Grade and Crushed Stone or Shell Refill
- 02240 Dewatering (During Construction)
- 02260 Finish Grading
- 02276 Temporary Erosion and Sedimentation Control
- 02315 Excavating, Backfilling and Compacting
- 02355 Lumber Left in Place
- 02444 Fencing
- 02485 Seeding and Sodding
- 02590 Water Services on Private Property
- 02615 Ductile Iron Pipe and Fittings
- 02616 Disinfecting Potable Water Pipe Lines
- 02617 Installation and Testing of Pressure Pipe
- 02618 Pipeline Cleaning
- 02620 Polyethylene (HDPE) Pipe and Fitting
- 02622 Polyvinyl Chloride (PVC) Pipe and Fittings
- 02623 Polyvinyl Chloride (PVC) Pipe (Gravity Sewer)
- 02627 Sanitary Sewer Manhole Rehabilitation
- 02640 Valves and Appurtenances

DIVISION 3 - CONCRETE

- 03500 Lift Station Specification

DIVISION 9 - PAINTING

- 09865 Surface Preparation and Shop Prime Painting
- 09900 Painting
- 09970 Surface Protection Spray System

DIVISION 10 - SPECIALTIES

- 10520 Fire Extinguishers

DIVISION 13 - SPECIAL CONSTRUCTION

- 13350A Wet Well Cleaning

DIVISION 15 - MECHANICAL

- 15400 Plumbing



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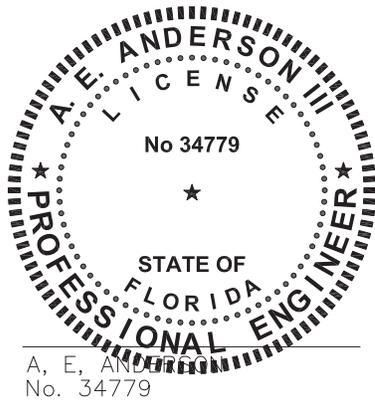
PROFESSIONAL ENGINEER'S CERTIFICATION FOR A. EMMETT ANDERSON, PE

PROJECT NAME: CHARLOTTE COUNTY UTILITIES BURNT STORE WRF EXPANSION

The following sections of the Technical Specifications in the Issued for Bid submittal for the above referenced project were prepared under my direction and supervision.

DIVISION 03 – CONCRETE

03450 Precast Polymer Concrete Structures



Digitally signed
by Augustus E
Anderson
Date: 2022.09.23
10:56:55 -04'00'

A. Emmett Anderson, III, PE
Florida Professional Engineer No. 34779
McKim & Creed, Inc.
9432 Baymeadows Road, Suite 230
Jacksonville, FL 32256

PROFESSIONAL ENGINEER'S CERTIFICATION FOR BILL BAND, PE

PROJECT NAME: MISSIONARY VILLAGE LIFT STATION REHABILITATION

The following sections of the Technical Specifications in the Issued for Bid submittal for the above referenced project were prepared under my direction and supervision.

DIVISION 3 - CONCRETE

03200 Concrete Reinforcement
03300 Cast-In-Place Concrete
03350 Concrete Finishes
03600 Grouting

DIVISION 4

04220 Masonry

DIVISION 5 - METALS

05310 Steel Deck
05500 Miscellaneous Metal

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

07100 Waterproofing, Damp Proofing and Caulking
07411 Metal Roof Panel - Standing Seam

DIVISION 8 - DOORS AND WINDOWS

08120 Aluminum Doors and Frames
08710 Finish Hardware
08800 Glazing



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PROFESSIONAL ENGINEER'S CERTIFICATION FOR AUBREY HAUDRICOURT, PE

PROJECT NAME: MISSIONARY VILLAGE LIFT STATION REHABILITATION

The following sections of the Technical Specifications in the Issued for Bid submittal for the above referenced project were prepared under my direction and supervision.

DIVISION 16 -ELECTRICAL

- 16050 Electrical - General Provisions
- 16075 Identification for Electrical Systems
- 16110 Conduits and Fittings
- 16120 Wires and Cables
- 16135 Pull, Junction and Terminal Boxes
- 16136 Outlet Boxes
- 16137 Underground Ductbanks for Electrical Systems
- 16138 Manholes and Handholes for Electrical Systems
- 16141 Low Voltage Receptacles
- 16142 Snap Switches
- 16143 Disconnect Switches
- 16150 Motors
- 16160 Panelboards
- 16215 Electrical Power Distribution Study
- 16231 Emergency Generator Set
- 16271 Dry Type Low Voltage Distribution Transformers
- 16289 Surge Protective Devices
- 16370 Variable Frequency Drives
- 16410 Enclosed Circuit Breakers
- 16450 Grounding and Bonding for Electrical Systems
- 16501 Lighting
- 16505 Hangers and Supports for Electrical Systems

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Clearwater, Florida 33756



END OF SECTION

DIVISION 1 GENERAL REQUIREMENTS

SECTION 01005 GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE AND INTENT

A. Description

The work to be done consists of the furnishing of all labor, materials and equipment, and the performance of all work included in this Contract.

B. Work Included

The Contractor shall furnish all labor, superintendence, materials, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, shop drawings, working drawings and other means of construction necessary or proper for performing and completing the work. He shall obtain and pay for all required permits necessary for the work, other than those permits such as the DEP permit and railroad permit, which may have already been obtained. He shall perform and complete the work in the manner best calculated to promote rapid construction consistent with safety of life and property and to the satisfaction of the County, and in strict accordance with the Contract Documents. The Contractor shall clean up the work and maintain it during and after construction, until accepted, and shall do all work and pay all incidental costs. He shall repair or restore all structures and property that may be damaged or disturbed during performance of the work.

The cost of incidental work described in these General Requirements, for which there are no specific Contract Items, shall be considered as part of the general cost of doing the work and shall be included in the prices for the various Contract Items. No additional payment will be made.

The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment.

C. Public Utility Installations and Structures

Public utility installations and structures shall be understood to include all poles, tracks, pipes, wires, conduits, house service connections, vaults, manholes and all other appurtenances and facilities pertaining thereto.

The Contractor shall protect all installations and structures from damage during the work. Access across any buried public utility installation or structure shall be made only in such locations and by means approved by the County. All required protective devices and construction shall be provided by the Contractor at his expense. All existing public utilities damaged by the Contractor, which are shown on the Plans or have been located in the field by the utility, shall be repaired by the Contractor, at his expense, as approved by the County. No separate payment shall be made for such protection or repairs to public utility installations or structures.

Public utility installations or structures owned or controlled by the County or other governmental body, which are required by this contract to be removed, relocated, replaced or rebuilt by the Contractor not identified in any separate bid item shall be considered as a part of the general cost of doing the work and shall be included in the prices bid for the various contract items. No separate payment shall be made.

Where public utility installations or structures owned or controlled by the County or other governmental body are encountered during the course of the work, and are not indicated on the Plans or in the Specifications, and when, in the opinion of the County, removal, relocation, replacement or rebuilding is necessary to complete the work under this Contract, such work shall be accomplished by the utility having jurisdiction, or such work may be ordered, in writing by the County, for the contractor to accomplish. If such work is accomplished by the utility having jurisdiction, it will be carried out expeditiously and the Contractor shall give full cooperation to permit the utility to complete the removal, relocation, replacement or rebuilding as required. If such work is accomplished by the Contractor, it will be in accordance with the General and Supplemental General Conditions.

The Contractor shall give written notice to County and other governmental utility departments and other owners of public utilities of the location of his proposed construction operations, at least forty-eight hours in advance of breaking ground in any area or on any unit of the work. This can be accomplished by making the appropriate contact with the "Sunshine State One-Call of Florida, Inc. Call Center ("Call Sunshine") and per all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).

The maintenance, repair, removal, relocation or rebuilding of public utility installations and structures, when accomplished by the Contractor as herein provided, shall be done by methods approved by the County.

1.02 PLANS AND SPECIFICATIONS

A. Plans

When obtaining data and information from the Plans, figures shall be used in preference to scaled dimensions, and large-scale drawings in preference to small-scale drawings.

B. Copies Furnished to Contractor

The Contractor shall furnish each of the subcontractors, manufacturers, and material men such copies of the Contract Documents as may be required for their work. Additional copies of the Plans and Specifications, when requested, may be furnished to the Contractor at cost of reproduction.

C. Supplementary Drawings

When, in the opinion of the County, it becomes necessary to explain more fully the work to be done or to illustrate the work further or to show any changes which may be required, drawings known as Supplementary Drawings, with specifications

pertaining thereto, will be prepared by the County and five paper prints thereof will be given to the Contractor.

D. Contractor to Check Plans and Data

The Contractor shall verify all dimensions, quantities and details shown on the Plans, Supplementary Drawings, Schedules, Specifications or other data received from the County, and shall notify him of all errors, omissions, conflicts, and discrepancies found therein. Failure to discover or correct errors, conflicts or discrepancies shall not relieve the Contractor of full responsibility for unsatisfactory work, faulty construction or improper operation resulting therefrom nor from rectifying such conditions at his own expense. He will not be allowed to take advantage of any errors or omissions, as full instructions will be furnished by the County, should such errors or omissions be discovered. All schedules are given for the convenience of the County and the Contractor and are not guaranteed to be complete. The Contractor shall assume all responsibility for the making of estimates of the size, kind, and quality of materials and equipment included in work to be done under the Contract.

E. Specifications

The Technical Specifications consist of three parts: General, Products and Execution. The General Section contains General Requirements which govern the work. Products and Execution modify and supplement these by detailed requirements for the work and shall always govern whenever there appears to be a conflict.

F. Intent

All work called for in the Specifications applicable to this Contract, but not shown on the Plans in their present form, or vice versa, shall be of like effect as if shown or mentioned in both. Work not specified in either the Plans or in the Specifications, but involved in carrying out their intent or in the complete and proper execution of the work, is required and shall be performed by the Contractor as though it were specifically delineated or described.

The apparent silence of the Specifications as to any detail, or the apparent omission from them of a detailed description concerning any work to be done and materials to be furnished, shall be regarded as meaning that only the best general practice is to prevail and that only material and workmanship of the best quality is to be used, and interpretation of these Specifications shall be made upon that basis.

The inclusion of the Related Requirements (or work specified elsewhere) in the General part of the specifications is only for the convenience of the Contractor, and shall not be interpreted as a complete list of related Specification Sections.

1.03 MATERIALS AND EQUIPMENT

A. Manufacturer

All transactions with the manufacturers or subcontractors shall be through the Contractor, unless the Contractor shall request, in writing to the County, that the manufacturer or subcontractor deal directly with the County. Any such transactions shall not in any way release the Contractor from his full responsibility under this Contract.

Any two or more pieces or material or equipment of the same kind, type or classification, and being used for identical types of services, shall be made by the same manufacturer.

B. Delivery

The Contractor shall deliver materials in ample quantities to insure the most speedy and uninterrupted progress of the work so as to complete the work within the allotted time. The Contractor shall also coordinate deliveries in order to avoid delay in, or impediment of, the progress of the work of any related Contractor.

C. Tools and Accessories

The Contractor shall, unless otherwise stated in the Contract Documents, furnish with each type, kind or size of equipment, one complete set of suitably marked high grade special tools and appliances which may be needed to adjust, operate, maintain or repair the equipment. Such tools and appliances shall be furnished in approved painted steel cases, properly labeled and equipped with good grade cylinder locks and duplicate keys.

Spare parts shall be furnished as specified.

Each piece of equipment shall be provided with a substantial nameplate, securely fastened in place and clearly inscribed with the manufacturer's name, year of manufacture, serial number, weight and principal rating data.

D. Installation of Equipment.

The Contractor shall have on hand sufficient proper equipment and machinery of ample capacity to facilitate the work and to handle all emergencies normally encountered in work of this character.

Equipment shall be erected in a neat and workmanlike manner on the foundations at the locations and elevations shown on the Plans, unless directed otherwise by the County during installation. All equipment shall be correctly aligned, leveled and adjusted for satisfactory operation and shall be installed so that proper and necessary connections can be made readily between the various units.

The Contractor shall furnish, install and protect all necessary anchor and attachment bolts and all other appurtenances needed for the installation of the devices included in the equipment specified. Anchor bolts shall be as approved by the County and made of ample size and strength for the purpose intended. Substantial templates and working drawings for installation shall be furnished.

The Contractor shall furnish all materials and labor for, and shall properly bed in non-shrink grout, each piece of equipment on its supporting base that rests on masonry foundations.

Grout shall completely fill the space between the equipment base and the foundation. All metal surfaces coming in contact with concrete or grout shall receive a coat of coal tar epoxy equal to Koppers 300M or provide a 1/32-inch neoprene gasket between the metal surface and the concrete or grout.

E. Service of Manufacturer's Engineer

The Contract prices for equipment shall include the cost of furnishing (as required by equipment specifications sections) a competent and experienced engineer or superintendent who shall represent the manufacturer and shall assist the Contractor, when required, to install, adjust, test and place in operation the equipment in conformity with the Contract Documents. After the equipment is placed in permanent operation by the County, such engineer or superintendent shall make all adjustments and tests required by the County to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by the County in the proper operation and maintenance of such equipment.

1.04 INSPECTION AND TESTING

A. General

Inspection and testing of materials will be performed by the County unless otherwise specified.

For tests specified to be made by the Contractor, the testing personnel shall make the necessary inspections and tests and the reports thereof shall be in such form as will facilitate checking to determine compliance with the Contract Documents. Three (3) copies of the reports shall be submitted and authoritative certification thereof must be furnished to the County as a prerequisite for the acceptance of any material or equipment.

If, in the making of any test of any material or equipment, it is ascertained by the County that the material or equipment does not comply with the Contract, the Contractor will be notified thereof and he will be directed to refrain from delivering said material or equipment, or to remove it promptly from the site or from the work and replace it with acceptable material, without cost to the County.

Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized test codes of the ANSI, ASME, or the IEEE, except as may otherwise be stated herein.

The Contractor shall be fully responsible for the proper operation of equipment during tests and instruction periods and shall neither have nor make any claim for damage which may occur to equipment prior to the time when the County formally takes over the operation thereof.

B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the County or duly authorized inspection engineers or inspections bureaus without cost to the Contractor, unless otherwise expressly specified.

The cost of shop and field tests of equipment and of certain other tests specifically called for in the Contract Documents shall be borne by the Contractor and such costs shall be deemed to be included in the Contract price.

Materials and equipment submitted by the Contractor as the equivalent to those specifically named in the Contract may be tested by the County for compliance. The Contractor shall reimburse the County for the expenditures incurred in making such tests on materials and equipment which are rejected for non-compliance.

C. Inspections of Materials

The Contractor shall give notice in writing to the County, at least two weeks in advance of his intention to commence the manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. Such notice shall contain a request for inspection, the date of commencement and the expected date of completion of the manufacture or preparation of materials. Upon receipt of such notice, the County will arrange to have a representative present at such times during the manufacture as may be necessary to inspect the materials or he will notify the Contractor that the inspection will be made at a point other than the point of manufacture, or he will notify the Contractor that inspection will be waived. The Contractor must comply with these provisions before shipping any material. Such inspection shall not release the Contractor from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

D. Certificate of Manufacture

When inspection is waived or when the County so requires, the Contractor shall furnish to him authoritative evidence in the form of Certificates of Manufacture that the materials to be used in the work have been manufactured and tested in conformity with the Contract Documents. These certificates shall be notarized and shall include copies of the results of physical tests and chemical analyses, where necessary, that have been made directly on the product or on similar products of the manufacturer.

E. Shop Tests of Operating Equipment

Each piece of equipment for which pressure, duty, capacity, rating, efficiency, performance, function or special requirements are specified shall be tested in the shop of the maker in a manner which shall conclusively prove that its characteristics comply fully with the requirements of the Contract Documents. No such equipment shall be shipped to the work until the County notifies the Contractor, in writing, that the results of such tests are acceptable.

The cost of shop tests and of furnishing manufacturer's preliminary and shop test data of operating equipment shall be borne by the Contractor.

F. Preliminary Field Tests

As soon as conditions permit, the Contractor shall furnish all labor, materials, and instruments and shall make preliminary field tests of equipment. If the preliminary field tests disclose any equipment furnished under this Contract which does not comply with the requirements of the Contract Documents, the Contractor shall, prior to the acceptance tests, make all changes, adjustments and replacements required. The furnishing Contractor shall assist in the preliminary field tests as applicable.

G. Final Field Tests

Upon completion of the work and prior to final payment, all equipment and piping installed under this Contract shall be subjected to acceptance tests as specified or required to prove compliance with the Contract Documents.

The Contractor shall furnish labor, fuel, energy, water and all other materials, equipment and instruments necessary for all acceptance tests, at no additional cost to the County. The Supplier shall assist in the final field tests as applicable.

H. Failure of Tests

Any defects in the materials and equipment or their failure to meet the tests, guarantees or requirements of the Contract Documents shall be promptly corrected by the Contractor. The decision of the County as to whether or not the Contractor has fulfilled his obligations under the Contract shall be final and conclusive. If the Contractor fails to make these corrections or if the improved materials and equipment, when tested, shall again fail to meet the guarantees of specified requirements, the County, notwithstanding its partial payment for work, and materials and equipment, may reject the materials and equipment and may order the Contractor to remove them from the site at his own expense.

In case the County rejects any materials and equipment, then the Contractor shall replace the rejected materials and equipment within a reasonable time. If he fails to do so, the County may, after the expiration of a period of thirty (30) calendar days after giving him notice in writing, proceed to replace such rejected materials and equipment, and the cost thereof shall be deducted from any compensation due or which may become due the Contractor under his Contract.

I. Final Inspection

During such final inspections, the work shall be clean and free from water. In no case will the final pay application be prepared until the Contractor has complied with all requirements set forth and the County has made his final inspection of the entire work and is satisfied that the entire work is properly and satisfactorily constructed in accordance with the requirements of the Contract Document.

1.05 TEMPORARY STRUCTURES

A. Temporary Fences

If, during the course of the work, it is necessary to remove or disturb any fence or part thereof, the Contractor shall, at his own expense, if so ordered by the County, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The County shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used.

1.06 TEMPORARY SERVICES

A. First Aid

The Contractor shall keep upon the site, at each location where work is in progress, a completely equipped first aid kit and shall provide ready access thereto at all times when people are employed on the work.

1.07 LINES AND GRADES

A. Grade

All work under this Contract shall be constructed in accordance with the lines and grades shown on the Plans, or as given by the County. The full responsibility for keeping alignment and grade shall rest upon the Contractor.

B. Safeguarding Marks

The Contractor shall safeguard all points, stakes, grade marks, monuments and bench marks made or established on the work, bear the cost of reestablishing them if disturbed, and bear the entire expense of rectifying work improperly installed due to not maintaining or protecting or removing without authorization such established points, stakes and marks.

The Contractor shall safeguard all existing and known property corners, monuments and marks adjacent to but not related to the work and, if required, shall bear the cost of reestablishing them if disturbed or destroyed.

C. Datum Plane

All elevations indicated or specified refer to the Mean Sea Level Datum of the NAVD 1988 and/or NGVD 1929.

1.08 ADJACENT STRUCTURES AND LANDSCAPING

A. Responsibility

The Contractor shall also be entirely responsible and liable for all damage or injury as a result of his operations to all other adjacent public and private property, structures of any kind and appurtenances thereto met with during the progress of the work. The cost of protection, replacement in their original locations and conditions or payment of damages for injuries to such adjacent public and private property and structures affected by the work, whether or not shown on the Plans, and the removal, relocation and reconstruction of such items called for on the Plans or specified shall be included in the various Contract Items and no separate

payments will be made therefore. Where such public and private property, structures of any kind and appurtenances thereto are not shown on the Plans and when, in the opinion of the County, additional work is deemed necessary to avoid interference with the work, payment therefore will be made as provided for in the General Conditions.

Contractor is expressly advised that the protection of buildings, structures, tunnels, tanks, pipelines, etc. and related work adjacent and in the vicinity of his operations, wherever they may be, is solely his responsibility. Conditional inspection of buildings or structures in the immediate vicinity of the project which may reasonably be expected to be affected by the Work shall be performed by and be the responsibility of the Contractor.

Contractor shall, before starting operations, make an examination of the interior and exterior of the adjacent structures, buildings, facilities, etc., and record by notes, measurements, photographs, etc., conditions which might be aggravated by open excavation and construction. Repairs or replacement of all conditions disturbed by the construction shall be made to the satisfaction of the County. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the County.

Prior to the beginning of any excavations, the Contractor shall advise the County of all buildings or structures on which he intends to perform work or which performance of the project work will affect.

B. Protection of Trees

1. All trees and shrubs shall be adequately protected by the Contractor with boxes and otherwise and in accordance with ordinances governing the protection of trees. No excavated materials shall be placed so as to injure such trees or shrubs. Trees or shrubs destroyed by negligence of the Contractor or his employees shall be replaced by him with new stock of similar size and age, at the proper season and at the sole expense of the Contractor.
2. Beneath trees or other surface structures, where possible, pipelines may be built in short tunnels, backfilled with excavated materials, except as otherwise specified, or the trees or structures carefully supported and protected from damage.
3. The County may order the Contractor, for the convenience of the County, to remove trees along the line or trench excavation. If so ordered, the County will obtain any permits required for removal of trees. Such tree removal ordered shall be paid for under the appropriate Contract Items.

C. Lawn Areas

Lawn areas shall be left in as good condition as before the starting of the work. Where sod is to be removed, it shall be carefully removed, and later replaced, or the area where sod has been removed shall be restored with new sod.

D. Restoration of Fences

Any fence, or part thereof, that is damaged or removed during the course of the work shall be replaced or repaired by the Contractor and shall be left in as good a condition as before the starting of the work. The manner in which the fence is repaired or replaced and the materials used in such work shall be subject to the approval of the County. The cost of all labor, materials, equipment, and work for the replacement or repair of any fence shall be deemed included in the appropriate Contract Item or items, or if no specific Item is provided therefore, as part of the overhead cost of the work, and no additional payment will be made therefore.

1.09 PROTECTION OF WORK AND PUBLIC

A. Barriers and Lights

During the prosecution of the work, the Contractor shall put up and maintain at all times such barriers and lights as will effectually prevent accidents. The Contractor shall provide suitable barricades, red lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the work causes obstructions to the normal traffic or constitutes in any way a hazard to the public, in accordance with state and local requirements.

B. Smoke Prevention

A strict compliance with ordinances regulating the production and emission of smoke will be required. No open fires will be permitted.

C. Noise

The Contractor shall eliminate noise to as great an extent as practicable at all times. Air compressing plants shall be equipped with silencers and the exhaust of all engines or other power equipment shall be provided with mufflers. In the vicinity of hospitals and schools, special care shall be used to avoid noise or other nuisances. The Contractor shall strictly observe all local regulations and ordinances covering noise control.

D. Access to Public Services

Neither the materials excavated nor the materials or plant used in the construction of the work shall be so placed as to prevent free access to all fire hydrants, valves or manholes.

E. Dust prevention

The Contractor shall prevent dust nuisance from his operations or from traffic by keeping the roads and/or construction areas sprinkled with water at all times.

1.10 CUTTING AND PATCHING

The Contractor shall do all cutting, fitting or patching of his portion of the work that may be required to make the several parts thereof join and coordinate in a manner satisfactory to the County and in accordance with the Plans and Specifications.

The work must be done by competent workmen skilled in the trade required by the restoration.

1.11 CLEANING

A. During Construction

During construction of the work, the Contractor shall, at all times, keep the site of the work and adjacent premises as free from material, debris and rubbish as is practicable and shall remove the same from any portion of the site if, in the opinion of the County, such material, debris, or rubbish constitutes a nuisance or is objectionable. The Contractor shall remove from the site all of his surplus materials and temporary structures when no further need therefore develops.

B. Final Cleaning

At the conclusion of the work, all equipment, tools, temporary structures and materials belonging to the Contractor shall be promptly taken away, and he shall remove and promptly dispose of all water, dirt, rubbish or any other foreign substances.

The Contractor shall thoroughly clean all equipment and materials installed by him and shall deliver such materials and equipment undamaged in a bright, clean, polished and new operating condition.

1.12 MISCELLANEOUS

A. Protection Against Siltation and Bank Erosion

1. The Contractor shall arrange his operations to minimize siltation and bank erosion on construction sites and on existing or proposed water courses and drainage ditches.
2. The Contractor, at his own expense, shall remove any siltation deposits and correct any erosion problems as directed by the County which results from his construction operations.

B. Protection of Wetland Areas

The Contractor shall properly dispose of all surplus material, including soil, in accordance with Local, State and Federal regulations. Under no circumstances shall surplus material be disposed of in wetland areas as defined by the Florida Department of Environmental Protection or Southwest Florida Water Management District.

C. Existing Facilities

The work shall be so conducted to maintain existing facilities in operation insofar as is possible. Requirements and schedules of operations for maintaining existing facilities in service during construction shall be as described in the Special Provisions.

D. Use of Chemicals

All chemicals used during project construction or furnished for project operation, whether herbicide, pesticide, disinfectant, polymer, reactant, or of other classification, must show approval of either EPA or USDA. Use of all such chemicals and disposal of residues shall be in strict conformance with instructions.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01010 SUMMARY OF WORK

PART 1 GENERAL

1.01 WORK COVERED BY CONTRACT DOCUMENTS/REQUIREMENTS INCLUDED

- A. The work included in this contract consists of the construction of a new triplex lift station with a polymer concrete wet well, electrical panels and controls, instrumentation, piping, fittings, valves, magnetic flow meter, emergency pump out connection, new polymer concrete manhole, new gravity sewer and force mains with connections to an existing manhole and 2 existing force mains, rehabilitate an existing manhole, etc. The work will also include providing and installing a new on-site emergency electric generator, relocating the existing odor control unit and installing new pipe between the new wet well and the relocated odor control unit, and relocating the existing RTU antenna and light pack.
- B. The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by these Specifications and as shown on the Contract Drawings.
- C. The Contractor shall perform the work complete, in place and ready for continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by the County.
- D. The Contractor shall furnish and install all materials, equipment and labor which is reasonably and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

1.02 CONTRACTS

Construct all the Work under a single contract.

1.03 WORK SEQUENCE

- A. All work done under this Contract shall be done with a minimum of inconvenience to the users of the system or facility. The Contractor shall coordinate his work with private property owners such that existing utility services are maintained to all users to the maximum extent possible.
- B. The Contractor shall, if necessary and feasible, construct the work in stages to accommodate the County's use of the premises during the construction period; coordinate the construction schedule and operations with the County's Representative.
- C. The Contractor shall, where feasible, construct the Work in stages to provide for public convenience and not close off public use of any facility until completion of construction to provide alternative usage.

1.04 CONSTRUCTION AREAS

- A. The Contractor shall: Limit his use of the construction areas for work and for

storage, to allow for:

1. Work by other Contractors.
 2. County's Use.
 3. Public Use.
- B. Coordinate use of work site under direction of County's Representative.
- C. Assume full responsibility for the protection and safekeeping of products under this Contract, stored on the site.
- D. Move any stored products under the Contractor's control, which interfere with operations of the County or separate contractor.
- E. Obtain and pay for the use of additional storage of work areas needed for Contractor operations.

1.05 COUNTY OCCUPANCY

- A. It is assumed that portions of the Work will be completed prior to completion of the entire Work. Upon completion of construction of each individual facility, including testing, if the County, at its sole discretion, desires to accept the individual facility, the Contractor will be issued a dated certificate of completion and acceptance for each individual facility. The County will assume ownership and begin operation of the individual facility on that date and the three-year guaranty period shall commence on that date. The County has the option of not accepting the entire work as a whole until it is completed, tested and approved by the County.

1.06 PARTIAL COUNTY OCCUPANCY

The Contractor shall schedule his operations for completion of portions of the Work, as designated, for the County's occupancy prior to substantial completion of the entire work.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01015 CONTROL OF WORK

PART 1 GENERAL

1.01 WORK PROGRESS

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

1.02 PRIVATE LAND

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

1.03 WORK LOCATIONS

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

1.04 OPEN EXCAVATIONS

- A. All open excavations shall be adequately safeguarded by providing temporary barricades, caution signs, lights and other means to prevent accidents to persons and damage to property. The Contractor shall, at his own expense, provide suitable and safe bridges and other crossings for accommodating travel by pedestrians and workmen. Bridges provided for access to private property during construction shall be removed when no longer required. If the excavation becomes a hazard, or if it excessively restricts traffic at any point, the County may require special construction procedures such as limiting the length of open trench, prohibiting stacking excavated material in the street and requiring that the trench shall not remain open overnight.
- B. The Contractor shall take precautions to prevent injury to the public due to open trenches. All trenches, excavated material, equipment, or other obstacles which could be dangerous to the public shall be barricaded and well lighted at all times when construction is not in progress.

1.05 DISTRIBUTION SYSTEMS AND SERVICES

- A. The Contractor shall avoid interruptions to water, telephone, cable TV, sewer, gas, or other related utility services. He shall notify the County and the appropriate agency well in advance of any requirement for dewatering, isolating, or relocating

a section of a utility, so that necessary arrangements may be made.

- B. If it appears that utility service will be interrupted for an extended period, the County may order the Contractor to provide temporary service lines at the Contractor's expense. Inconvenience of the users shall be kept to the minimum, consistent with existing conditions. The safety and integrity of the systems are of prime importance in scheduling work.

1.06 PROTECTION AND RELOCATION OF EXISTING STRUCTURES AND UTILITIES

- A. The Contractor shall assume full responsibility for the protection of all buildings, structures and utilities, public or private, including poles, signs, services to building utilities, gas pipes, water pipes, hydrants, sewers, drains and electric and telephone cables and other similar facilities, whether or not they are shown on the Drawings. The Contractor shall carefully support and protect all such structures and utilities from injury of any kind. Any damage resulting from the Contractor's operation shall be repaired by the Contractor at his expense.
- B. The Contractor shall bear full responsibility for obtaining locations of all underground structures and utilities (including existing water services, drain lines and sewers). Services to buildings shall be maintained and all costs or charges resulting from damage thereto shall be paid by the Contractor.
- C. Protection and temporary removal and replacement of existing utilities and structures as described in this Section shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit prices established in the Bid.
- D. If, in the opinion of the County, permanent relocation of a utility owned by the County is required, the County may direct the Contractor, in writing, to perform the work. Work so ordered will be paid for at the Contract unit prices, if applicable, or as extra work as classified in the General Conditions. If relocation of a privately owned utility is required, the County will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the County and utility and shall have no claim for delay due to such relocation. The Contractor shall notify public utility companies in writing at least 48 hours (excluding Saturdays, Sundays and legal holidays) before excavating near their utilities.

1.07 TEST PITS

Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the Contractor immediately after the utility location and the surface shall be restored in a manner equal or better than the original condition. No separate payment will be made.

1.08 CARE AND PROTECTION OF PROPERTY

- A. The Contractor shall be responsible for the preservation of all public and private property and shall use every precaution necessary to prevent damage thereto. If any direct or indirect damage is done to public or private property by or on account of any act, omission, neglect, or misconduct in the execution of the work on the

part of the Contractor, such property shall be restored by the Contractor, at his expense, to a condition equal or better to that existing before the damage was done, or he shall make good the damage in another manner acceptable to the County.

- B. All sidewalks which are disturbed by the Contractor's operations shall be restored to their original or better condition by the use of similar or comparable materials. All curbing shall be restored in a condition equal to the original construction and in accordance with the best modern practice.
- C. Along the location of this work, all fences, walks, bushes, trees, shrubbery and other physical features shall be protected and restored in a thoroughly workmanlike manner unless otherwise shown on the drawings. Fences and other features removed by the Contractor shall be replaced in the location indicated by the County as soon as conditions permit. All grass areas beyond the limits of construction which have been damaged by the Contractor shall be regraded and sodded to equal or exceed original conditions.
- D. Trees close to the work which drawings do not specify to be removed, shall be boxed or otherwise protected against injury. The Contractor shall trim all branches that are liable to damage because of his operations, but in no case shall any tree be cut or removed without prior notification to the County. All injuries to bark, trunk, limbs and roots of trees shall be repaired by dressing, cutting and painting according to approved methods, using only approved tools and materials.
- E. The protection, removal and replacement of existing physical features along the line of work shall be a part of the work under the Contract and all costs in connection therewith shall be included in the unit and/or lump sum prices established under the items in the Bid.

1.09 MAINTENANCE OF TRAFFIC

- A. Open pits, trenches, unpaved streets, debris, or other obstructions due to construction that will prevent the normal flow of traffic during an extended construction stoppage, for any reason, shall be minimized. In the event an extended construction stoppage is found to be necessary, Contractor shall, at his own expense, provide normal traffic flow during extended construction stoppage. Extended stoppage will be defined by the County.
- B. All excavated material shall be placed so that vehicular and pedestrian traffic may be maintained at all times. If the Contractor's operations cause traffic hazards, he shall repair the road surface, provide temporary roadways, erect wheel guards or fences, or take other safety measures which are satisfactory to the County.
- C. Any changes to the traffic pattern require a Traffic Control Plan as detailed in section 01570 of this specification.

1.10 WATER FOR CONSTRUCTION PURPOSES

- A. In locations where public water supply is available, the Contractor may purchase water for all construction purposes.

- B. The Contractor shall be responsible for paying for all water tap fees incurred for the purpose of obtaining a potable water service or temporary use meter.

1.11 MAINTENANCE OF FLOW

The Contractor shall at his own cost, provide for the flow of sewers, drains and water courses interrupted during the progress of the work and shall immediately cart away and remove all offensive matter. The entire procedure of maintaining existing flow shall be fully discussed with the County well in advance of the interruption of any flow.

1.12 CLEANUP

During the course of the work, the Contractor shall keep the site of his operations in as clean and neat a condition as is possible. He shall dispose of all residue resulting from the construction work and at the conclusion of the work, he shall remove and haul away any surplus excavation, broken pavement, lumber, equipment, temporary structures and any other refuse remaining from the construction operations and shall leave the entire site of the work in a neat and orderly condition.

1.13 COOPERATION WITHIN THIS CONTRACT

- A. All firms or person authorized to perform any work under this Contract shall cooperate with the General Contractor and his subcontractors or trades and shall assist in incorporating the work of other trades where necessary or required.
- B. Cutting and patching, drilling and fitting shall be carried out where required by the trade or subcontractor having jurisdiction, unless otherwise indicated herein or directed by the County.

1.14 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from injury in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions injured shall be reconstructed by the Contractor at his own expense.
- B. All structures shall be protected in a manner approved by the County. Should any of the floors or other parts of the structures become heaved, cracked, or otherwise damaged, all such damaged portions of the work shall be completely repaired and made good by the Contractor, at his own expense and to the satisfaction of the County. If, in the final inspection of the work, any defects, faults, or omissions are found, the Contractor shall cause the same to be repaired or removed and replaced by proper materials and workmanship without extra compensation for the materials and labor required. Further, the Contractor shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the warranty period described in the Contract.
- C. Further, the Contractor shall take all necessary precautions to prevent damage to any structure due to water pressure during and after construction and until such structure is accepted and taken over by the County.

1.15 CONSTRUCTION WITHIN RIGHT-OF-WAY

Where pipe lines are installed within FDOT right-of-way, all excavation backfill and compaction for the purpose of reconstructing roadways and/or adjacent slopes contiguous thereto shall be in accordance with FDOT or Manatee County Standards and Specifications, whichever is applicable. Contractor shall satisfy the authorized representative of the FDOT with respect to proper safety procedures, construction methods, required permitting, etc., within the FDOT right-of-way.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01030 SPECIAL PROJECT PROCEDURES

PART 1 GENERAL

1.01 PERMITS

Upon notice of award, the Contractor shall immediately apply for all applicable permits not previously obtained by the County to do the work from the appropriate governmental agency or agencies. No work shall commence until all applicable permits have been obtained and copies delivered to the County. The costs for obtaining all permits shall be borne by the Contractor.

1.02 CONNECTIONS TO EXISTING SYSTEM

The Contractor shall perform all work necessary to locate, excavate and prepare for connections to the existing systems all as shown on the Drawings or where directed by the County. The cost for this work and for the actual connection shall be included in the price bid for the project and shall not result in any additional cost to the County. The termination point for each contract shall be as shown on the Contract Drawings.

1.03 RELOCATIONS

The Contractor shall be responsible for the coordination of the relocation of structures, including but not limited to light poles, power poles, signs, sign poles, fences, piping, conduits and drains that interfere with the positioning of the work as set out on the Drawings. No relocation of the items under this Contract shall be done without approval from the County.

1.04 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

- A. The attention of the Contractor is drawn to the fact that during excavation, the possibility exists of the Contractor encountering various utility lines not shown on the Drawings. The Contractor shall exercise extreme care before and during excavation to locate and flag these lines as to avoid damage to the existing lines.
- B. It is the responsibility of the Contractor to ensure that all utility or other poles, the stability of which may be endangered by the close proximity of excavation, are temporarily stayed in position while work proceeds in the vicinity of the pole and that the utility or other companies concerned be given reasonable advance notice.
- C. The existing utility locations are shown without express or implied representation, assurance, or guarantee that they are complete or correct or that they represent a true picture of underground piping to be encountered. The Contractor shall be responsible for notifying the various utility companies to locate their respective utilities in advance of construction in conformance with all requirements provided for in the Florida Underground Facilities Damage Prevention and Safety Act (Florida Statutes, Title XXXIII, Chapter 556).
- D. The existing piping and utilities that interfere with new construction shall be rerouted as shown, specified, or required. Before any piping and utilities not shown

on the Drawings are disturbed, the Contractor shall notify the County and shall provide suggestions on how best to resolve the issue.

- E. The Contractor shall exercise care in any excavation to locate all existing piping and utilities. All utilities which do not interfere with complete work shall be carefully protected against damage. Any existing utilities damaged in any way by the Contractor shall be restored or replaced by the Contractor at his expense as directed by the County.
- F. It is intended that wherever existing utilities such as water, sewer, gas, telephone, electrical, or other service lines must be crossed, deflection of the pipe within recommended limits and cover shall be used to satisfactorily clear the obstruction unless otherwise indicated in the Drawings. However, when in the opinion of the County this procedure is not feasible, he may direct the use of fittings for a utilities crossing as detailed on the Drawings. No deflections will be allowed in gravity sanitary sewer lines or in existing storm sewer lines.

1.05 SUSPENSION OF WORK DUE TO WEATHER

Refer to FDOT Standards and Specifications Book, Section 8.

1.06 HURRICANE PREPAREDNESS PLAN

- A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the County a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the County in case of a hurricane warning.
- B. In the event of inclement weather, or whenever County shall direct, Contractor shall insure that he and his Subcontractors shall carefully protect work and materials against damage or injury from the weather. If, in the opinion of the County, any portion of work or materials is damaged due to the failure on the part of the Contractor or Subcontractors to protect the work, such work and materials shall be removed and replaced at the expense of the Contractor.

1.07 POWER SUPPLY

Electricity as may be required for construction and permanent power supply shall be secured and purchased by the Contractor.

1.08 SALVAGE

Any existing equipment or material, including, but not limited to, valves, pipes, fittings, couplings, etc., which is removed or replaced as a result of construction under this project may be designated as salvage by the County and if so shall be protected for a reasonable time until picked up by the County. Any equipment or material not worthy of salvaging, as directed by the County, shall be disposed of by the Contractor at no additional cost.

1.09 DEWATERING

- A. The Contractor shall do all groundwater pumping necessary to prevent flotation of any part of the work during construction operations with his own equipment.
- B. The Contractor shall pump out water and wastewater which may seep or leak into the excavations for the duration of the Contract and with his own equipment. He shall dispose of this water in an appropriate manner.

1.10 ADDITIONAL PROVISIONS

- A. Before commencing work on any of the existing pipelines, structures or equipment, the Contractor shall notify the County, in writing, at least 10 calendar days in advance of the date he proposes to commence such work.
- B. The Contractor shall provide, at his own expense, all necessary temporary facilities for access to and for protection of, all existing facilities. The County's personnel must have ready access at all times to the existing facilities. The Contractor is responsible for all damage to existing structures, equipment and facilities caused by his construction operations and must repair all such damage when and as ordered by the County.

1.11 CONSTRUCTION CONDITIONS

The Contractor shall strictly adhere to the specific requirements of the governmental unit(s) and/or agency(ies) having jurisdiction over the work. Wherever there is a difference in the requirements of a jurisdictional body and these Specifications, the more stringent shall apply.

1.12 PUBLIC NUISANCE

- A. The Contractor shall not create a public nuisance including but not limited to encroachment on adjacent lands, flooding of adjacent lands, excessive noise or dust.
- B. Sound levels must meet Manatee County Ordinance #87-34, (which amends Ordinance 81-3, The Manatee County Noise Control Ordinance). Sound levels in excess of such ordinance are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the County for excessive noise shall not relieve the Contractor of the other portions of this specification.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.13 WARRANTIES

- A. All material supplied under these Specifications shall be warranted by the Contractor and the manufacturers for a period of three (3) years. Warranty period shall commence on the date of County acceptance.

- B. The material shall be warranted to be free from defects in workmanship, design and materials. If any part of the system should fail during the warranty period, it shall be replaced at no expense to the County. All material and installation costs shall be 100% borne by the Contractor.
- C. The manufacturer's warranty period shall run concurrently with the Contractor's warranty or guarantee period. No exception to this provision shall be allowed. The Contractor shall be responsible for obtaining warranties from each of the respective suppliers or manufacturers for all the material specified under these contract specifications,
- D. In the event that the manufacturer is unwilling to provide a three-year warranty commencing at the time of County acceptance, the Contractor shall obtain from the manufacturer a four (4) year warranty starting at the time of equipment delivery to the job site. This four-year warranty shall not relieve the Contractor of the three-year warranty starting at the time of County acceptance of the equipment.

1.14 FUEL STORAGE & FILLING

- A. If the contractor is storing fuel on site, or doing his own fuel filling of portable equipment (other than hand-held equipment), he is responsible for any required response, clean-up or reporting required, at no additional cost to the county.
- B. The Contractor shall prepare and submit a fuel storage / spill abatement plan prior to start of construction if required.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01045 CUTTING AND PATCHING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall be responsible for all cutting, fitting and patching, including excavation and backfill, required to complete the work or to:
 - 1. Make its several parts fit together properly.
 - 2. Uncover portions of the work to provide for installation of ill-timed work.
 - 3. Remove and replace defective work.
 - 4. Remove and replace work not conforming to requirements of Contract Documents.
 - 5. Provide penetrations of non-structural surfaces for installation of piping and electrical conduit.

PART 2 PRODUCTS

2.01 MATERIALS

Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.01 INSPECTION

- A. Inspect existing conditions of project, including elements subject to damage or to movement during cutting and patching.
- B. After uncovering work, inspect conditions affecting installation of products, or performance of work.
- C. Report unsatisfactory or questionable conditions to County. Do not proceed with work until County has provided further instructions.

3.02 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value to integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of project from damage.
- C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work and maintain excavations free from water.

3.03 PERFORMANCE

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

- B. Execute excavating and backfilling by methods which will prevent settlement or damage to other work.
- C. Fit and adjust products to provide a finished installation to comply with specified products, functions, tolerances and finishes.
- D. Restore work which has been cut or removed; install new products to provide completed work in accordance with the requirements of the Contract Documents.
- E. Replace surfaces airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.
- F. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes.

END OF SECTION

SECTION 01050 FIELD ENGINEERING AND SURVEYING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall provide and pay for field surveying service required for the project.
- B. The Contractor shall furnish and set all necessary stakes to establish the lines and grades as shown on the Contract Drawings and layout each portion of the Work of the Contract.

1.02 QUALIFICATION OF SURVEYOR AND ENGINEER

All construction staking shall be conducted by or under the supervision of a Florida Registered Professional Surveyor and Mapper. The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the County.

1.03 SURVEY REFERENCE POINTS

- A. Existing basic horizontal and vertical control points for the Project are designated on the Contract Drawings.
- B. Locate and protect all survey monumentation, property corners and project control points prior to starting work and preserve all permanent reference points during construction. All costs associated with the replacement of all survey monumentation, property corners and project control points shall be borne by the Contractor.

Make no changes or relocations without prior written notice to County.

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

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

Establish replacements based on original survey control.

1.04 PROJECT SURVEY REQUIREMENTS

The Contractor shall establish temporary bench marks as needed, referenced to data established by survey control points.

1.05 RECORDS

The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings per Section 01720.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01090 REFERENCE STANDARDS

PART 1 GENERAL

1.01 REQUIREMENTS

Abbreviations and acronyms used in Contract Documents to identify reference standards.

- A. Application: When a standard is specified by reference, comply with requirements and recommendations stated in that standard, except when requirements are modified by the Contract Documents, or applicable codes established stricter standards.
- B. Publication Date: The most recent publication in effect on the date of issue of Contract Documents, except when a specific publication date is specified.

1.03 ABBREVIATIONS, NAMES AND ADDRESSES OR ORGANIZATIONS

Obtain copies of reference standards direct from publication source, when needed for proper performance of work, or when required for submittal by Contract Documents.

AA	Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
AASHTO	American Association of State Highway and Transportation Officials 444 North Capital Street, N.W. Washington, DC 20001
ACI	American Concrete Institute Box 19150 Reford Station Detroit, MI 48219
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AISC	American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16th Street NW Washington, DC 20036
ANSI	American National Standards Institute 1430 Broadway

New York, NY 10018

- ASHRAE American Society of Heating, Refrigerating and Air Conditioning Engineers
179I Tullie Circle, N.E.
Atlanta, GA 30329
- ASME American Society of Mechanical Engineers
345 East 47th Street
New York, NY 10017
- ASTM American Society for Testing and Materials
1916 Race Street
Philadelphia, PA 19103
- AWWA American Water Works Association
6666 West Quincy Avenue
Denver, CO 80235
- AWS American Welding Society
2501 N.W. 7th Street
Miami, FL 33125
- CRSI Concrete Reinforcing Steel Institute
180 North LaSalle Street, Suite 2110
Chicago, IL 60601
- FDEP Florida Department of Environmental Protection
3900 Commonwealth Blvd.
Tallahassee, Florida 32399
- FDOT Florida Department of Transportation Standards Specifications for
Road and Bridge Construction
Maps & Publication Sales - Mail Station 12
605 Suwannee St.
Tallahassee, FL 32399-0450
- FS Federal Specification
General Services Administration Specifications and Consumer
Information Distribution Section (WFSIS)
Washington Navy Yard, Bldg. 197
Washington, DC 20407
- MCPW UTIL STD Manatee County Utility Engineering
1022 26th Ave E
Bradenton, FL 34208
- MLSFA Metal Lath/Steel Framing Association
221 North LaSalle Street
Chicago, IL 60601

MMA	Monorail Manufacturer's Association 1326 Freeport Road Pittsburgh, PA 15238
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NEMA	National Electrical Manufacturer's Assoc. 2101 L Street N.W. Washington, DC 20037
OHSA	Occupational Safety and Health Assoc. 5807 Breckenridge Pkwy., Suite A Tampa, FL 33610-4249
PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
SMACNA	Sheet Metal and Air Conditioning Contractor's National Association 8224 Old Court House Road Vienna, VA 22180
SSPC	Steel Structures Painting Council 402 24 th Street, Suite 600 Pittsburgh, PA 15213
SWFWMD	Southwest Florida Water Management District 2379 Broad Street Brooksville, FL 34604-6899
UL	Underwriter's Laboratories, Inc. 333 Pfingston Road Northbrook, IL 60062

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01150 MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.01 SCOPE

- A. The scope of this section of the Contract Documents is to further define the items included in each Bid Item in the Bid Form section of the Contract Documents. Payment will be made based on the specified items included in the description in this section for each bid item.
- B. All contract prices included in the Bid Form section will be full compensation for all shop drawings, working drawings, labor, materials, tools, equipment, and incidentals necessary to complete the construction as shown on the Drawings and/or as specified in the Contract Documents to be performed under this Contract. Actual quantities of each item bid on a unit price basis will be determined upon completion of the construction in the manner set up for each item in this section of the Specifications. Payment for all items listed in the Bid Form will constitute full compensation for all work shown and/or specified to be performed under this Contract.

1.02 ESTIMATED QUANTITIES

The quantities shown are approximate and are given only as a basis of calculation upon which the award of the Contract is to be made. The County does not assume any responsibility for the final quantities, nor shall the Contractor claim misunderstanding because of such estimate of quantities. Final payment will be made only for satisfactorily completed quantity of each item.

1.03 WORK OUTSIDE AUTHORIZED LIMITS

No payment will be made for work constructed outside the authorized limits of work.

1.04 MEASUREMENT STANDARDS

Unless otherwise specified for the items involved, all measurements of distance shall be taken horizontally or vertically.

1.05 AREA MEASUREMENTS

In the measurement of items to be paid for on the basis of area of finished work, the lengths and/or widths to be used in the calculations shall be the final dimensions measured along the surface of the completed work within the neat lines shown or designated.

1.06 LUMP SUM ITEMS

Where payment for items is shown to be paid for on a lump sum basis, no separate payment will be made for any item of work required to complete the lump sum items. Lump sum contracts shall be complete, tested and fully operable prior to request for final payment. Contractor may be required to provide a break-down of the lump sum

totals.

1.07

UNIT PRICE ITEM

Separate payment will be made for the items of work described herein and listed on the Bid Form. Any related work not specifically listed but required for satisfactory completion of the work shall be considered to be included in the scope of the appropriate listed work items.

No separate payment will be made for the following items and the cost of such work shall be included in the applicable pay items of work. Final payments shall not be requested by the Contractor or made by the County until as-built (record) drawings have been submitted and approved by the County.

1. Project signs and photographs.
2. Removal, repair, replacement or relocation of all signs, walls, private irrigation systems and related items.
3. Rubbish and spoil removal.
4. Shop Drawings, Working Drawings.
5. Clearing, grubbing, and grading except as hereinafter specified.
6. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
7. Dewatering and disposal of surplus water.
8. Structural fill, backfill, and grading.
9. Replacement of unpaved roadways, and shrubbery plots.
10. Cleanup & miscellaneous work.
11. Foundation and borrow materials, except as hereinafter specified.
12. Testing and placing system in operation.
13. Any material and equipment required to be installed and utilized for the tests.
14. Pipe, structures, pavement replacement, asphalt, and shell driveways and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
15. Maintaining the existing quality of service during construction.
16. Appurtenant work as required for a complete and operable system.
17. Seeding and hydro mulching.

MISSIONARY VILLAGE LIFT STATION REHABILITATION

BID ITEM NO. 1 - MOBILIZATION AND DEBMOBILIZATOIN

Measurement and payment for this Bid Item shall include full compensation for the required 100 percent (100%) Performance Bond, 100 Percent (100%) Payment Bond, all required insurance for the project and the Contractor's mobilization and demobilization costs as shown in the Bid Form. Mobilization includes, but it not limited to preparation and movement of personnel, equipment, supplies and incidentals such as safety and sanitary supplies/ facilities

Payment for mobilization shall not exceed 10 percent (10%) of the total Contract cost unless the Contractor can prove to the County that his actual mobilization cost exceeds 10 percent (10%).

Partial payments for this Bid Item will be made in accordance with the following schedule:

Percent of Original Contract Amount:	Percent Allowable Payment of Mobilization/Demobilization Bid Item Price:
5	25
10	35
25	45
50	50
75	75
100	100

These payments will be subject to the standard retainage provided in the Contract. Payment of the retainage will be made after completion of the work and demobilization.

BID ITEM 2 - MECHANICAL IMPROVEMENTS

Payment of all work included in this Bid Item will be made at the applicable Contract lump sum price for furnishing all labor, materials, and equipment necessary for pump and header piping replacement. Provide all demolition, new pumps and piping, valves and supports specified herein or as otherwise necessary for the completion of the Work associated with this Contract. Refer to drawings and specifications.

- 2.01 **Traffic Control** shall include all labor, materials and equipment including any necessary signage and other ancillary items necessary as called out on the drawings and per the Contract Documents.

Payment for this item shall be Lump Sum.

- 2.02 **10" Check Valve** shall include all labor, materials and equipment including for installation of the 10" check valve as called out on the drawings and per the Contract Documents.

Payment for this item shall be for each 10" Check Valve installed.

- 2.03 **10" Gate Valve** shall include all labor, materials and equipment including for installation of the 10" gate valve as called out on the drawings and per the Contract Documents.

Payment for this item shall be for each 10" Gate Valve installed.

- 2.04 **10" DR 11 HDPE 90 Degree Bend** shall include all labor, materials and equipment including for installation of the 10" DR 11 HDPE 90 Degree Bend as called out on the drawings and per the Contract Documents.

Payment for this item shall be for each 10" DR 11 HDPE 90 Degree Bend installed.

- 2.05 **10" PE X Flanged HDPE** shall include all labor, materials and equipment including for installation of the 10" PE X Flanged HDPE as called out on the drawings and per the Contract Documents.

Payment for this item shall be for each of the 10" PE X Flanged HDPE installed.

- 2.06 **10" HDPE Riser** shall include all labor, materials and equipment including for installation of the 10" HDPE Riser as called out on the drawings and per the Contract Documents.

Payment for this item shall be for lineal foot 10" HDPE Riser installed.

- 2.07 **12" DI FM** shall include all labor, materials, and equipment necessary to install the 10" DI force main pipe as called out on the drawings and per the Contract Documents.

Payment for 10" DI FM shall be per lineal foot of pipe installed.

- 2.08 **12" MAG Flow Meter** shall include all labor, materials, and equipment necessary for installing each 12" MAG Flow Meter as called out on the drawings and per the Contract Documents.

Payment for this item shall be for each 12" MAG Flow Meter installed.

- 2.09 **12" Gate Valve** shall include all labor, materials and equipment including for installation of the 12" gate valve as called out on the drawings and per the Contract Documents.

Payment for this item shall be for each 12" Gate Valve installed.

- 2.10 **12" Restrained C900 DR-18 PVC FM** shall include all labor, materials, and equipment necessary for installing 12" Restrained C900 DR-18 PVC FM as called out on the drawings and per the Contract Documents.

Payment for 12" Restrained C900 DR-18 PVC FM shall be per lineal foot installed.

- 2.11 **10" Schedule 80 PVC Odor Control Suction Pipe** shall include all labor, materials, and equipment necessary for installing 10" ASTM D2241 SDR 21 PVC Odor Control Suction Pipe as called out on the drawings and per the Contract Documents.

Payment for 10" Schedule 80 PVC Odor Control Suction Pipe shall be per lineal foot installed.

- 2.12 **12" SDR 26 PVC Gravity Sewer including connection to MH S2** shall include all labor, materials, and equipment necessary for installing 12" SDR 26 PVC Gravity Sewer and including the connection to MH S2 as called out on the drawings and per the Contract Documents.

Payment for 12" SDR 26 PVC Gravity Sewer including connection to MH S2 shall be per lineal foot installed.

- 2.13 **12" Force Main Drop Connection** shall include all labor, materials, and equipment necessary for installing each 12" Force Main Drop Connection as called out on the drawings and per the Contract Documents.

Payment for 12" Force Main Drop Connection shall be per each installed.

- 2.14 **16' Dia. Polymer Concrete Wetwell** shall include all labor, materials, and equipment necessary for installing each 16' Dia. Polymer Concrete Wetwell as called out on the drawings and per the Contract Documents.

Payment for 16' Dia. Polymer Concrete Wetwell shall be per each installed.

- 2.15 **Core Wet Well and Install Connection Boot for 10" Pipe** shall include all labor, materials, and equipment necessary for installing Core Wet Well and Install Connection Boot for 10" Pipe as called out on the drawings and per the Contract Documents.

Payment for Core Wet Well and Install Connection Boot for 10" Pipe shall be each installed.

- 2.16 **Core Wet Well and Install Connection Boot for 12" Pipe** shall include all labor, materials, and equipment necessary for installing Core Wet Well and Install Connection Boot for 12" Pipe as called out on the drawings and per the Contract Documents.

Payment for Core Wet Well and Install Connection Boot for 12" Pipe shall be each installed.

- 2.17 **Core Wet Well and Install Connection Boot for 20" Pipe** shall include all labor, materials, and equipment necessary for installing Core Wet Well and Install Connection Boot for 20" Pipe as called out on the drawings and per the Contract Documents.

Payment for Core Wet Well and Install Connection Boot for 20" Pipe shall be each installed.

- 2.18 **5' Diameter Polymer Manhole** shall include all labor, materials, and equipment necessary for installing each 5' Diameter Polymer Manhole as called out on the drawings and per the Contract Documents.

Payment for 5' Diameter Polymer Manhole shall be per each installed.

- 2.19 **Core Manhole and Install Connection Boot for 12" Pipe** shall include all labor, materials, and equipment necessary for installing Core Manhole and Install Connection Boot for 12" Pipe as called out on the drawings and per the Contract Documents.

Payment for Core Manhole and Install Connection Boot for 12" Pipe shall be each installed.

- 2.20 **Core Manhole and Install Connection Boot for 20" Pipe** shall include all labor, materials, and equipment necessary for installing Core Manhole and Install Connection Boot for 20" Pipe as called out on the drawings and per the Contract Documents.

Payment for Core Manhole and Install Connection Boot for 20" Pipe shall be each installed.

- 2.21 **2" Schedule 80 PVC** shall include all labor, materials, and equipment necessary for installing 2" Schedule 80PVC as called out on the drawings and per the Contract Documents.

Payment for 2" Schedule 80 PVC shall be per lineal foot installed.

- 2.22 **2" Service Tap** shall include all labor, materials, and equipment necessary for installing 2" Service Tap as called out on the drawings and per the Contract Documents.

Payment for 2" Service Tap shall be per the tap on the water main and the lineal foot of water service pipe installed.

- 2.23 **20" C900 DR 18 PVC Gravity Sewer** shall include all labor, materials, and equipment necessary for installing 20" C900 DR 18 PVC Gravity Sewer as called out on the drawings and per the Contract Documents.

Payment for 20" C900 DR 18 PVC Gravity Sewer shall be per lineal foot installed

- 2.24 **6" Cam Lock and Cap** shall include all labor, materials, and equipment necessary for installing each 6" Cam Lock and Cap as called out on the drawings and per the Contract Documents.

Payment for 6" Cam Lock and Cap shall be per each installed.

- 2.25 **6" Gate Valve** shall include all labor, materials, and equipment necessary for installing each 6" Gate Valve as called out on the drawings and per the Contract Documents.

Payment for 6" Gate Valve shall be per each installed.

- 2.26 **6' Chain-link Fence** shall include all labor, materials, and equipment necessary for installing 6' Chain-link Fence as called out on the drawings and per the Contract Documents.

Payment for 6' Chain-link Fence shall be per lineal foot installed.

- 2.27 **6' Tall x 15" Long Cantilever Slide Gates for Fence Opening** shall include all labor, materials, and equipment necessary for installing each 6' Tall x 15" Long ' Cantilever Slide Gates for Fence Opening as called out on the drawings and per the Contract Documents.

Payment for 6' Tall x 15" Long Cantilever Slide Gates for Fence Opening shall be per each installed.

- 2.28 **Connection to Existing 12" Valve** shall include all labor, materials, and equipment necessary for installing each Connection to Existing 12" Valve as called out on the drawings and per the Contract Documents.

Payment for Connection to Existing 12" Valve shall be per each installed.

- 2.29 **Demolition** shall include all labor, materials and equipment including any necessary signage and other ancillary items necessary for Demolition of the existing lift station as called out on the drawings and per the Contract Documents.

Payment for Demolition shall be Lump Sum.

- 2.30 **DI Fittings** shall include all labor, materials, and equipment necessary for installing DI Fittings shall be measured by the ton of the aggregate weight of all DI fittings as called out on the drawings and per the Contract Documents.

Payment for DI Fittings shall be per ton installed.

- 2.31 **Hose Bib and Rack** shall include all labor, materials, and equipment necessary for installing each Hose Bib and rack as called out on the drawings and per the Contract Documents.

Payment for Hose Bib and rack shall be per each installed.

- 2.32 **Rehab Existing Manhole** shall include all labor, materials, and equipment necessary for installing each Rehab Existing Manhole as called out on the drawings and per the Contract Documents.

Payment for Rehab Existing Manhole shall be per each.

- 2.33 **Relocate Generator off-site** shall include all labor, materials, and equipment necessary to Relocate Generator off-site as called out on the drawings and per the Contract Documents.

Payment for the relocate of Generator off site shall be per each.

- 2.34 **SS Pipe Supports** shall include all labor, materials, and equipment necessary to install each SS Pipe Support as called out on the drawings and per the Contract Documents.

Payment for SS Pipe Supports shall be per each installed.

- 2.35 **Pumps, Discharge Connections, Guide Rails & Upper Guide Rail Brackets** shall include all labor, materials, and equipment necessary to install each Pumps, Discharge Connections, Guide Rails & Upper Guide Rail Brackets as called out on the drawings and per the Contract Documents.

Payment for Pumps, Discharge Connections, Guide Rails & Upper Guide Rail Brackets shall be per each.

- 2.36 **Pumps, Access Hatches, with Fall Protection Grates** shall include all labor, materials, and equipment necessary to install each Pumps, Access Hatches, with Fall Protection Grates as called out on the drawings and per the Contract Documents.

Payment for Pumps, Access Hatches, with Fall Protection Grates shall be per each.

- 2.37 **Cable Holder** shall include all labor, materials, and equipment necessary to install each Cable Holder as called out on the drawings and per the Contract Documents.

Payment for Cable Holder shall be per each.

- 2.38 **Water Meter Assembly** shall include all labor, materials, and equipment necessary to install each Water Meter Assembly as called out on the drawings and per the Contract Documents.

Payment for Water Meter Assembly shall be per each.

- 2.39 **2" Backflow Preventor Assembly** shall include all labor, materials, and equipment necessary to install each 2" Backflow Preventor Assembly as called out on the drawings and per the Contract Documents.

Payment for 2" Backflow Preventor Assembly shall be per each.

- 2.40 **2" X 2" Combination Air and Vacuum Release Valve** shall include all labor, materials, and equipment necessary to install each 2" X 2" Combination Air and Vacuum Release Valve as called out on the drawings and per the Contract Documents.

Payment for 2" X 2" Combination Air and Vacuum Release Valve shall be per each.

BID ITEM NO. 3 - STRUCTURAL

Payment of all work included under this Bid Item will be for furnishing all labor, materials, and equipment necessary to install the polymer concrete wet well and manhole and to construct concrete and masonry improvements for the driveway, to

mount pipe, fittings, valves and flow meter located adjacent to the new lift station and construct the electrical equipment building.

- 3.01 **Concrete Slab-On-Grade** shall include all labor, materials, and equipment necessary for installing Concrete Slab-On-Grade measured by the cubic yard of concrete as called out on the drawings and per the Contract Documents.

Payment for Concrete Slab-On-Grade shall be per cubic yard installed.

- 3.02 **6" Thick Concrete Driveway** shall include all labor, materials, and equipment necessary for installing Concrete Driveway, including joints, prefabricated expansion joint material and poured joint sealant measured by the square yard of concrete at the thickness shown and as called out on the drawings and per the Contract Documents.

Payment for 6" Thick Concrete Driveway shall be per square yard installed.

- 3.03 **Excavate Useable Soil (0 to 18 ft deep)** shall include all labor, materials, and equipment necessary for Excavate Useable Soil (0 to 18 ft deep) for installation of the wet well and manhole measured by the cubic yard as called out on the drawings and per the Contract Documents.

Payment for Excavate Useable Soil (0 to 18 ft deep) shall be per cubic yard installed.

- 3.04 **Excavate Unusable Clay Soil (18 to 22 ft deep) including disposal** shall include all labor, materials, and equipment necessary for Excavate unusable Clay Soil (18 to 22 ft deep) including disposal of the unusable soil measured by the cubic yard as called out on the drawings and per the Contract Documents.

Payment for Excavate unusable Clay Soil (18 to 22 ft deep) including disposal shall be per cubic yard installed.

- 3.05 **Excavate unusable Limestone (22 ft and deeper) including disposal** shall include all labor, materials, and equipment necessary for Excavate unusable Limestone (22 ft and deeper) including disposal of the unusable limestone measured by the cubic yard as called out on the drawings and per the Contract Documents.

Payment for Excavate unusable Limestone (22 ft and deeper) including disposal shall be per cubic yard installed.

- 3.06 **Construct Leveling Course** shall include all labor, materials, and equipment necessary to Construct Leveling Course on which the wet well structure will be set using washed shell or crushed stone including compaction measured by the cubic yard in place as called out on the drawings and per the Contract Documents.

Payment for Construct Leveling Course shall be per cubic yard installed.

- 3.07 **Backfill and Compact Useable Soil** shall include all labor, materials, and equipment necessary to Backfill and Compact Useable Soil around the new wet well and manhole measured by the cubic yard in place as called out on the drawings and per the Contract Documents.

Payment for Backfill and Compact Useable Soil shall be per cubic yard installed.

- 3.08 **Backfill and Compact Imported Soil** shall include all labor, materials, and equipment necessary to Backfill and Compact Imported Soil around the new wet well and manhole measured by the cubic yard in place as called out on the drawings and per the Contract Documents.

Payment for Backfill and Compact Imported Soil shall be per cubic yard installed.

- 3.09 **Mill Existing Asphalt Pavement** shall include all labor, materials, and equipment necessary for installing Mill Existing Asphalt Pavement measured by the square yard of concrete as called out on the drawings and per the Contract Documents.

Payment for Mill Existing Asphalt Pavement shall be per square yard installed.

- 3.10 **Roadway Base Restoration** shall include all labor, materials, and equipment necessary for installing Roadway Base Restoration measured by the square yard of concrete as called out on the drawings and per the Contract Documents.

Payment for Roadway Base Restoration shall be per square yard installed.

- 3.11 **Local Road SIII Asphaltic Concrete** shall include all labor, materials, and equipment necessary for installing Local Road SIII Asphaltic Concrete measured by the square yard of concrete as called out on the drawings and per the Contract Documents.

Payment for Local Road SIII Asphaltic Concrete shall be per square yard installed.

- 3.12 **Dewatering (Pipe and Structures)** shall include all labor, materials, and equipment necessary for performing Dewatering (Pipe and Structures) operations measured by the calendar days of duration of the work as called out on the drawings and per the Contract Documents.

Payment for Dewatering (Pipe and Structures) shall be per Day of duration.

BID ITEM NO. 4- ELECTRICAL EQUIPMENT BUILDING

Payment of all work included under this Bid Item will be for furnishing all labor, materials, and equipment necessary to construct concrete improvements for

electrical equipment installation and concrete block building meeting the requirements of FAC Chapter 62-604.400.3(e), be Category 5 (>160mph) hurricane rated, elevated, and located adjacent to the new pump station.

- 4.01 **Excavation** shall include all labor, materials, and equipment necessary for Excavation for installation of the electrical equipment building measured by the cubic yard as called out on the drawings and per the Contract Documents.

Payment for Excavation shall be per cubic yard.

- 4.02 **Backfill and Compaction** shall include all labor, materials, and equipment necessary for the site preparation for the building including but not limited to backfill and testing and related site preparation work, and other ancillary items necessary as called out on the drawings and per the Contract Documents.

Payment for Backfill and Compaction shall be by cubic yard.

- 4.03 **Concrete Slabs on Grade** shall include all labor, materials, and equipment necessary for the reinforced concrete slabs on grade including but not limited to required site preparation, reinforcing steel, concrete, and other ancillary items necessary as called out on the drawings and per the Contract Documents.

Payment for Concrete Slabs on Grade shall be cubic yards

- 4.04 **Concrete Masonry Walls** shall include all labor, materials, and equipment necessary for constructing the Concrete Masonry Walls including but not limited to required steel reinforcement, concrete mortar, and other ancillary items necessary as called out on the drawings and per the Contract Documents.

Payment for Concrete Masonry Walls shall be square foot.

- 4.05 **Steel Beams** shall include all labor, materials, and equipment necessary for the erection and coordination of the installation of the steel beams necessary for supporting the roof of the concrete block building, and other ancillary items necessary as called out on the drawings and per the Contract Documents.

Payment for Steel Beams shall be linear foot.

- 4.06 **Steel Plates** shall include all labor, materials, and equipment necessary for the installation of the Steel Plates (base plates for steel framework), including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Steel Plates shall be per square foot.

- 4.07 **Steel Deck** shall include all labor, materials, and equipment necessary for the installation of the Steel Deck, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Steel Deck shall be per square foot.

- 4.08 **CIP Anchor Bolts** shall include all labor, materials and equipment necessary to install CIP Steel Anchor Bolts, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for CIP Steel Anchor Bolts shall be per each.

- 4.09 **1/2" Plywood** shall include all labor, materials and equipment necessary to install 1/2" Plywood, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for 1/2" Plywood shall be per square foot.

- 4.10 **Rigid Insulation Boards** shall include all labor, materials and equipment necessary to install Rigid Insulation Boards, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Rigid Insulation Boards shall be per square foot.

- 4.11 **Underlayment** shall include all labor, materials and equipment necessary to install Underlayment, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Underlayment shall be per square foot.

- 4.12 **Standing Seam Metal Roof** shall include all labor, materials and equipment necessary to install Standing Seam Metal Roof, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Standing Seam Metal Roof shall be per square foot.

- 4.13 **Alum Doors w/ Hardware** shall include all labor, materials and equipment necessary to install Alum Doors w/ Hardware, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Alum Doors w/ Hardware shall be per each.

- 4.14 **Alum Frames** shall include all labor, materials and equipment necessary to install Alum Frames, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Alum Frames shall be per each.

- 4.15 **Caulk & Sealant** shall include all labor, materials and equipment necessary to caulk and seal, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Caulk and Sealant shall be per lineal foot each.

- 4.16 **Paint Interior Walls** shall include all labor, materials and equipment necessary to paint interior walls, including but not limited to ancillary items necessary for the complete installation as called out on the drawings and per the Contract Documents.

Payment for Paint Interior Walls shall be per square foot each.

BID ITEM NO. 5 - INSTRUMENTATION & CONTROLS

Payment of all work included in this Bid Item will be made at the applicable Contract lump sum price for furnishing all plant, labor, materials, and equipment necessary for the refurbishment of the lift station. The existing control panel backboard for lift station along with a stand-alone UPS will be relocated into a new control panel enclosure by the CONTRACTOR. The control panel enclosure will be provided by the SYSTEM INTEGRATOR. Refer to DRAWINGS and SPECIFICATIONS for more information.

- 5.01 ***Relocate Tower, RTU, Startup, and Commissioning Services*** shall include all labor, materials, and equipment necessary for the work to Relocate tower, RTU, startup, and commissioning services including dismantling the existing tower and installing it at the new location as called out on the drawings and per the Contract Documents.

Payment for Relocate tower, RTU, startup, and commissioning services shall be per each installed.

BID ITEM NO. 6 - ELECTRICAL

Payment of all work included in this Bid Item will be made at the applicable Contract lump sum price for furnishing all plant, labor, materials, and equipment necessary for the replacement of the electrical distribution and pump control equipment. Existing building lighting shall remain along with receptacle circuits; however, the receptacles and switches themselves will be replaced with corrosion resistant devices

- 6.01 ***Main Service Entrance Breaker*** shall include all labor, materials, and equipment necessary for the work to install each Main Service Entrance Breaker as called out on the drawings and per the Contract Documents.

Payment for Main Service Entrance Breaker shall be per each installed.

6.02 **VFD's** shall include all labor, materials, and equipment necessary for the work to install each VFD as called out on the drawings and per the Contract Documents.

Payment for VFD's shall be per each installed.

6.03 **Automatic Transfer Switch** shall include all labor, materials, and equipment necessary for the work to install each Automatic Transfer Switch as called out on the drawings and per the Contract Documents.

Payment for Automatic Transfer Switch shall be per each installed.

6.04 **Power Distribution Panel** shall include all labor, materials, and equipment necessary for the work to install each Power Distribution Panel as called out on the drawings and per the Contract Documents.

Payment for Power Distribution Panel shall be per each installed.

6.05 **450kW Generator** shall include all labor, materials, and equipment necessary for the work to install each 450kV Generator as called out on the drawings and per the Contract Documents.

Payment for 450kV Generator shall be per each installed.

6.06 **120 V Power Distribution** shall include all labor, materials, and equipment necessary for the work to install each 120 V Power Distribution as called out on the drawings and per the Contract Documents.

Payment for 120 V Power Distribution shall be per each installed.

6.07 **Low Voltage Receptacles** shall include all labor, materials, and equipment necessary for the work to install each Low Voltage Receptacle as called out on the drawings and per the Contract Documents.

Payment for Low Voltage Receptacles shall be per each installed.

6.08 **Outlet Boxes** shall include all labor, materials, and equipment necessary for the work to install each Outlet Box as called out on the drawings and per the Contract Documents.

Payment for Outlet Boxes shall be per each installed.

6.09 **Rigid Conduit** shall include all labor, materials, and equipment necessary for installing Rigid Conduit as called out on the drawings and per the Contract Documents.

Payment for Rigid Conduit shall be per lineal foot installed.

6.10 **Low Voltage Cables** shall include all labor, materials, and equipment necessary for installing Low Voltage Cables as called out on the drawings and per the Contract Documents.

Payment for Low Voltage Cables shall be per lineal foot installed.

- 6.11 **Instrumentation Cable** shall include all labor, materials, and equipment necessary for installing Instrumentation Cable as called out on the drawings and per the Contract Documents.

Payment for Instrumentation Cable shall be per lineal foot installed.

- 6.12 **Flexible Conduits & Fittings** shall include all labor, materials, and equipment necessary for the work to install each Flexible Conduits & Fittings as called out on the drawings and per the Contract Documents.

Payment for Flexible Conduits & Fittings shall be per each installed.

- 6.13 **Sealing Fitting** shall include all labor, materials, and equipment necessary for the work to install each Sealing Fitting as called out on the drawings and per the Contract Documents.

Payment for Sealing Fitting shall be per each installed.

- 6.14 **Hangers and Supports for Electrical Systems** shall include all labor, materials, and equipment necessary for the work to install each Hangers and Supports for Electrical Systems as called out on the drawings and per the Contract Documents.

Payment for Hangers and Supports for Electrical Systems shall be per each installed.

- 6.15 **Underground Ductbank** shall include all labor, materials, and equipment necessary for the work to install concrete Underground Ductbank measured by the cubic yard as called out on the drawings and per the Contract Documents.

Payment for Underground Ductbank shall be per cubic yard installed.

- 6.16 **Manholes and Handholes** shall include all labor, materials, and equipment necessary for the work to install each Manholes and Handholes as called out on the drawings and per the Contract Documents.

Payment for Manholes and Handholes shall be per each installed.

- 6.17 **AC Unit Split System** shall include all labor, materials, and equipment necessary for the work to install each AC Unit Split System as called out on the drawings and per the Contract Documents.

Payment for AC Unit Split System shall be per each installed.

- 6.18 **Manual Transfer Switch** shall include all labor, materials, and equipment necessary for the work to install each Manual Transfer Switch as called out on the drawings and per the Contract Documents.

Payment for Manual Transfer Switch shall be per each installed.

- 6.19 **Disconnect** shall include all labor, materials, and equipment necessary for the work to install each Disconnect as called out on the drawings and per the Contract Documents.

Payment for Disconnect shall be per each installed.

Grounding and Bonding

- 6.20 **Grounding Rods** shall include all labor, materials, and equipment necessary for the work to install each Grounding Rods as called out on the drawings and per the Contract Documents.

Payment for Grounding Rods shall be per each installed.

- 6.21 **Grounding Cable** shall include all labor, materials, and equipment necessary for the work to install Grounding Cable measured by the lineal foot as called out on the drawings and per the Contract Documents.

Payment for Grounding Cable shall be per lineal feet installed.

- 6.22 **Exothermic Mold, Weld and Bonding** shall include all labor, materials and equipment including other ancillary items necessary for Exothermic Mold, Weld and Bonding as called out on the drawings and per the Contract Documents.

Payment for Exothermic Mold, Weld and Bonding shall be Lump Sum.

BID ITEM NO. 7 - CIVIL

Payment of all work included in this Bid Item will be made at the applicable Contract lump sum price for furnishing all plant, labor, materials, and equipment necessary for erosion and sedimentation control, temporary bypass pumping, stone and wood type mulch for weed barrier and site restoration.

- 7.01 **Erosion and Sediment Control** shall include all labor, materials and equipment including other ancillary items necessary for installation and maintenance of the erosion and sedimentation controls as called out on the drawings and per the Contract Documents.

Payment for Erosion and Sediment Control shall be Lump Sum.

- 7.02 **Temporary Bypass Pumping for Installation of 12" Gravity Sewer** shall include all labor, materials and equipment including other ancillary items necessary for installation and maintenance of the Temporary Bypass Pumping for Installation of the 12" Gravity Sewer as called out on the drawings and per the Contract Documents.

Payment for Temporary Bypass Pumping for the installation of the 12" Gravity Sewer shall be Lump Sum.

- 7.03 **Stone Surface 4" Thick With Polypropylene Weed Barrier** shall include all labor, materials and equipment including other ancillary items necessary for installation and maintenance of the Stone Surface 4" Thick With Polypropylene Weed Barrier as called out on the drawings and per the Contract Documents.

Payment for Stone Surface 4" Thick With Polypropylene Weed Barrier shall be Square Yard.

- 7.04 **Wood Type Mulch 4" Thick With Polypropylene Weed Barrier** shall include all labor, materials and equipment including other ancillary items necessary for installation and maintenance of the Wood Type Mulch 4" Thick With Polypropylene Weed Barrier as called out on the drawings and per the Contract Documents.

Payment for Wood Type Mulch 4" Thick With Polypropylene Weed Barrier shall be Square Yard.

- 7.05 **Site Restoration** shall include all labor, materials and equipment including other ancillary items necessary for installation and maintenance of the Site Restoration as called out on the drawings and per the Contract Documents.

Payment for Site Restoration shall be Lump Sum.

BID ITEM NO. 8- PERMIT ALLOWANCE

Fees for submitting applications for permits required to complete construction in accordance with the plans and specifications, such as Building Permit, NPDES, etc. The quantity measured for payment shall be the actual receipt-supported permit fees. Payment will be made at the actual cost to the Contractor for the permits required and acquired. Upon completion of the permitting process, the Contractor will submit receipts for permit fees to the County and Engineer.

Payment for this item shall be lump sum.

BID ITEM 9- RECORD DRAWINGS

Payment for all work included under this Bid Item shall be made at the Contract lump sum price bid listed in the Bid Form and shall represent full compensation for all labor, materials and equipment required to generate and provide record drawings approved and accepted by the County. Record drawings shall be in strict accordance with Section 1.14 of the Manatee County Public Work Utility Standards.

Payment for this item shall be lump sum.

BID ITEM 10 - CONTRACT CONTINGENCUBIC YARD

Payment for all work under this Bid Item shall be made only at the County's discretion.

This Bid Item shall not exceed 10% of the Bidders Total Base Bid. The Bidder shall calculate and enter a dollar amount for this Bid Item.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01152 REQUESTS FOR PAYMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Submit Applications for Payment to the Project Manager or as directed at the preconstruction meeting, in accordance with the schedule established by Conditions of the Contract and Agreement between County and Contractor.

1.02 FORMAT AND DATA REQUIRED

- A. Submit payment requests in the form provided by the County with itemized data typed in accordance with the Bid Form.
- B. Provide construction photographs in accordance with Contract Documents.

1.03 SUBSTANTIATING DATA FOR PROGRESS PAYMENTS

- A. When the County requires substantiating data, Contractor shall submit suitable information with a cover letter.
- B. Submit one copy of data and cover letter for each copy of application.

1.04 PREPARATION OF APPLICATION FOR FINAL PAYMENT

Fill in application form as specified for progress payments.

1.05 SUBMITTAL PROCEDURE

- A. Submit applications for payment at the times stipulated in the Agreement.
- B. Number: Three (3) copies of each application; all signed and certified by the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01153 CHANGE ORDER PROCEDURES

PART 1 GENERAL

1.01 DEFINITION

- A. Change Order: A written order signed by the Owner, the Architect/Engineer and the Contractor authorizing a change in the Project Plans and/or Specifications and, if necessary, a corresponding adjustment in the Contract Sum and/or Contract Time, pursuant to Article V of the General Conditions of the Construction Agreement.
- B. Administrative Change Adjustment: Minor change order under 10% of project cost or 20% time, does not have to be Board approved.
- C. Field Directive: A written order issued by Owner which orders minor changes in the Work not involving a change in Contract Time, to be paid from the Owner's contingency funds.
- D. Field Order: Minor change to contract work that does not require adjustment of contract sum or expected date of completion.

1.02 REQUIREMENTS INCLUDED

- A. The Contractor shall promptly implement change order procedures:
 - 1. Provide full written data required to evaluate changes.
 - 2. Maintain detailed records of work done on a time-and-material/force account basis.
 - 3. Provide full documentation to County on request.
- B. The Contractor shall designate a member of the Contractor's organization who:
 - 1. Is authorized to accept changes to the Work.
 - 2. Is responsible for informing others in the Contractor's employ of the authorized changes into the Work.

1.03 PRELIMINARY PROCEDURES

- A. Project Manager may initiate changes by submitting a Request to Contractor. Request will include:
 - 1. Detailed description of the change, products, costs and location of the change in the Project.
 - 2. Supplementary or revised Drawings and Specifications.
 - 3. The projected time extension for making the change.
 - 4. A specified period of time during which the requested price will be considered valid.
 - 5. Such request is for information only and is not an instruction to execute the changes, nor to stop work in progress.

- B. Contractor may initiate changes by submitting a written notice to the Project Manager, containing:
 - 1. Description of the proposed changes.
 - 2. Statement of the reason for making the changes.
 - 3. Statement of the effect on the Contract Sum and the Contract Time.
 - 4. Statement of the effect on the work of separate contractors.
 - 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

1.04 FIELD ORDER CHANGE

- A. In lieu of a Change Order, the Project Manager may issue a Field Order for the Contractor to proceed with additional work within the original intent of the Project.
- B. Field Order will describe changes in the work, with attachments of backup information to define details of the change.
- C. Contractor must sign and date the Field Order to indicate agreement with the terms therein.

1.05 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump sum proposal and for each unit price which has not previously been established, with sufficient substantiating data to allow the County to evaluate the quotation.
- B. On request, provide additional data to support time and cost computations:
 - 1. Labor required.
 - 2. Equipment required.
 - 3. Products required.
 - a. Recommended source of purchase and unit cost.
 - b. Quantities required.
 - 4. Taxes, insurance and bonds.
 - 5. Credit for work deleted from Contract, similarly documented.
 - 6. Overhead and profit.
 - 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs and for work done on a time-and-material/force account basis, with documentation as required for a lump-sum proposal.
 - 1. Name of the County's authorized agent who ordered the work and date of the order.
 - 2. Date and time work was performed and by whom.
 - 3. Time record, summary of hours work and hourly rates paid.
 - 4. Receipts and invoices for:
 - a. Equipment used, listing dates and time of use.

- b. Products used, listing of quantities.
- c. Subcontracts.

1.06 PREPARATION OF CHANGE ORDERS

- A. Project Manager will prepare each Change Order.
- B. Change Order will describe changes in the Work, both additions and deletions, with attachments as necessary to define details of the change.
- C. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contract Time.

1.07 LUMP SUM/FIXED PRICE CHANGE ORDER

- A. Project Manager initiates the form, including a description of the changes involved and attachments based upon documents and proposals submitted by the Contractor, or requests from the County, or both.
- B. Once the form has been completed, all copies should be sent to Contractor for approval. After approval by Contractor, all copies should be sent to County for approval. The County will distribute executed copies after approval by the Board of County Commissioners.

1.08 UNIT PRICE CHANGE ORDER

- A. Contents of Change Orders will be based on, either:
 - 1. County's definition of the scope of the required changes.
 - 2. Contractor's Proposal for a change, as approved by the County.
 - 3. Survey of completed work.
- B. The amounts of the unit prices to be:
 - 1. Those stated in the Agreement.
 - 2. Those mutually agreed upon between County and Contractor.

1.09 TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/CONSTRUCTION CHANGE AUTHORIZATION

- A. Refer to Article V.5.6 of the General Conditions of the Construction Agreement.

1.10 CORRELATION WITH CONTRACTOR'S SUBMITTALS

- A. Periodically revise Schedule of Values and Application for Payment forms to record each change as a separate item of work, and to record the adjusted Contract Sum.
- B. Periodically revise the Construction Schedule to reflect each change in Contract Time. Revise sub schedules to show changes for other items of work affected by the changes.
- C. Upon completion of work under a Change Order, enter pertinent changes in Record

Documents.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01200 PROJECT MEETINGS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The County shall schedule the pre-construction meeting, periodic progress meetings and special meetings, if required, throughout progress of work.
- B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.
- C. The Contractor shall attend meetings to ascertain that work is expedited consistent with Contract Documents and construction schedules.

1.02 PRE-CONSTRUCTION MEETING

- A. Attendance:
 - 1. County's Engineer.
 - 2. County's Project Manager
 - 3. Contractor.
 - 4. Resident Project Representative.
 - 5. Related Labor Contractor's Superintendent.
 - 6. Major Subcontractors.
 - 7. Major Suppliers.
 - 8. Others as appropriate.
- B. Suggested Agenda:
 - 1. Distribution and discussion of:
 - a. List of major subcontractors.
 - b. Projected Construction Schedules.
 - c. Coordination of Utilities
 - 2. Critical work sequencing.
 - 3. Project Coordination.
 - a. Designation of responsible personnel.
 - b. Emergency contact persons with phone numbers.
 - 4. Procedures and processing of:
 - a. Field decisions.
 - b. Submittals.
 - c. Change Orders.
 - d. Applications for Payment.
 - 5. Procedures for maintaining Record Documents.

6. Use of premises:
 - a. Office, work and storage areas.
 - b. County's REQUIREMENTS.
7. Temporary utilities.
8. Housekeeping procedures.
9. Liquidated damages.
10. Equal Opportunity Requirements.
11. Laboratory testing.
12. Project / Job meetings: Progress meeting, other special topics as needed.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01310 CONSTRUCTION SCHEDULE & PROJECT RESTRAINTS

PART 1 GENERAL

1.01 GENERAL

- A. Construction under this contract must be coordinated with the County and accomplished in a logical order to maintain utilization and flow through existing facilities and public properties and rights-of-way and to allow construction to be completed within the time allowed by Contract Documents and in the manner set forth in the Contract.

1.02 CONSTRUCTION SCHEDULING GENERAL PROVISIONS

- A. No work shall be done between 7:00 p.m. and 7:00 a.m. nor on weekends or legal holidays without written permission of the County. However, emergency work may be done without prior permission.
- B. Night work may be established by the Contractor as regular procedure with the written permission of the County. Such permission, however, may be revoked at any time by the County if the Contractor fails to maintain adequate equipment and supervision for the proper execution and control of the work at night.
- C. Due to potential health hazards and requirements of the State of Florida and the U.S. Environmental Protection Agency, existing facilities must be maintained in operation.
- D. The Contractor shall be fully responsible for providing all temporary piping, plumbing, electrical hook-ups, lighting, temporary structure, or other materials, equipment and systems required to maintain the existing facility's operations. All details of temporary piping and temporary construction are not necessarily shown on the Drawings or covered in the Specifications. However, this does not relieve the Contractor of the responsibility to insure that construction will not interrupt proper facility operations.
- E. The Contractor shall designate an authorized representative of his firm who shall be responsible for development and maintenance of the schedule and of progress and payment reports. This representative of the Contractor shall have direct project control and complete authority to act on behalf of the Contractor in fulfilling the commitments of the Contractor's schedule.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS

- A. The Contractor shall submit a critical path schedule as described herein.
- B. The planning, scheduling, management and execution of the work is the sole responsibility of the Contractor. The progress schedule requirement is established to allow County to review Contractor's planning, scheduling, management and execution of the work; to assist County in evaluating work progress and make

progress payments and to allow other contractors to cooperate and coordinate their activities with those of the Contractor.

2.02 FORM OF SCHEDULES

- A. Prepare schedules using the latest version of Microsoft Project, or other County approved software, in the form of a horizontal bar chart diagram. The diagram shall be time-scaled and sequenced by work areas. Horizontal time scale shall identify the first work day of each week.
- B. Activities shall be at least as detailed as the Schedule of Values. Activity durations shall be in whole working days. In addition, man-days shall be shown for each activity or tabulated in an accompanying report.
- C. Diagrams shall be neat and legible and submitted on sheets at least 8-1/2 inches by 11 inches suitable for reproduction. Scale and spacing shall allow space for notations and future revisions.

2.03 CONTENT OF SCHEDULES

- A. Each monthly schedule shall be based on data as of the last day of the current pay period.
- B. Description for each activity shall be brief, but convey the scope of work described.
- C. Activities shall identify all items of work that must be accomplished to achieve substantial completion, such as items pertaining to Contractor's installation and testing activities; items pertaining to the approval of regulatory agencies; contractor's time required for submittals, fabrication and deliveries; the time required by County to review all submittals as set forth in the Contract Documents; items of work required of County to support pre-operational, startup and final testing; time required for the relocation of utilities. Activities shall also identify interface milestones with the work of other contractors performing work under separate contracts with County.
- D. Schedules shall show the complete sequence of construction by activities. Dates for beginning and completion of each activity shall be indicated as well as projected percentage of completion for each activity as of the first day of each month.
- E. Submittal schedule for shop drawing review, product data, and samples shall show the date of Contractor submittal and the date approved submittals will be required by the County, consistent with the time frames established in the Specifications.
- F. For Contract change orders granting time extensions, the impact on the Contract date(s) shall equal the calendar-day total time extension specified for the applicable work in the Contract change orders.
- G. For actual delays, add activities prior to each delayed activity on the appropriate critical path(s). Data on the added activities of this type shall portray all steps leading to the delay and shall further include the following: separate activity identification, activity description indicating cause of the delay, activity duration consistent with whichever set of dates below applies, the actual start and finish

dates of the delay or, if the delay is not finished, the actual start date and estimated completion date.

- H. For potential delays, add an activity prior to each potentially delayed activity on the appropriate critical path(s). Data for added activities of this type shall include alternatives available to mitigate the delay including acceleration alternatives and further show the following: separate activity identification, activity description indicating cause of the potential delay and activity duration equal to zero work days.

2.04 SUPPORTING NARRATIVE

- A. Status and scheduling reports identified below shall contain a narrative to document the project status, to explain the basis of Contractor's determination of durations, describe the Contract conditions and restraints incorporated into the schedule and provide an analysis pertaining to potential problems and practical steps to mitigate them.
- B. The narrative shall specifically include:
 - 1. Actual completion dates for activities completed during the monthly report period and actual start dates for activities commenced during the monthly report period.
 - 2. Anticipated start dates for activities scheduled to commence during the following monthly report period.
 - 3. Changes in the duration of any activity and minor logic changes.
 - 4. The progress along the critical path in terms of days ahead or behind the Contract date.
 - 5. If the Monthly Status Report indicates an avoidable delay to the Contract completion date or interim completion dates as specified in the Agreement, Contractor shall identify the problem, cause and the activities affected and provide an explanation of the proposed corrective action to meet the milestone dates involved or to mitigate further delays.
 - 6. If the delay is thought to be unavoidable, the Contractor shall identify the problem, cause, duration, specific activities affected and restraints of each activity.
 - 7. The narrative shall also discuss all change order activities whether included or not in the revised/current schedule of legal status. Newly introduced change order work activities and the CPM path(s) that they affect, must be specifically identified. All change order work activities added to the schedule shall conform with the sequencing and Contract Time requirements of the applicable Change Order.
 - 8. Original Contract date(s) shall not be changed except by Contract change order. A revision need not be submitted when the foregoing situations arise unless required by County. Review of a report containing added activities will not be construed to be concurrence with the duration or restraints for such added activities; instead the corresponding data as ultimately incorporated into the applicable Contract change order shall govern.
 - 9. Should County require additional data, this information shall be supplied by Contractor within 10 calendar days.

2.05 SUBMITTALS

- A. Contractor shall submit estimated and preliminary progress schedules (as identified in the Terms and Conditions of the Contract and the General Conditions), monthly status reports, a start-up schedule and an as-built schedule report all as specified herein.
- B. All schedules, including estimated and preliminary schedules, shall be in conformance with the Contract Documents.
- C. The finalized progress schedule discussed in the Contract Documents shall be the first monthly status report and as such shall be in conformance with all applicable specifications contained herein.
- D. Monthly Status Report submittals shall include a time-scaled (days after notice to proceed) diagram showing all contract activities and supporting narrative. The initial detailed schedule shall use the notice to proceed as the start date. The finalized schedule, if concurred with by County, shall be the work plan to be used by the contractor for planning, scheduling, managing and executing the work.
- E. The schedule diagram shall be formatted as above. The diagram shall include (1) all detailed activities included in the preliminary and estimated schedule submittals, (2) calendar days prior to substantial completion, (3) summary activities for the remaining days. The critical path activities shall be identified, including critical paths for interim dates, if possible.
- F. The Contractor shall submit progress schedules with each application for payment.

2.06 MONTHLY STATUS REPORTS

- A. Contractor shall submit detailed schedule status reports on a monthly basis with the Application for Payment. The first such status report shall be submitted with the first Application for Payment and include data as of the last day of the pay period. The Monthly Report shall include a "marked-up" copy of the latest detailed schedule of legal status and a supporting narrative including updated information as described above. The Monthly Report will be reviewed by County and Contractor at a monthly schedule meeting and Contractor will address County's comments on the subsequent monthly report. Monthly status reports shall be the basis for evaluating Contractor's progress.
- B. The "marked-up" diagram shall show, for the latest detailed schedule of legal status, percentages of completion for all activities, actual start and finish dates and remaining durations, as appropriate. Activities not previously included in the latest detailed schedule of legal status shall be added, except that contractual dates will not be changed except by change order. Review of a marked-up diagram by County will not be construed to constitute concurrence with the time frames, duration, or sequencing for such added activities; instead the corresponding data as ultimately incorporated into an appropriate change order shall govern.

2.07 STARTUP SCHEDULE

- A. At least 60 calendar days prior to the date of substantial completion, Contractor

shall submit a time-scaled (days after notice to proceed) diagram detailing the work to take place in the period between 60 days prior to substantial completion, together with a supporting narrative. County shall have 10 calendar days after receipt of the submittal to respond. Upon receipt of County's comments, Contractor shall make the necessary revisions and submit the revised schedule within 10 calendar days. The resubmittal, if concurred with by County, shall be the Work Plan to be used by Contractor for planning, managing, scheduling and executing the remaining work leading to substantial completion.

- B. The time-scaled diagram shall use the latest schedule of legal status for those activities completed ahead of the last 60 calendar days prior to substantial completion and detailed activities for the remaining 60-day period within the time frames outlined in the latest schedule of legal status.
- C. Contractor will be required to continue the requirement for monthly reports, as outlined above. In preparing this report, Contractor must assure that the schedule is consistent with the progress noted in the startup schedule.

2.08 REVISIONS

- A. All revised Schedule Submittals shall be made in the same form and detail as the initial submittal and shall be accompanied by an explanation of the reasons for such revisions, all of which shall be subject to review and concurrence by County. The revision shall incorporate all previously made changes to reflect current as-built conditions. Minor changes to the approved submittal may be approved at monthly meetings; a minor change is not considered a revision in the context of this paragraph.
- B. A revised schedule submittal shall be submitted for review when required by County.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01340 SHOP DRAWINGS, PROJECT DATA AND SAMPLES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall submit to the County for review and approval: working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this section called data) that have been produced within the last three (3) years, and material samples (hereinafter in this section called samples) as are required for the proper control of work, including, but not limited to those working drawings, shop drawings, data and samples for materials and equipment specified elsewhere in the Specifications and in the Contract Drawings. Submittals may be done electronically via PDF documents.
- B. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the County. The County will provide the initial submittal log in electronic format. The electronic log (excel file) shall be passed back and forth between the Contractor and the County for each submittal package. This log shall include the following items:
1. Submittal description and number assigned.
 2. Date to County.
 3. Date returned to Contractor (from County).
 4. Status of Submittal (No exceptions taken, returned for confirmation or resubmittal, rejected).
 5. Date of Resubmittal and Return (as applicable).
 6. Date material released (for fabrication).
 7. Projected date of fabrication.
 8. Projected date of delivery to site.
 9. Projected date and required lead time so that product installation does not delay contact.
 10. Status of O&M manuals submitted.

1.03 CONTRACTOR'S RESPONSIBILITY

- A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the County for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the County without the Contractor's stamp will be returned to the Contractor for conformance with this requirement. Shop drawings shall indicate any deviations in the submittal from requirements of the contract Documents.
- B. The Contractor shall ensure that all submitted cut sheets, product sheets, product documentation, etc. are current versions of the product information and are not older than three (3) years. Product certification(s) shall be no older than three (3) years. Any submitted documents found to be beyond the acceptable date ranges shall be rejected.

- C. Determine and verify:
 - 1. Field measurements.
 - 2. Field construction criteria.
 - 3. Catalog numbers and similar data.
 - 4. Conformance with Specifications and indicate all variances from the Specifications.
- D. The Contractor shall furnish the County a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.
- E. The Contractor shall not begin any of the work covered by a drawing, data, or a sample returned for correction until a revision or correction thereof has been reviewed and returned to him, by the County, with No Exceptions Taken or Approved As Noted.
- F. The Contractor shall submit to the County all drawings and schedules sufficiently in advance of construction requirements to provide no less than twenty-one (21) calendar days for checking and appropriate action from the time the County receives them. Submittals are to be scheduled, submitted, reviewed, and approved prior to the acquisition of the material or equipment. Coordinate scheduling, sequencing, preparing, and processing of submittals with performance of work so that work will not be delayed by submittal processing. Allow time for potential resubmittal.
- G. No delay costs or time extensions will be allowed for time lost in late submittals or resubmittals.
- H. All material & product submittals, other than samples, may be transmitted electronically as a pdf file. All returns to the contractor will be as a pdf file only unless specifically requested otherwise.
- I. The Contractor shall be responsible for and bear all cost of damages which may result from the ordering of any material or from proceeding with any part of work prior to the completion of the review by County of the necessary Shop Drawings.

1.04 COUNTY'S REVIEW OF SHOP DRAWINGS AND WORKING DRAWINGS

- A. The County's review of drawings, data and samples submitted by the Contractor shall cover only general conformity to the Specifications, external connections and dimensions which affect the installation.
- B. The review of drawings and schedules shall be general and shall not be construed:
 - 1. As permitting any departure from the Contract requirements.
 - 2. As relieving the Contractor of responsibility for any errors, including details, dimensions and materials.
 - 3. As approving departures from details furnished by the County, except as otherwise provided herein.

- C. If the drawings or schedules as submitted describe variations and show a departure from the Contract requirements which the County finds to be in the interest of the County and to be so minor as not to involve a change in Contract Price or time for performance, the County may return the reviewed drawings without noting any exception.
- D. When reviewed by the County, each of the Shop and Working Drawings shall be identified as having received such review being so stamped and dated. Shop Drawings stamped "REJECTED" and with required corrections shown shall be returned to the Contractor for correction and resubmittal.
- E. Resubmittals will be handled in the same manner as first submittals. On resubmittals, the Contractor shall direct specific attention, in writing or on resubmitted Shop Drawings, to revisions other than the corrections requested by the County on previous submissions. The Contractor shall make any corrections required by the County.
- F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the County.
- G. The County shall review a submittal/resubmittal a maximum of three (3) times after which cost of review shall be borne by the Contractor. The cost of engineering shall be equal to the County's actual payroll cost.
- H. When the Shop and Working Drawings have been completed to the satisfaction of the County, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the County.
- I. No partial submittals shall be reviewed. Incomplete submittals shall be returned to the Contractor and shall be considered not approved until resubmitted.

1.05 SHOP DRAWINGS

- A. When used in the Contract Documents, the term "Shop Drawings" shall be considered to mean Contractor's plans for material and equipment which become an integral part of the Project. These drawings shall be complete and detailed. Shop Drawings shall consist of fabrication, drawings, setting drawings, schedule drawings, manufacturer's scale drawings and wiring and control diagrams. Cuts, catalogs, pamphlets, descriptive literature and performance and test data, shall be considered only as supportive to required Shop Drawings as defined above.
- B. Drawings and schedules shall be checked and coordinated with the work of all trades involved, before they are submitted for review by the County and shall bear the Contractor's stamp of approval and original signature as evidence of such checking and coordination. Drawings or schedules submitted without this stamp of approval and original signature shall be returned to the Contractor for resubmission.
- C. Each Shop Drawing shall have a blank area 3-1/2 inches by 3-1/2 inches, located adjacent to the title block. The title block shall display the following:

1. Number and title of the drawing.
 2. Date of Drawing or revision.
 3. Name of project building or facility.
 4. Name of contractor and subcontractor submitting drawing.
 5. Clear identification of contents and location of the work.
 6. Specification title and number.
- D. If drawings show variations from Contract requirements because of standard shop practice or for other reasons, the Contractor shall describe such variations in his letter of transmittal. If acceptable, proper adjustment in the contract shall be implemented where appropriate. If the Contractor fails to describe such variations, he shall not be relieved of the responsibility of executing the work in accordance with the Contract, even though such drawings have been reviewed.
- E. Data on materials and equipment shall include, without limitation, materials and equipment lists, catalog sheets, cuts, performance curves, diagrams, materials of construction and similar descriptive material. Materials and equipment lists shall give, for each item thereon, the name and location of the supplier or manufacturer, trade name, catalog reference, size, finish and all other pertinent data.
- F. For all mechanical and electrical equipment furnished, the Contractor shall provide a list including the equipment name and address and telephone number of the manufacturer's representative and service company so that service and/or spare parts can be readily obtained.
- G. All manufacturers or equipment suppliers who proposed to furnish equipment or products shall submit an installation list to the County along with the required shop drawings. The installation list shall include at least five installations where identical equipment has been installed and have been in operation for a period of at least one (1) year.
- H. Only the County will utilize the color "red" in marking shop drawing submittals.

1.06 SUBMITTAL PREPARATION

- A. Each submittal is to be complete and in sufficient detail to allow ready determination of compliance with contract requirements.
- B. Collect required data for each specific material, product, unit of work, or system into a single submittal. Prominently mark choices, options, and portions applicable to the submittal. Partial submittals will not be accepted for expedition of construction effort. Submittal will be returned without review if incomplete.
- C. If available product data is incomplete, provide Contractor-prepared documentation to supplement product data and satisfy submittal requirements.
- D. All irrelevant or unnecessary data shall be removed from the submittal to facilitate accuracy and timely processing. Submittals that contain the excessive amount of irrelevant or unnecessary data will be returned with review.
- E. Provide a transmittal form for each submittal with the following information:

1. Project title, location and number.
 2. Construction contract number.
 3. Date of the drawings and revisions.
 4. Name, address, and telephone number of subcontractor, supplier, manufacturer, and any other subcontractor associated with the submittal.
 5. List paragraph number of the specification section and page number; and sheet number of the contract drawings by which the submittal is required.
 6. When a resubmission, the resubmittal document name shall remain the same, but shall add an alphabetic suffix on submittal description. For example, submittal 18 would become 18A, to indicate resubmission.
 7. Product identification and location in project.
- F. The Contractor is responsible for reviewing and certifying that all submittals are in compliance with contract requirements before submitting to the County for review.
- G. Stamp, sign, and date each submittal transmittal form indicating action taken.
- H. Stamp used by the Contractor on the submittal transmittal form to certify that the submittal meets contract requirements is to be similar to the following:

<p>CONTRACTOR (Firm Name)</p> <p>____ Approved</p> <p>____ Approved with corrections as noted on submittal data and/or attached sheet(s).</p> <p>I certify that the following document and information has been verified to be is not more than three (3) years old.</p> <p>SIGNATURE: _____</p> <p>TITLE: _____</p> <p>DATE: _____</p>
--

1.07 WORKING DRAWINGS

- A. When used in the Contract Documents, the term "working drawings" shall be considered to mean the Contractor's fabrication and erection drawings for structures such as roof trusses, steelwork, precast concrete elements, bulkheads, support of open cut excavation, support of utilities, groundwater control systems, forming and false work; underpinning; and for such other work as may be required for construction of the project.
- B. Copies of working drawings as noted above, shall be submitted to the County where required by the Contract Documents or requested by the County and shall be submitted at least thirty (30) days (unless otherwise specified by the County) in advance of their being required for work.

- C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the County, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the County and Engineer shall not have responsibility therefor.

1.08 SAMPLES

- A. The Contractor shall furnish, for the review of the County, samples required by the Contract Documents or requested by the County. Samples shall be delivered to the County as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until reviewed by the County.
- B. Samples shall be of sufficient size and quantity to clearly illustrate:
 - 1. Functional characteristics of the product, with integrally related parts and attachment devices.
 - 2. Full range of color, texture and pattern.
 - 3. A minimum of two samples of each item shall be submitted.
- C. Each sample shall have a label indicating:
 - 1. Name of product.
 - 2. Name of Contractor and Subcontractor.
 - 3. Material or equipment represented.
 - 4. Place of origin.
 - 5. Name of Producer and Brand (if any).
 - 6. Location in project.
(Samples of finished materials shall have additional markings that will identify them under the finished schedules.)
 - 7. Reference specification paragraph.
- D. The Contractor shall prepare a transmittal letter in triplicate for each shipment of samples containing the information required above. He shall enclose a copy of this letter with the shipment and send a copy of this letter to the County. Review of a sample shall be only for the characteristics or use named in such and shall not be construed to change or modify any Contract requirements.
- E. Reviewed samples not destroyed in testing shall be sent to the County or stored at the site of the work. Reviewed samples of the hardware in good condition will be marked for identification and may be used in the work. Materials and equipment incorporated in work shall match the reviewed samples. If requested at the time of submission, samples which failed testing or were rejected shall be returned to the Contractor at his expense.

1.09 APPROVED SUBMITTALS

- A. County approval of submittals is not to be construed as a complete check, and indicates only that the general method of construction, materials, detailing, and other information are satisfactory.
- B. County approval of a submittal does not relieve the Contractor of the responsibility for any error which may exist. The Contractor is responsible for fully complying with all contract requirements and the satisfactory construction of all work, including the need to check, confirm, and coordinate the work of all subcontractors for the project. Non-compliant material incorporated in the work will be removed and replaced at the Contractor's expense.
- C. After submittals have been approved, no resubmittal for the purpose of substituting materials or equipment will be considered unless accompanied by an explanation of why a substitution is necessary.
- D. Retain a copy of all approved submittals at project site, including approved samples.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01370 SCHEDULE OF VALUES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall submit to the County a Schedule of Values allocated to the various portions of the work, within 10 days after date of Notice to Proceed.
- B. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.
- C. The Schedule of Values shall be used only as the basis for the Contractor's Applications for Payment.

1.02 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Schedule of Values will be considered for approval by County upon Contractor's request. Identify schedule with:
 - 1. Title of Project and location.
 - 2. Project number.
 - 3. Name and address of Contractor.
 - 4. Contract designation.
 - 5. Date of submission.
- B. Schedule of Values shall list the installed value of the component parts of the work in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Follow the table of contents for the Contract Document as the format for listing component items for structures:
 - 1. Identify each line item with the number and title of the respective major section of the specification.
 - 2. For each line item, list sub values of major products or operations under item.
- D. Follow the bid sheets included in this Contract Documents as the format for listing component items for pipe lines.
- E. The sum of all values listed in the schedule shall equal the total Contract sum.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01380 CONSTRUCTION PHOTOGRAPHS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall employ a competent photographer to take construction record photographs or perform video, recording including furnishing all labor, materials, equipment and incidentals necessary to obtain photographs and/or video recordings of all construction areas.
- B. Preconstruction record information shall consist of video recordings on digital video disks (DVD).
- C. Construction progress information shall consist of photographs and digital photographs on a recordable compact disc (CD-R).

1.02 QUALIFICATIONS

- A. All photography shall be done by a competent camera operator who is fully experienced and qualified with the specified equipment.
- B. For the video recording, the audio portion should be done by a person qualified and knowledgeable in the specifics of the Contract, who shall speak with clarity and diction so as to be easily understood.

1.03 PROJECT PHOTOGRAPHS

- A. Provide one print of each photograph with each pay application.
- B. Provide one recordable compact disc with digital photographs with each pay application.
- C. Negatives:
 - 1. All negatives shall remain the property of photographer.
 - 2. The Contractor shall require that photographer maintain negatives or protected digital files for a period of two years from date of substantial completion of the project.
 - 3. Photographer shall agree to furnish additional prints to County at commercial rates applicable at time of purchase. Photographer shall also agree to participate as required in any litigation requiring the photographer as an expert witness.
- D. The Contractor shall pay all costs associated with the required photography and prints. Any parties requiring additional photography or prints shall pay the photographer directly.
- E. All project photographs shall be a single weight, color image. All finishes shall be smooth surface and glossy and all prints shall be 8 inches x 10 inches.

- F. Each print shall have clearly marked on the back, the name of the project, the orientation of view, the date and time of exposure, name and address of the photographer and the photographers numbered identification of exposure.
- G. All project photographs shall be taken from locations to adequately illustrate conditions prior to construction, or conditions of construction and state of progress. The Contractor shall consult with the County at each period of photography for instructions concerning views required.

1.04 VIDEO RECORDINGS

- A. Video, recording shall be done along all routes that are scheduled for construction. Video, recording shall include full, recording of both sides of all streets and the entire width of easements plus 10 feet on each side on which construction is to be performed. All video recording shall be in full color.
- B. A complete view, in sufficient detail with audio description of the exact location shall be provided.
- C. The engineering plans shall be used as a reference for stationing in the audio portion of the recordings for easy location identification.
- D. Two complete sets of video recordings shall be delivered to the County on digital video disks (DVD) for the permanent and exclusive use of the County prior to the start of any construction on the project.
- E. All video recordings shall contain the name of the project, the date and time of the video, recording, the name and address of the photographer and any other identifying information required.
- F. Construction shall not start until preconstruction video recordings are completed, submitted and accepted by the County. In addition, no progress payments shall be made until the preconstruction video recordings are accepted by the County.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01410 TESTING AND TESTING LABORATORY SERVICES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. County shall employ and pay for the services of an independent testing laboratory to perform testing specifically indicated on the Contract Documents or called out in the Specifications. County may elect to have materials and equipment tested for conformity with the Contract Documents at any time.
 - 1. Contractor shall cooperate fully with the laboratory to facilitate the execution of its required services.
 - 2. Employment of the laboratory shall in no way relieve the Contractor's obligations to perform the work of the Contract.

1.02 LIMITATIONS OF AUTHORITY OF TESTING LABORATORY

- A. Laboratory is not authorized to:
 - 1. Release, revoke, alter or enlarge on requirements of Contract Documents.
 - 2. Approve or accept any portion of the Work.
 - 3. Perform any duties of the Contractor.

1.03 CONTRACTOR'S RESPONSIBILITIES

- A. Cooperate with laboratory personnel; provide access to Work and/or to Manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.
- D. Materials and equipment used in the performance of work under this Contract are subject to inspection and testing at the point of manufacture or fabrication. Standard specifications for quality and workmanship are indicated in the Contract Documents. The County may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the Contract Documents. All costs of this testing and providing statements and certificates shall be a subsidiary obligation of the Contractor and no extra charge to the County shall be allowed on account of such testing and certification.
- E. Furnish incidental labor and facilities:
 - 1. To provide access to work to be tested.
 - 2. To obtain and handle samples at the project site or at the source of the product to be tested.

3. To facilitate inspections and tests.
 4. For storage and curing of test samples.
- F. Notify laboratory sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests.
1. When tests or inspections cannot be performed due to insufficient notice, Contractor shall reimburse County for laboratory personnel and travel expenses incurred due to Contractor's negligence.
- G. Employ and pay for the services of the same or a separate, equally qualified independent testing laboratory to perform additional inspections, sampling and testing required for the Contractor's convenience and as approved by the County.
- H. If the test results indicate the material or equipment complies with the Contract Documents, the County shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the contractor shall pay for the laboratory costs directly to the testing firm or the total of such costs shall be deducted from any payments due the Contractor.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01510 TEMPORARY AND PERMANENT UTILITIES

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

The Contractor shall be responsible for furnishing all requisite temporary utilities, i.e., power, water, sanitation, etc. The Contractor shall obtain and pay for all permits required as well as pay for all temporary usages. The Contractor shall remove all temporary facilities upon completion of work.

1.02 REQUIREMENTS OF REGULATORY AGENCIES

- A. Comply with National Electric Code.
- B. Comply with Federal, State and Local codes and regulations and with utility company requirements.
- C. Comply with County Health Department regulations.

PART 2 PRODUCTS

2.01 MATERIALS, GENERAL

Materials for temporary utilities may be "used". Materials for electrical utilities shall be adequate in capacity for the required usage, shall not create unsafe conditions and shall not violate requirements of applicable codes and standards.

2.02 TEMPORARY ELECTRICITY AND LIGHTING

Arrange with the applicable utility company for temporary power supply. Provide service required for temporary power and lighting and pay all costs for permits, service and for power used.

2.03 TEMPORARY WATER

- A. The Contractor shall arrange with Manatee County Utilities Customer Service office to provide water for construction purposes, i.e., meter, pay all costs for installation, maintenance and removal, and service charges for water used.
- B. The Contractor shall protect piping and fitting against freezing.

2.04 TEMPORARY SANITARY FACILITIES

- A. The Contractor shall provide sanitary facilities in compliance with all laws and regulations.
- B. The Contractor shall service, clean and maintain facilities and enclosures.

PART 3 EXECUTION

3.01 GENERAL

- A. The Contractor shall maintain and operate systems to assure continuous service.
- B. The Contractor shall modify and extend systems as work progress requires.

3.02 REMOVAL

- A. The Contractor shall completely remove temporary materials and equipment when their use is no longer required.
- B. The Contractor shall clean and repair damage caused by temporary installations or use of temporary facilities.

END OF SECTION

SECTION 01570 TRAFFIC REGULATION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. The Contractor shall be responsible for providing safe and expeditious movement of traffic through construction zones. A construction zone is defined as the immediate areas of actual construction and all abutting areas which are used by the Contractor and which interfere with the driving or walking public.
- B. The Contractor shall remove temporary equipment and facilities when no longer required, restore grounds to original or to specified conditions.

1.02 TRAFFIC CONTROL

- A. The necessary traffic control shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, markings, barricades, channelization and hand signaling devices. The Contractor shall be responsible for installation and maintenance of all devices and detour routes and signage for the duration of the construction period. The Contractor shall utilize the appropriate traffic plan from the FDOT Maintenance of Traffic Standards, Series 600 of the FDOT Roadway & Traffic Design Standards, Latest Edition.
- B. Should there be the necessity to close any portion of a roadway carrying vehicles or pedestrians the Contractor shall submit a Traffic Control Plan (TCP) at least 5 days before a partial or full day closure, and at least 8 days before a multi-day closure. TCP shall be submitted, along with a copy of their accreditation, by a certified IMSA or ATSA Traffic Control Specialist.
 - 1. At no time will more than one (1) lane of a roadway be closed to vehicles and pedestrians without an approved road closure from the County Transportation Department. With any such closings, adequate provision shall be made for the safe expeditious movement of each.
 - 2. All traffic control signs must be in place and inspected at least 1 day in advance of the closure. Multi-day closures notification signs shall be in place at least 3 days in advance of the closure. All signs must be covered when not in effect, and checked twice a day by the Worksite Traffic Supervisor when they are in effect.
- C. The Contractor shall be responsible for removal, relocation, or replacement of any traffic control device in the construction area which exists as part of the normal preconstruction traffic control scheme. Any such actions shall be performed by the Contractor under the supervision and in accordance with the instructions of the applicable highway department unless otherwise specified.
- D. The Contractor will consult with the County immediately on any vehicular or pedestrian safety or efficiency problem incurred as a result of construction of the project.
- E. The Contractor shall provide ready access to businesses and homes in the project

area during construction. The Contractor shall be responsible for coordinating this work with affected homeowners.

- F. When conditions require the temporary installation of signs, pavement markings and traffic barriers for the protection of workers and traffic, the entire array of such devices shall be depicted on working drawings for each separate stage of work. These drawings shall be submitted to the County for review and approval prior to commencement of work on the site.
- G. Precast concrete traffic barriers shall be placed adjacent to trenches and other excavations deeper than six inches below the adjacent pavement surface.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01580 PROJECT IDENTIFICATION AND SIGNS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Furnish, install and maintain County project identification signs.
- B. Remove signs on completion of construction.
- C. Allow no other signs to be displayed except for traffic control and safety.

1.02 PROJECT IDENTIFICATION SIGN (COUNTY)

- A. Two painted sign, of not less than 32 square feet (3 square meters) area, with painted graphic content to include:
 - 1. Title of Project.
 - 2. Name of County.
 - 3. Names and titles of authorities as directed by County.
 - 4. Prime Contractor.
- B. Graphic design, style of lettering and colors: As approved by the County.
- C. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by the County

1.03 INFORMATIONAL SIGNS

- A. Painted signs with painted lettering, or standard products.
 - 1. Size of signs and lettering: as required by regulatory agencies, or as appropriate to usage.
 - 2. Colors: as required by regulatory agencies, otherwise of uniform colors throughout project.
- B. Erect at appropriate locations to provide required information.

1.04 QUALITY ASSURANCE

- A. Sign Painter: Professional experience in type of work required.
- B. Finishes, Painting: Adequate to resist weathering and fading for scheduled construction period.

1.05 PUBLIC NOTIFICATION

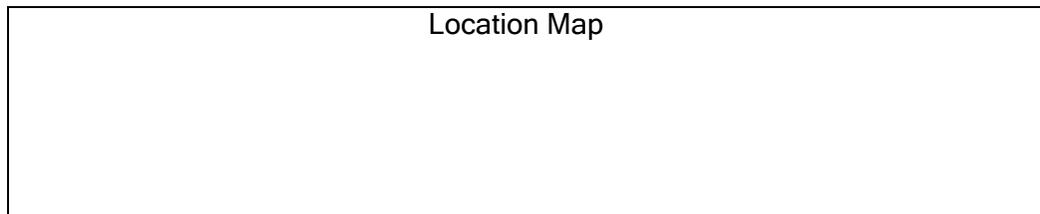
- A. Door Hangers: The Contractor shall generate and distribute door hangers to all residents who will be impacted by project construction.

1. Residents impacted include anyone who resides inside, or within 500 feet of project limits of construction.
- B. Door Hangers shall be distributed prior to start of construction of the project. Hangers shall be affixed to doors of residents via elastic bands or tape.

EXAMPLE:

PLEASE PARDON THE INCONVENIENCE WHILE THE ROADWAY IS BEING
RECONSTRUCTED IN YOUR NEIGHBORHOOD

This project consists of utility improvements and the reconstruction of ??? Boulevard from U.S. ??? to ??? Street West. The project is expected to begin in August, 200X and be completed in July 200X.



WE HOPE TO KEEP ANY INCONVENIENCE TO A MINIMUM. HOWEVER, IF YOU HAVE ANY PROBLEMS, PLEASE CONTACT THE FOLLOWING:

- | | | |
|----|---|--|
| A. | Contractor
Contractor Address
Contractor Phone (Site Phone) | Project Manager
PM Address
PM Phone No. & Ext. |
| B. | Project Inspector
Inspector Phone Number | |

AFTER HOURS EMERGENCY NUMBER - (941) 747-HELP
THANK YOU FOR YOUR UNDERSTANDING AND PATIENCE
MANATEE COUNTY GOVERNMENT - PROJECT MANAGEMENT DEPT.

PART 2 PRODUCTS

2.01 SIGN MATERIALS

- A. Structure and Framing: May be new or used, wood or metal, in sound condition structurally adequate to work and suitable for specified finish.
- B. Sign Surfaces: Exterior softwood plywood with medium density overlay, standard large sizes to minimize joints.
 1. Thickness: As required by standards to span framing members, to provide even, smooth surface without waves or buckles.
- C. Rough Hardware: Galvanized.

- D. Paint: Exterior quality, as specified in the Contract Documents.

PART 3 EXECUTION

3.01 PROJECT IDENTIFICATION SIGN

- A. Paint exposed surface or supports, framing and surface material; one coat of primer and one coat of exterior paint.
- B. Paint graphics in styles, size and colors selected.

3.02 MAINTENANCE

The Contractor shall maintain signs and supports in a neat, clean condition; repair damages to structures, framing or sign.

3.03 REMOVAL

The Contractor shall remove signs, framing, supports and foundations at completion of project.

END OF SECTION

SECTION 01590 COUNTY'S FIELD OFFICE

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Contractor shall furnish, install and maintain one temporary field office during the entire construction period for the sole use of the County.

1.02 OTHER REQUIREMENTS

- A. Prior to installation of the County's field office, the Contractor shall consult with the County on location, access and related facilities.
- B. All site use approvals shall be obtained by the Contractor.
- A. Upon completion of construction, the Contractor shall remove the field office and restore the site to its original condition.

1.03 REQUIREMENTS FOR FACILITIES

- A. Construction:
 - 1. The field office shall be structurally sound, weather tight, with floors raised aboveground.
 - 2. At Contractor's option, portable or mobile buildings may be used.
- B. Office for Field Engineer:
 - 1. A separate office for sole use of the County with secure entrance doors, key and lock shall be provided.
 - 2. Area: 250 sq. ft. minimum, with minimum dimension of 8 feet.
 - 3. Windows:
 - a. Minimum of three (3).
 - b. Operable sash and insect screens.
 - c. Locate field office to provide maximum view of construction areas.
 - 4. Furnishings:
 - a. Two standard size chairs and desks with three drawers each.
 - b. One drafting table: 39"x72"x36" high, with one equipment drawer.
 - c. One metal, double-door storage cabinet with lock and key.
 - d. One plan rack to hold a minimum of six sets of project drawings.
 - e. One standard four-drawer legal-size metal filing cabinet with lock and key.
 - f. Six linear feet of bookshelves.
 - g. One swivel arm chair.
 - h. Two straight chairs.
 - i. One drafting table stool.
 - j. One waste basket.

- k. One tackboard, 36"x30".
- l. One fire extinguisher.
- m. One first aid kit.

5. Services:

- a. Adequate lighting.
- b. Exterior lighting at entrance door.
- c. Automatic heating and mechanical cooling equipment to maintain comfort conditions.
- d. Minimum of four 110 volt duplex electric convenience outlets, at least one on each wall.
- e. Electric distribution panel: Two circuits minimum 110 volt, 60 hertz service.
- f. Convenient access to drinking water and toilet facilities.
- g. Telephone: One private direct line instrument.
- h. Fax: combination fax/duplicator.

PART 2 PRODUCTS

2.01 MATERIALS, EQUIPMENT, FURNISHINGS

May be new or used, but must be serviceable, adequate for required purpose and must adhere to all applicable codes or regulations including the Manatee County Building Codes.

PART 3 EXECUTION

3.01 PREPARATION

Fill and grade site as necessary for temporary structure to provide positive surface drainage.

3.02 INSTALLATION

- A. Construct temporary field office on proper foundation and provide connections for all utility services.
 - 1. Secure portable or mobile building when used.
 - 2. Provide steps and landings at entrance doors.

END OF SECTION

SECTION 01600 MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Material and equipment incorporated into the work:
1. Conform to applicable specifications and standards.
 2. Comply with size, make, type and quality specified, or as specifically approved in writing by the County.
 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 gages, to be interchangeable.
 - c. Two or more items of the same kind shall be identical and manufactured by the same manufacturer.
 - d. Products shall be suitable for service conditions.
 - e. Equipment capacities, sizes and dimensions shown or specified shall be adhered to unless variations are specifically approved in writing.
 4. Do not use material or equipment for any purpose other than that for which it is specified.
 5. All material and equipment incorporated into the project shall be new.

1.02 MANUFACTURER'S INSTRUCTIONS

- A. When Contract Documents require that installation of work shall comply with manufacturer's printed instructions, obtain and distribute copies of such instructions to parties involved in the installation, including two copies to County. Maintain one set of complete instructions at the job site during installation and until completion.
- B. Handle, install, connect, clean, condition and adjust products in strict accordance with such instructions and in conformity with specified requirements. Should job conditions or specified requirements conflict with manufacturer's instructions, consult with County prior to proceeding. Do not proceed with work without clear instructions.

1.03 TRANSPORTATION AND HANDLING

- A. Arrange deliveries of products in accordance with construction schedules, coordinate to avoid conflict with work and conditions at the site.
1. Deliver products in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 2. Immediately on delivery, inspect shipments to assure compliance with requirements of Contract Documents and approved submittals and that

products are properly protected and undamaged.

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

1.04 SUBSTITUTIONS AND PRODUCT OPTIONS

Contractor's Options:

1. For products specified only by reference standard, select any product meeting that standard.
2. For products specified by naming one or more products or manufacturers and "or equal", Contractor must submit a request for substitutions of any product or manufacturer not specifically named in a timely manner so as not to adversely affect the construction schedule.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01620 STORAGE AND PROTECTION

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Provide secure storage and protection for products to be incorporated into the work and maintenance and protection for products after installation and until completion of Work.

1.02 STORAGE

- A. Store products immediately on delivery and protect until installed in the Work, in accord with manufacturer's instructions, with seals and labels intact and legible.
- B. Exterior Storage
 - 1. Provide substantial platform, blocking or skids to support fabricated products above ground to prevent soiling or staining.
 - a. Cover products, subject to discoloration or deterioration from exposure to the elements, with impervious sheet coverings. Provide adequate ventilation to avoid condensation.
 - b. Prevent mixing of refuse or chemically injurious materials or liquids.
- A. Arrange storage in manner to provide easy access for inspection.

1.03 MAINTENANCE OF STORAGE

- A. Maintain periodic system of inspection of stored products on scheduled basis to assure that:
 - 1. State of storage facilities is adequate to provide required conditions.
 - 2. Required environmental conditions are maintained on continuing basis.
 - 3. Surfaces of products exposed to elements are not adversely affected. Any weathering of products, coatings and finishes is not acceptable under requirements of these Contract Documents.
- B. Mechanical and electrical equipment which requires servicing during long term storage shall have complete manufacturer's instructions for servicing accompanying each item, with notice of enclosed instructions shown on exterior of package.
 - 1. Equipment shall not be shipped until approved by the County. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the County.
 - 2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity controlled building approved by the County until such time as the equipment is to be

installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. Moving parts shall be rotated a minimum of once weekly to insure proper lubrication and to avoid metal-to-metal "welding". Upon installation of the equipment, the Contractor shall start the equipment, at least half load, once weekly for an adequate period of time to insure that the equipment does not deteriorate from lack of use.
5. Lubricants shall be changed upon completion of installation and as frequently as required, thereafter during the period between installation and acceptance.
6. Prior to acceptance of the equipment, the Contractor shall have the manufacturer inspect the equipment and certify that its condition has not been detrimentally affected by the long storage period. Such certifications by the manufacturer shall be deemed to mean that the equipment is judged by the manufacturer to be in a condition equal to that of equipment that has been shipped, installed, tested and accepted in a minimum time period. As such, the manufacturer will guaranty the equipment equally in both instances. If such a certification is not given, the equipment shall be judged to be defective. It shall be removed and replaced at the Contractor's expense.

1.04 PROTECTION AFTER INSTALLATION

- A. Provide protection of installed products to prevent damage from subsequent operations. Remove when no longer needed, prior to completion of work.
- B. Control traffic to prevent damage to equipment and surfaces.
- C. Provide coverings to protect finished surfaces from damage.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01700 CONTRACT CLOSEOUT

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

Comply with requirements stated in Conditions of the Contract and in Specifications for administrative procedures in closing out the work.

1.02 SUBSTANTIAL COMPLETION

- A. The Contractor shall submit the following items when the Contractor considers the work to be substantially complete:
 - 1. A written notice that the work, or designated portion thereof, is substantially complete.
 - 2. A list of items to be completed or corrected.
- B. Within a reasonable time after receipt of such notice, the County shall make an inspection to determine the status of completion.
- C. Project record documents and operations and maintenance manuals must be submitted before the project shall be considered substantially complete.
- D. If the County determines that the work is not substantially complete:
 - 1. The County shall notify the Contractor in writing, stating the reasons.
 - 2. The Contractor shall remedy the deficiencies in the work and send a second written notice of substantial completion to the County.
 - 3. The County shall reinspect the work.
- E. When the County finds that the work is substantially complete:
 - 1. The Engineer shall prepare and deliver to the County a tentative Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a tentative list of the items to be completed or corrected before final payment.
 - 2. The Engineer shall consider any objections made by the County as provided in Conditions of the Contract. When the Engineer considers the work substantially complete, he will execute and deliver to the County a definite Certificate of Substantial Completion (Manatee County Project Management Form PMD-8) with a revised tentative list of items to be completed or corrected.

1.03 FINAL INSPECTION

- A. When the Contractor considered the work to be complete, he shall submit written certification stating that:
 - 1. The Contract Documents have been reviewed.
 - 2. The work has been inspected for compliance with Contract Documents.

3. The work has been completed in accordance with Contract Documents.
 4. The equipment and systems have been tested in the presence of the County's representative and are operational.
 5. The work is completed and ready for final inspection.
- B. The County shall make an inspection to verify the status of completion after receipt of such certification.
- C. If the County determines that the work is incomplete or defective:
1. The County shall promptly notify the Contractor in writing, listing the incomplete or defective work.
 2. The Contractor shall take immediate steps to remedy the stated deficiencies and send a second written certification to County that the work is complete.
 3. The County shall reinspect the work.
- D. Upon finding the work to be acceptable under the Contract Documents, the County shall request the Contractor to make closeout submittals.
- E. For each additional inspection beyond a total of three (3) inspections for substantial and final completion due to the incompleteness of the work, the Contractor shall reimburse the County's fees.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO COUNTY

- A. Project Record Documents (prior to substantial completion).
- B. Operation and maintenance manuals (prior to substantial completion).
- C. Warranties and Bonds.
- D. Evidence of Payment and Release of Liens: In accordance with requirements of General and Supplementary Conditions.
- E. Certification letter from Florida Department of Transportation and Manatee County Department of Transportation, as applicable.
- F. Certificate of Insurance for Products and Completed Operations.
- G. Final Reconciliation, Warranty Period Declaration, and Contractor's Affidavit (Manatee County Project Management Form PMD-9).

1.05 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the County.
- B. Statement shall reflect all adjustments to the Contract Sum:
 1. The original Contract Sum.
 2. Additions and deductions resulting from:

- a. Previous Change Orders
 - b. Unit Prices
 - c. Penalties and Bonuses
 - d. Deductions for Liquidated Damages
 - e. Other Adjustments
- 3. Total Contract Sum, as adjusted.
 - 4. Previous payments.
 - 5. Sum remaining due.
- C. Project Management shall prepare a final Change Order, reflecting approved adjustments to the Contract Sum which were not previously made by Change Orders.

1.06 FINAL APPLICATION FOR PAYMENT

Contractor shall submit the final Application for Payment in accordance with procedures and requirements stated in the Conditions of the Contract.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01710 CLEANING

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

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

1.02 DISPOSAL REQUIREMENTS

Conduct cleaning and disposal operations to comply with all Federal, State and Local codes, ordinances, regulations and anti-pollution laws.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Use only those cleaning materials which will not create hazards to health or property and which will not damage surfaces.
- B. Use only those cleaning materials and methods recommended by manufacturer of the surface material to be cleaned.
- C. Use cleaning materials only on surfaces recommended by cleaning material manufacturer.

PART 3 EXECUTION

3.01 DURING CONSTRUCTION

- A. Execute periodic cleaning to keep the work, the site and adjacent properties free from accumulation of waste materials, rubbish and wind-blown debris, resulting from construction operations.
- B. Provide on-site containers for the collection of waste materials, debris and rubbish.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.02 DUST CONTROL

- A. Clean interior spaces prior to the start of finish painting and continue cleaning on an as-needed basis until painting is finished.
- B. Schedule operations so that dust and other contaminants resulting from cleaning process will not fall on wet or newly-coated surfaces.

3.03 FINAL CLEANING

- A. Employ skilled workmen for final cleaning.

- B. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- C. Prior to final completion or County occupancy, Contractor shall conduct an inspection of sight-exposed interior and exterior surfaces and all work areas to verify that the entire work is clean.

END OF SECTION

SECTION 01720 PROJECT RECORD DOCUMENTS

PART 1 STANDARDS

1.01 MINIMUM RECORD DRAWING STANDARDS FOR ALL RECORD DRAWINGS SUBMITTED TO MANATEE COUNTY

- A. Record drawings shall be submitted to at least the level of detail in the contract documents. It is anticipated that the original contract documents shall serve as at least a background for all record information. Original drawings in CAD format may be requested of the County.
- B. Drawings shall meet the criteria of paragraph 2.04 D above and as mentioned in Section 1.14 Record Drawings in the Manatee County Public Works Standards, Part I Utilities Standards Manual approved June 2015.

PART 2 STANDARDS

2.01 REQUIREMENTS INCLUDED

- A. Contractor shall maintain at the site for the County one record copy of:
 - 1. Drawings.
 - 2. Specifications.
 - 3. Addenda.
 - 4. Change Orders and other modifications to the Contract.
 - 5. County's field orders or written instructions.
 - 6. Approved shop drawings, working drawings and samples.
 - 7. Field test records.
 - 8. Construction photographs.

2.02 MAINTENANCE OF DOCUMENTS AND SAMPLES

- A. Store documents and samples in Contractor's field office apart from documents used for construction.
 - 1. Provide files and racks for storage of documents.
 - 2. Provide locked cabinet or secure storage space for storage of samples.
- B. File documents and samples in accordance with CSI format.
- C. Maintain documents in a clean, dry, legible, condition and in good order. Do not use record documents for construction purposes.
- D. Make documents and samples available at all times for inspection by the County.

2.03 MARKING DEVICES

- A. Provide felt tip marking pens for recording information in the color code designated by the County.

2.04 RECORDING DRAWINGS PREPARATION

- A. Record information concurrently with construction progress.
- B. Do not conceal any work until required information is recorded.
- C. Drawings; Legibly mark to record actual construction:
 - 1. All underground piping with elevations and dimensions. Changes to piping location. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements. Actual installed pipe material, class, etc. Locations of drainage ditches, swales, water lines and force mains shall be shown every 200 feet (measured along the centerline) or alternate lot lines, whichever is closer. Dimensions at these locations shall indicate distance from centerline of right-of-way to the facility.
 - 2. Field changes of dimension and detail.
 - 3. Changes made by Field Order or by Change Order.
 - 4. Details not on original contract drawings.
 - 5. Equipment and piping relocations.
 - 6. Locations of all valves, fire hydrants, manholes, water and sewer services, water and force main fittings, underdrain cleanouts, catch basins, junction boxes and any other structures located in the right-of-way or easement, shall be located by elevation and by station and offset based on intersection P.I.'s and centerline of right-of-way. For facilities located on private roads, the dimensioning shall be from centerline of paving or another readily visible baseline.
 - 7. Elevations shall be provided for all manhole rim and inverts; junction box rim and inverts; catch basin rim and inverts; and baffle, weir and invert elevations in control structures. Elevations shall also be provided at the PVI's and at every other lot line or 200 feet, whichever is less, of drainage swales and ditches. Bench marks and elevation datum shall be indicated.
 - 8. Slopes for pipes and ditches shall be recalculated, based on actual field measured distances, elevations, pipe sizes, and type shown. Cross section of drainage ditches and swales shall be verified.
 - 9. Centerline of roads shall be tied to right-of-way lines. Elevation of roadway centerline shall be given at PVI's and at all intersections.
 - 10. Record drawings shall show bearings and distances for all right-of-way and easement lines, and property corners.
 - 11. Sidewalks, fences and walls, if installed at the time of initial record drawing submittal, shall be located every 200 feet or alternate lot lines, whichever is closer. Dimensions shall include distance from the right-of-way line and the back of curb and lot line or easement line.
 - 12. Sanitary sewer mainline wyes shall be located from the downstream manhole. These dimensions shall be provided by on-site inspections or televising of the sewer following installation.
 - 13. Elevations shall be provided on the top of operating nuts for all water and force main valves.
 - 14. Allowable tolerance shall be ± 6.0 inches for horizontal dimensions. Vertical dimensions such as the difference in elevations between manhole inverts shall have an allowable tolerance of $\pm 1/8$ inch per 50 feet (or part thereof) of horizontal distance up to a maximum tolerance of ± 2 inch.

15. Properly prepared record drawings on mylar, together with two copies, shall be certified by a design professional (Engineer and/or Surveyor registered in the State of Florida), employed by the Contractor, and submitted to the County.
- D. Specifications and Addenda; Legibly mark each Section to record:
1. Manufacturer, trade name, catalog number and supplier of each product and item of equipment actually installed.
 2. Changes made by field order or by change order.
- E. Shop Drawings (after final review and approval):
1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

2.05 SUBMITTAL

- A. Prior to substantial completion and prior to starting the bacteria testing of water lines, deliver signed and sealed Record Documents and Record Drawings to the County. These will be reviewed and verified by the inspector. If there are any required changes or additions, these shall be completed and the entire signed and sealed set resubmitted prior to final pay application.
- B. The Contractor shall employ a Professional Engineer or Surveyor registered in the State of Florida to verify survey data and properly prepare record drawings. Record drawings shall be certified by the professional(s) (Engineer or Surveyor licensed in Florida), as stipulated by the Land Development Ordinance and submitted on signed and sealed paper drawings, signed and dated mylar drawings together with an AutoCAD version on a recordable compact disk (CD).
- C. The CD shall contain media in AutoCad Version 2004 or later, or in any other CAD program compatible with AutoCad in DWG or DXF form. All fonts, line types, shape files, external references, or other pertinent information used in the drawing and not normally included in AutoCad shall be included on the media with a text file or attached noted as to its relevance and use.
- D. Accompany submittal with transmittal letter, containing:
1. Date.
 2. Project title and number.
 3. Contractor's name and address.
 4. Title and number of each Record Document.
 5. Signature of Contractor or his authorized representative.

Note: The data required to properly prepare these record drawings shall be obtained at the site, at no cost to the County by the responsible design professional or his/her duly appointed representative. The appointed representative shall be a qualified employee of the responsible design professional or a qualified inspector retained by the responsible design professional on a project-by-project basis.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01730 OPERATING AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

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

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

- B. Instruct County's personnel in maintenance of products and equipment and systems.
- C. Provide three (3) sets of operating and maintenance manuals for each piece of equipment provided within this Contract.

1.02 FORM OF SUBMITTALS

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

B. Format:

1. Size: 8-1/2 inch x 11 inch
2. Paper: 20 pound minimum, white, for typed pages
3. Text: Manufacturer's printed data or neatly typewritten
4. Drawings:
 - a. Provide reinforced punched binder tab, bind in with text.
 - b. Fold larger drawings to size of text pages.
5. Provide fly-leaf for each separate product or each piece of operating equipment.
 - a. Provide typed description of product and major component parts of equipment.
 - b. Provide indexed tabs.
6. Cover: Identify each volume with typed or printed title "OPERATING AND MAINTENANCE INSTRUCTIONS". List:
 - a. Title of Project.
 - b. Identity of separate structures as applicable.
 - c. Identity of general subject matter covered in the manual.

C. Binders:

1. Commercial quality three-ring binders with durable and cleanable plastic covers.
2. Maximum ring size: 1 inch.

3. When multiple binders are used, correlate the data into related consistent groupings.

1.03 MANUAL FOR EQUIPMENT AND SYSTEMS

- A. Submit three copies of complete manual in final form.
- B. Content for each unit of equipment and system, as appropriate:
 1. Description of unit and component parts.
 - a. Function, normal operating characteristics and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 2. Operating Procedures:
 - a. Start-up, break-in, routine and normal operating instructions.
 - b. Regulation, control, stopping, shut-down and emergency instructions.
 - c. Summer and winter operating instructions.
 - d. Special operating instructions.
 3. Maintenance Procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Alignment, adjusting and checking.
 4. Servicing and lubricating schedule.
 - a. List of lubricants required.
 5. Manufacturer's printed operating and maintenance instructions.
 6. Description of sequence of operation by control manufacturer.
 7. Original manufacturer's parts list, illustrations, assembly drawings and diagrams required for maintenance.
 - a. List of predicted parts subject to wear.
 - b. Items recommended to be stocked as spare parts.
 8. As installed control diagrams by controls manufacturer.
 9. Each contractor's coordination drawings.
 - a. As installed color coded piping diagrams.
 10. Charts of valve tag numbers, with location and function of each valve.
 11. List of original manufacturer's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
 12. Other data as required under pertinent sections of specifications.

- C. Content, for each electric and electronic system, as appropriate:
1. Description of system and component parts.
 - a. Function, normal operating characteristics and limiting conditions.
 - b. Performance curves, engineering data and tests.
 - c. Complete nomenclature and commercial number of replaceable parts.
 2. Circuit directories of panelboards.
 - a. Electrical service.
 - b. Controls.
 - c. Communications.
 3. As-installed color coded wiring diagrams.
 4. Operating procedures:
 - a. Routine and normal operating instructions.
 - b. Sequences required.
 - c. Special operating instructions.
 5. Maintenance procedures:
 - a. Routine operations.
 - b. Guide to "trouble-shooting".
 - c. Disassembly, repair and reassembly.
 - d. Adjustment and checking.
 6. Manufacturer's printed operating and maintenance instructions.
 7. List of original manufacture's spare parts, manufacturer's current prices and recommended quantities to be maintained in storage.
 8. Prepare and include additional data when the need for such data becomes apparent during instruction of County's personnel.
- D. Prepare and include additional data when the need for such data becomes apparent during instruction on County's personnel.
- E. Additional requirements for operating and maintenance data: Respective sections of Specifications.

1.04 SUBMITTAL SCHEDULE

- A. Submit one copy of completed data in final form fifteen days prior to substantial completion.
 1. Copy will be returned after substantial completion, with comments (if any).
- B. Submit two copies of approved data in final form. Final acceptance will not be provided until the completed manual is received and approved.

1.05 INSTRUCTION OF COUNTY'S PERSONNEL

- A. Prior to final inspection or acceptance, fully instruct County's designated operating and maintenance personnel in operation, adjustment and maintenance of products, equipment and systems.
- B. Operating and maintenance manual shall constitute the basis of instruction.
 - 1. Review contents of manual with personnel in full detail to explain all aspects of operations and maintenance.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01740 WARRANTIES AND BONDS

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile specified warranties and bonds.
- B. Compile specified service and maintenance contracts.
- C. Co-execute submittals when so specified.
- D. Review submittals to verify compliance with Contract Documents.
- E. Submit to County for review and transmittal.

1.02 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers and subcontractors.
- B. Number of original signed copies required: Two each.
- C. Table of Contents: Neatly typed, in orderly sequence. Provide complete information for each item.
 - 1. Product or work item.
 - 2. Firm, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning of warranty, bond or service and maintenance contract.
 - 5. Duration of warranty, bond or service maintenance contract.
 - 6. Provide information for County's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
 - 7. Contractor, name of responsible principal, address and telephone number.

1.03 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8-1/2 inch x 11 inch punched sheets for standard 3-ring binder. Fold larger sheets to fit into binders.
 - 2. Cover: Identify each packet with typed or printed title "WARRANTIES AND BONDS". List:
 - a. Title of Project.
 - b. Name of Contractor.

- C. Binders: Commercial quality, three-ring, with durable and cleanable plastic covers.

1.04 TIME OF SUBMITTALS

- A. Make submittals within ten days after date of substantial completion and prior to final request for payment.
- B. For items of work, where acceptance is delayed materially beyond date of substantial completion, provide updated submittal within ten days after acceptance, listing date of acceptance as start of warranty period.

1.05 SUBMITTALS REQUIRED

- A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.
- B. Approval by the County of all documents required under this section is a prerequisite to requesting a final inspection and final payment

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01900 PERMITS

PART 1 GENERAL

1.01 GENERAL

- A. The Contractor shall obtain all permits necessary to complete Work under this Contract.
- B. Where permits require that certain work is to be performed only in the presence of a representative of the permitting entity, the Contractor shall provide all coordination and notification required to assure the permit conditions are not violated.

1.02 PERMITS

- A. The County has obtained / will obtain permits from the following agencies where required for the construction of the work included in the project.
- B. All other permits and licenses required to perform the work included in the contract are the complete and total responsibility of the Contractor including but not limited to the following:
 - 1. FDEP - NOI including preparation of SWPPP
 - 2. FDEP - Generic Permit for the Discharge of Produced Groundwater
 - 3. Manatee County Building Permit (Signed and Sealed Drawings will be provided to Contractor by McKim & Creed).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

DIVISION 2 - SITE WORK

SECTION 02010 SUBSURFACE INVESTIGATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. A geotechnical investigation and assessment was conducted for this project. Refer to the final Geotechnical Report by Terracon Consultants, Inc. May 26, 2021.

1.02 QUALITY ASSURANCE

- A. Bidders should visit the site and acquaint themselves with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but all such investigations shall be performed under time schedules and arrangements approved in advance by the OWNER.

1.03 JOB CONDITIONS

- A. The CONTRACTOR shall visit the site and acquaint himself with all existing conditions. Prior to bidding, bidders may make their own subsurface investigations to satisfy themselves as to site and subsurface conditions, but such subsurface investigations shall be performed only under time schedules and arrangements approved in advance by the OWNER.

PART 2 PRODUCTS (NOT REQUIRED)

PART 3 EXECUTION

3.01 PERFORMANCE

- A. All work relative to subsurface conditions shall be accomplished in accordance with the specific requirements of the individual sections of the Specifications.
- B. Readjust all work performed which does not meet technical or design requirements as hereinafter specified, but make no deviations from the Contract Documents without specific and written approval of the General Contractor.

END OF SECTION

SECTION 2050 DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes demolition, abandonment, debris removal and items to be salvaged as indicated on the Drawings and as specified herein.
- B. Demolition items consist of, but are not limited to the following:
 - 1. Removal of materials, equipment and appurtenances as shown on Contract Plans.
 - 2. Items to be salvaged will be documented at the pre-construction meeting.

1.02 QUALITY ASSURANCE

- A. Accomplish all demolition work so there is no injury to any persons and no damage to adjacent structures or property. All demolition methods shall be in full compliance with municipal, county, state, and federal ordinances. Demolition work shall comply with the requirements of the Occupational Safety and Health Administration (OSHA).
- B. The CONTRACTOR shall comply with all municipal, county, state and federal ordinances regarding the disposal of rubble, scrap metal, asbestos and refuse.
- C. Demolition procedures shall provide for safe conduct of the work, protection of property which is to remain undisturbed, and coordination with other work in progress.

1.03 JOB CONDITIONS

- A. It shall be the responsibility of the CONTRACTOR to visit the site and inspect the nature and condition of the items to be removed and salvaged before submitting his bid.
- B. Dust Control: Control the amount of dust resulting from demolition to prevent the spread of dust to occupied portions of buildings and to avoid creation of a nuisance in the surrounding area. Do not use water when it will result in, or create, hazardous or objectionable conditions such as flooding and pollution.
- C. Protection of Existing Work: Protect existing work. Work damaged by the CONTRACTOR shall be repaired to match existing work.

PART 2 PRODUCTS

2.01 REPAIR AND REPLACEMENT MATERIALS

- A. Materials used in the repair or replacement of existing work to remain shall be identical or equal to the materials used in existing work when new unless otherwise provided in the contract documents.

PART 3 EXECUTION

3.01 PIPING

- A. Completely remove or abandon piping as shown on the Drawings. The CONTRACTOR shall schedule underground pipe removal and new pipe installation in order to minimize disruption of the existing piping system.

3.02 DISPOSAL

- A. Loaded/Unloaded Equipment, piping, and materials within a radius of 10-miles which are designated to remain the property of the COUNTY shall be turned over to the COUNTY.
- B. All removed equipment, piping, and materials not specifically designated to remain the property of the COUNTY shall become the property of the CONTRACTOR and shall be removed from the site.
- C. Do not allow debris and rubbish to accumulate on the site. Remove debris and rubbish from the site.

3.03 BACKFILLING

- A. Backfill excavations resulting from demolition.
- B. Backfill excavations which will not be beneath new structures, buildings, piping, or other new work.
- C. Backfill excavations as specified in Division 02 - Site Work.
- D. Place and compact backfill in other excavations to produce an adequate foundation for grassing.

3.04 REMOVAL AND ABANDONMENT OF ASBESTOS CEMENT PIPE AND APPURTENANCES

- A. The Contractor or subcontractor shall contact the appropriate regulatory agencies prior to removal or abandonment of any asbestos containing material and shall obtain all required permits and licenses and issue all required notices. The Contractor shall be responsible for all fees associated with permits, licenses and notices to the governing regulatory agencies.

All work associated with removal or abandonment of asbestos cement pipe and appurtenances shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.

1. Florida Administrative Code, Chapter 62-257, "Asbestos Program".
 2. National Emission Standards Hazardous Air Pollution (NESHAP), 40 CRF, Part 61, Subpart M, latest revisions.
 3. Occupational Safety and Health Act, 29 CFR
- B. All asbestos cement pipe sections shown on the Drawings to be removed, and all related valves, fittings and appurtenances shall be removed in their entirety and disposed of by the Contractor in accordance with this Section and applicable regulations. After removal of the facilities, all trenches shall be backfilled in accordance with the Contract Documents. The cost of disposing of the removed materials shall be borne by the Contractor.
- C. The Contractor shall make necessary provisions for the Engineer to monitor all removal operations.

3.05 CLEAN-UP

- A. Clean-up in areas where other work is to be done following demolition shall be as specified in the applicable Sections.
- B. Clean-up the job site in areas where no other work is to be done under this Contract following demolition. Remove all debris and rubbish, temporary facilities, and equipment. Level surface irregularities to eliminate depressions. Leave the work in a neat and presentable condition.

END OF SECTION

SECTION 02064 MODIFICATIONS TO EXISTING STRUCTURES, PIPING AND EQUIPMENT

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required to modify, alter and/or convert existing structures as shown or specified and as required for the installation of piping, mechanical equipment and appurtenances. Existing piping and equipment shall be removed and dismantled as necessary for the performance of facility alterations in accordance with the requirements herein specified.

PART 2 PRODUCTS

- A. Epoxy mortar shall be fiberglass fiber mixed with an epoxy filler.
- B. Non-shrink grout shall be a sand-cement, non-metallic formulation, having a 28-day strength of 4,000 psi and 0.0 percent shrinkage per ASTM C1090.
- C. Liners to be installed in existing manholes and wetwells shall be spray-applied, monolithic, reinforced urethane resin. Urethane resin-based manhole liner material shall be resistant to hydrogen sulfide gas, and other common contents found in a sanitary sewer environment.
- D. Approved manhole and wet well liner products are Raven 405, SprayWall, Green Monster, or SpectraShield.

PART 3 EXECUTION

3.01 GENERAL

- A. Cut, repair, reuse, excavate, demolish or otherwise remove parts of the existing structures or appurtenances, as indicated on the construction drawings, or as necessary to complete the work as required. Dispose of surplus materials resulting from the above work in an approved manner. The work shall include all necessary cutting and bending of reinforcing steel, structural steel, or miscellaneous metal work found embedded in the existing structures.
- B. Dismantle and remove all existing equipment, piping, and other appurtenances required for the completion of the work. Where called for or required, cut existing pipelines for the purpose of making connections thereto.
- C. Anchor bolts for equipment and structural steel to be removed shall be cut off one inch below the concrete surface. Surfaces shall then be refinished using non-shrink grout or epoxy mortar or as indicated on the construction drawings. Repairs to the interior surfaces of existing concrete structures in sanitary sewers shall be made with epoxy mortar. Repairs to be made on other existing concrete surfaces using non-shrink grout shall be made using a bonding agent such as Acrylbond by Concrete Producers Solutions or an equal approved by the County. Remove all dirt, curing compounds, sealers, paint, rust or other foreign material, and etch with

muriatic acid solution. Flush with clean water and while still damp, apply a coating of the bonding agent. Place the new grout patch onto the treated area immediately.

- D. At the time that a new connection is made to an existing pipeline, additional new piping, extending to and including a new valve, shall be installed. Pipe restraint devices, if required, shall also be installed as required. At the time when a new potable or reclaimed water service is installed, a pipe locator tracer wire shall be installed and connected to the tracer wire at the main.
- E. No existing structure, equipment, or appurtenance shall be shifted, cut, removed, or otherwise altered except with the express approval of and only to the extent approved by the County. All existing valve boxes, fire hydrants, air release valve cabinets, and manholes shall be relocated to meet the new finished grade elevations after construction.
- F. When removing materials or portions of existing utility pipelines or structures or when making openings in walls and partitions, take all precautions and use all necessary barriers and other protective devices so as not to damage the structures beyond the limits necessary for the new work, and not to damage the structures or contents by falling or flying debris. Unless otherwise approved by the County, saw-cutting, rotary core-boring, or line drilling will be required in removing material from existing concrete structures or pipes.
- G. Materials and equipment removed in the course of making alterations and additions shall remain the property of the County, except that items not salvageable, as determined by the County, shall be disposed of off the work site.
- H. All alterations to existing utility pipes and structures shall be done at such time and in such a manner as to comply with the approved time schedule. Before any part of the work is started, all tools, equipment, and materials shall be assembled and made ready so that the work can be completed without delays.
- I. All cutting of existing concrete or other material to provide suitable bonding to new work shall be done in a manner to meet the requirements of the respective section of these Standards covering the new work. When not covered, the work shall be carried on in the manner and to the extent directed by the County or per the construction drawings.
- J. Surfaces of seals visible in the completed work shall be made to match as nearly as possible the adjacent surfaces.
- K. Non-shrink cementitious grout shall be used for setting wall castings, sleeves, leveling pump bases, doweling anchors into existing concrete and elsewhere as shown on the construction drawings. The surface to which grout is to be applied shall be wetted to facilitate good bonding.
- L. Where necessary or required for the purpose of making connections; cut existing pipelines in a manner to provide an approved joint. Where required, use flanges, couplings, or adapters, all as required.

- M. Provide flumes, hoses, piping, pumps and well points, and other related items to divert or provide suitable plugs, bulkheads, or other means to hold back the flow of water or other liquids, all as required in the performance of the work.
- N. Care shall be taken not to damage any part of existing buildings or foundations or outside structures.
- O. Prior to entering confined spaces in sanitary sewer structures, conduct an evaluation of the atmosphere within, in accordance with local, state, and federal regulations. Provide ventilation equipment and other equipment as required to assure safe working conditions.

3.02 CONNECTING TO EXISTING PIPING AND EQUIPMENT

The Contractor shall verify exact location, material, alignment, joint, etc. of existing piping and equipment prior to making the connections called out in the Drawings. The verifications shall be performed with adequate time to correct any potential alignment or other problems prior to the actual time of connection. A County Inspector must be present for all tie-ins for a visual inspection.

3.03 REMOVAL AND ABANDONMENT OF ASBESTOS CEMENT PIPE AND APPURTENANCES

- A. All work associated with the removal or abandonment of existing asbestos cement pipe and appurtenances shall be performed by a licensed asbestos removal Contractor registered in the State of Florida.
- B. The asbestos Contractor shall contact the appropriate regulatory agencies prior to removal or abandonment of any asbestos material and shall obtain all required permits and licenses and issue all required notices. The cost for all fees associated with permits, licenses and notices to the governing regulatory agencies shall be borne by the asbestos Contractor.
- C. All work associated with removal or abandonment of asbestos cement pipe and appurtenances shall be performed in accordance with the standards listed below and all other applicable local, State, or Federal standards.
 - (1) Florida Administrative Code, Chapter 62-257, ASBESTOS PROGRAM
 - (2) Title 40 CFR, Part 61, Subpart M, NATIONAL EMISSION STANDARD FOR ASBESTOS
 - (3) Occupational Safety and Health Act, Title 29 CFR
 - (4) Title 40 CFR, Part 763, ASBESTOS
 - (5) Florida Statute Title XXXII, Chapter 469, ASBESTOS ABATEMENT
- D. All asbestos cement pipe sections indicated on the construction drawings to be removed, and all related tees, valves, fittings and appurtenances shall be removed in their entirety and disposed of by the asbestos Contractor in accordance with this Section. Asbestos cement nipples between tees and valves shall be replaced. After removal of the pipelines, all excavations shall be backfilled in accordance with the applicable provisions of the Trenching and Excavation Section of these Standards. The cost of disposing of the removed materials shall be borne by the asbestos Contractor.

- E. The cutting of existing asbestos-cement (A/C, a.k.a. "Transite") pipe shall be by hand tools only. No powered machine cutting is allowed. Removal of all fragments of pipe shall be double bagged prior to shipment. Longer sections of pipe removed may be shipped without double bagging. An asbestos manifest form must accompany each shipment of such pipe or pipe material waste to the Manatee County Lena Road Landfill. Prior to each shipment, a minimum of 24 hours notice to the Landfill field office (telephone (941) 748-5543) is required.

3.04 IN-PLACE GROUTING OF EXISTING PIPE

- A. Where water and wastewater utility pipes are to be abandoned in place, they shall be filled with a non-shrinking sand-cement grout. When such pipes are made of asbestos-cement materials, the abandonment activities shall be performed by a licensed asbestos Contractor. It is completely the Contractor's responsibility to obtain all regulatory clearances and provide documentation in cases where they have determined that an asbestos-cement pipe abandonment activity by in-place grouting does not require a licensed asbestos Contractor.
- B. The ends of the pipe sections to be grout-filled shall be capped or plugged with suitable pipe fittings. The grout material shall be of suitable properties and the pumping pressure shall be such that the pipe sections are filled completely with grout. All above ground features shall be removed: hydrants, meters, valve & meter boxes, pads, vaults, etc. Existing tees, crosses, and valves left in service shall be plugged and restrained.
- C. The County shall be given timely notice so that the County's representative may be present to monitor all pipe grouting operations. Provide standpipes and/or additional means of visual inspection as required to determine if adequate grout material has filled the entire pipe sections.
- D. All tees, crosses, and valves left in service shall be plugged and restrained.

3.05 SPRAY-APPLIED LINERS

- A. Use a high-pressure water spray to remove all foreign material from the walls and bench of the structure. Loose or protruding masonry materials shall be removed using a hammer and chisel. Fill any voids, holes or cracks using a hand trowel with epoxy mortar to form a uniform surface. Place covers over all pipe openings to prevent extraneous material from entering the pipes. Block or divert sewer flow from entering the structure. Any infiltration leaks shall be stopped by using such methods as approved by the County.
- B. The liner material shall be sprayed onto the invert, bench and wall areas. The sprayed-on material shall be applied such that the entire structure is lined with a structurally enhanced monolithic liner. The thickness of the wall liner material shall be such that it will withstand the hydraulic load generated by the surrounding groundwater table, using a factor of safety of two, and using the assumption that the groundwater table is at the level of the top of the structure. The invert and bench liner material shall be the same thickness as that required for the base of the wall.
- C. Special care shall be used to provide a smooth transition between the intersecting pipelines and the manhole inverts such that flow is not impaired. Remove concrete

material from the existing manhole base channel in depth to the required thickness of the new liner material.

- D. No active sewer flow shall be allowed in the newly lined structure, nor shall any vacuum tests be performed, until the liner material has had adequate time to cure, as recommended by the liner material manufacturer.
- E. Install the coating systems per manufacturer's recommendation and completely protect the structure from corrosion. The liner or coating systems must extend and seal onto manhole ring, onto and around pipe openings and any other protrusions, and completely cover the bench and flow invert. Provide a five (5)-year unlimited warranty on all workmanship and products. The work includes the surface preparation and application of the coating or liner system, and shall protect the structure for at least five (5) years from all leaks and from failure due to corrosion from exposure to corrosive gases such as hydrogen sulfide.

3.06 CONNECTION TO EXSTING MANHOLE

- A. Where required or as indicated on the construction drawings, make connection of new pipelines to existing manhole structures. If pipe stub-outs of the correct size and position are not available, make connections by removing a portion of the manhole wall by mechanical rotary core boring. The connection between pipe and concrete manhole shall be complete with resilient seals meeting the requirements of ASTM C923.
- B. A new channel shall be formed in the manhole base by removing and reforming or by providing new concrete to convey the new flow into the existing channel in accordance with the standard requirements for new sewer manhole structures. Flow direction shall not change by more than 90 degrees within the manhole base.
- C. Repair internal coating of existing manholes cored during connection of new sewers by applying approved coating material as listed above in accordance with the manufacturer's recommendations. If existing manhole has an internal coating other than that listed above, sandblast the interior of the existing manhole and apply an approved coating in accordance with the manufacturer's recommendations.
- D. When connecting a force main to an existing manhole, the force main termination manhole and the next two manholes downstream shall be rehabilitated and lined with a currently approved liner. If the existing manholes are lined with a non-conforming liner according to Part 2.D above, the existing liner shall be removed and replaced, unless otherwise noted on the plans or with written approval by the County.

END OF SECTION

SECTION 02100 SITE PREPARATION

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. This Section covers clearing, grubbing and stripping of the project site and/or along the pipeline route.
- B. The Contractor shall clear and grub all of the area within the limits of construction or as required, which includes, but is not limited to utility easements. The width of the area to be cleared shall be reviewed by the County prior to the beginning of any clearing.
- C. The Contractor's attention is directed to any Soil Erosion and Sediment Control Ordinances in force in Manatee County. The Contractor shall comply with all applicable sections of these ordinances.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 CLEARING

The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, trees shall be preserved as hereinafter specified unless otherwise designated by the County. Clearing operations shall be conducted so as to prevent damage to existing structures and installations and to those under construction, so as to provide for the safety of employees and others. Soil erosion control devices such as hay bales and silt fences shall be installed to satisfy all Federal, State and County requirements.

3.02 GRUBBING

Grubbing shall consist of the complete removal of all stumps, roots larger than 1-1/2 inches in diameter, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposes, resting on, under or protruding through the surface of the ground to a depth of 18 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density conforming to the surrounding ground surface.

3.03 STRIPPING

In areas so designated, topsoil shall be stockpiled. Topsoil so stockpiled shall be protected until it is placed as specified. The County shall have the option to receive all excess topsoil materials. The Contractor shall pay all equipment and labor cost to deliver excess top soil material to a remote site chosen by the County within a five mile radius of the construction site. Should County not choose to receive any

or all excess topsoil materials, the Contractor shall dispose of said material at no additional cost to County.

3.04 DISPOSAL OF CLEARED AND GRUBBED MATERIAL

The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris off site. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be considered a subsidiary obligation of the Contractor; the cost of which shall be included in the prices bid for the various classes of work.

3.05 PRESERVATION OF TREES

Those trees which are not designated for removal by the County shall be carefully protected from damage. The Contractor shall erect such barricades, guards and enclosures as may be considered necessary by him for the protection of the trees during all construction operation.

3.06 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

- A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property adjacent to proposed project site. Trees, shrubbery, gardens, lawns and other landscaping, which are not designated by the County to be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.
- B. All soil preservation procedures and replanting operations shall be under the supervision of a nursery representative experienced in such operations.
- C. Improvements to the land such as fences, walls, outbuildings and other structures which of necessity must be removed, shall be replaced with equal quality materials and workmanship.
- D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the County.

3.07 PRESERVATION OF PUBLIC PROPERTY

The appropriate paragraphs of these Specifications shall apply to the preservation and restoration of public lands, parks, rights-of-way, easements and all other damaged areas. This includes, but is not limited to the trimming of trees damaged by contractor's equipment.

END OF SECTION

SECTION 02220 EXCAVATION, BACKFILL, FILL AND GRADING FOR STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Structural excavation shall consist of the removal of material for the construction of foundations for structures and other excavation designated on the drawings or in these specifications.
- B. Structural excavation and backfill shall consist of furnishing material, if necessary and placing and compacting backfill material around structures to the lines and grades designated on the drawings, as specified or directed by the County.
- C. Structural excavation and backfill shall include the furnishing of all materials, equipment and other facilities which may be necessary to perform the excavations, place and compact the backfill, install sheeting and bracing, and carry out any necessary dewatering. It shall also include the wasting or disposal of surplus excavated material in a manner and in locations approved by the County.
- D. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to, protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 QUALITY ASSURANCE

- A. Testing Agency:
 - 1. In place soil compaction tests shall be performed by a qualified testing laboratory.
 - 2. Compaction tests shall be taken every 500 feet, except in the road crossings or road shoulders. Tests are to be taken according to current FDOT Standards.
- B. Reference Standards:
 - 1. American Society for Testing and Materials (ASTM):
 - a. ASTM D1557, Moisture-Density Relations of Soils Using 10-lb. (4.5-kg) Rammer and 18-in. (457-mm) Drop.

1.03 JOB CONDITIONS

- A. The Contractor shall provide, operate and maintain all necessary pumps, discharge lines, well points, etc., in sufficient number and capacity to keep all excavation, bases, pits, etc., free from seepage, standing or running water at all times throughout the period of construction.

- B. The Contractor shall assume all responsibility for the security of the excavation required, employing bracing, lining or other accepted means necessary to accomplish same.
- C. Excavated areas shall be cleared of all debris, water, slush, muck, clay and soft or loose earth and shall be conditioned to the entire satisfaction of the County.
- D. All excavated material unsuitable for use or which will not be used shall be disposed of in a manner consistent with State and County regulation.
- E. All unsuitable organic materials, roots, logs, etc., found during excavation shall be removed by the Contractor and the trench shall be refilled with suitable material.

PART 2 PRODUCTS

2.01 MATERIAL FOR CONTROLLED FILL

- A. Composition: Only approved material free from organic matter and lumps of clay, shall be used for backfill. Excavated earth free from debris or organic material may be used for backfilling foundations or fill.
- B. Crushed stone and shell shall meet or exceed current FDOT Standards.

2.02 UNSUITABLE MATERIAL

Unsuitable material shall be defined as highly organic soil per ASTM D2487 Group PT. This includes, but is not limited to, such items as topsoil, roots, vegetable matter, trash, debris, and clays that cannot be dried sufficiently to obtain specified compaction.

PART 3 EXECUTION

3.01 INSPECTION

- A. The Contractor shall verify that work preceding the affected work of this Section has been satisfactorily completed.
- B. Conditions adversely affecting the work of this Section shall be corrected to the satisfaction of the County.

3.02 REMOVAL OF UNSUITABLE MATERIALS

- A. The Contractor shall remove unsuitable material from within the limits of the Work.
- B. Materials meeting requirements for controlled fill shall be stockpiled as necessary and in such a manner satisfactory to the County.
- C. All material excavated shall be placed so as to minimize interference with public travel and to permit proper access for inspection of the work.

3.03 EXCAVATION

- A. When concrete or shell subbase footing is to rest on an excavated surface, care shall be taken not to disturb the natural soil. Final removal and replacement of the foundation material and subbase compaction to grade shall not be made until just before the concrete or masonry is placed.
- B. When any structural excavation is completed, the Contractor shall notify the County who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the County.
- C. The elevations of the footing bottom and the base slab as shown on the Drawings, shall be considered as approximate and the County may order in writing, such changes in dimensions or elevations of the footings and slab base as necessary to secure satisfactory foundations.
- D. All excavation shall be made within an area bounded by lines five feet outside and parallel to the exterior walls of the structure to allow for correct forming, shoring and inspection of foundation work. Pouring of concrete against earth side walls shall not be permitted.
- E. If the ground is excavated below the grade called for by the Drawings or becomes unstable due to the Contractor's carelessness or operations, the ground shall be excavated to undisturbed native soil before continuing concreting operations.
- F. If in the opinion of the County, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the County and if so directed, replaced by crushed stone or washed shell.

3.04 STRUCTURAL BACKFILL

- A. Structural backfill shall not be placed until the footings or other portions of the structure or facility have been inspected by the County and approved for backfilling.
- B. A minimum of 1-1/2" layer of lean concrete shall be placed as a working mat for the concrete base slabs and footings if required by the County.
- C. Fill shall be placed in uniform layers not more than 12" thick and compacted to a minimum of 98 percent of the maximum density determined by ASTM D1557, Method A or C, or as directed by the County. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the County.
- D. Compaction of structural backfill by ponding and jetting may be permitted when, as determined by the County: the backfill material is of such character that it will be self-draining when compacted; foundation materials will not soften or be otherwise damaged by the applied water; no damage from hydrostatic pressure will result to the structure. Ponding and jetting within two feet below finished subgrade shall not be permitted in roadway areas. At the discretion of the County, ponding and jetting may be permitted with compaction layers not to exceed four feet.

- E. Surplus material not used on-site shall be removed and disposed of off-site by the Contractor. In no case shall surplus material be deposited on adjacent lands. Fill used for grading shall be placed in layers not to exceed 12 inches in thickness and shall be compacted to a density equal or greater to that of the surrounding natural ground.

3.05 BACKFILLING AROUND STRUCTURES

- A. Common fill and structural fill are specified for use as backfill against the exterior walls of the structures. Fill shall be placed in layers having a maximum thickness of eight (8) inches in loose state and shall be compacted sufficiently to prevent settlement. If compaction is by rolling or ramming, material shall be wetted down as required. Where material can be suitably compacted by jetting or puddling, the Contractor may use one of these methods. No boulders shall be allowed to roll down the slopes and hit the walls.
- B. Backfilling shall be carried up evenly on all walls of an individual structure simultaneously. A variation of two (2) feet in elevation will be the maximum allowable. No backfill shall be allowed against walls until the walls and their supporting slabs, if applicable, have attained sufficient strength. Backfilling shall be subjected to approval by the County.
- C. In locations where pipes pass through building walls, the Contractor shall take the following precautions to consolidate the refill up to an elevation of at least one foot above the bottom of the pipes:
 - 1. Place structural fill in such areas for a distance of not less than three feet either side of the center line of the pipe in level layers not exceeding 6-inches in depth.
 - 2. Wet each layer to the extent directed and thoroughly compact each layer with a power tamper to the satisfaction of the County.
 - 3. Structural fill shall be of the quality specified under Part 2 of this Section.
- D. The surface of filled areas shall be graded to smooth true lines, strictly conforming to grades indicated on the grading plan. No soft spots or uncompacted areas shall be allowed in the work.
- E. Temporary bracing shall be provided as required during construction of all structures to protect partially completed structures against all construction loads, hydraulic pressure and earth pressure. The bracing shall be capable of resisting all loads applied to the walls as a result of backfilling.

3.06 FIELD QUALITY CONTROL

- A. The density of soil in place shall be a minimum of 95 percent in accordance with ASTM test 1557-70T, Method A or C.

END OF SECTION

SECTION 02221 TRENCHING, BEDDING AND BACKFILL FOR PIPE

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals necessary to perform all dewatering, excavation, backfill, fill, grading, trench protection or other related work required to complete the piping work shown on the Drawings and specified herein. The work shall include, but not be limited to: vaults; duct conduit; pipe; roadways and paving; backfilling; required fill or borrow operations; grading; disposal of surplus and unsuitable materials; and all related work such as sheeting, bracing and dewatering.
- B. Prior to commencing work, the Contractor shall examine the site and review test borings if available, or undertake his own subsurface investigations and take into consideration all conditions that may affect his work.
- C. The Contractor is responsible for the protection of every tree which is scheduled to remain in the project area. This includes trees which may or may not be shown on the plans. Every tree shall be adequately protected in place at no additional cost to the County. This includes, but is not limited to protecting the root systems and adjusting grades as necessary for tree/root protection.

1.02 PROTECTION

- A. Sheeting and Bracing in Excavations:
 - 1. In connection with construction of underground structures, the Contractor shall properly construct and maintain cofferdams. These shall consist of: sheeting and bracing as required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction and to protect adjacent structures, existing yard pipe and/or foundation material from disturbance, undermining, or other damage. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed.
 - 2. Trench sheeting for pipes: no sheeting is to be withdrawn if driven below, mid-diameter of any pipe and no wood sheeting shall be cut off at a level lower than one foot above the top of any pipe unless otherwise directed by the County. During the progress of the work, the County may direct the Contractor in writing to leave additional wood sheeting in place. If steel sheeting is used for trench sheeting, removal shall be as specified above, unless written approval is given for an alternate method of removal.
 - 3. All sheeting and bracing not left in place shall be carefully removed in such a manner as not to endanger the construction or other structures, utilities, existing piping, or property. Unless otherwise approved or indicated on the Drawings or in the Specification, all sheeting and bracing shall be removed after completion of the piping or structure, care being taken not to disturb or otherwise injure the pipeline or finished masonry. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by

- ramming with tools specifically made for that purpose, by watering, or as may otherwise be directed.
4. The Contractor shall construct, to the extent he deems it desirable for his method of operation, the cofferdams and sheeting outside the neat lines of the pipeline trench or foundation unless otherwise indicated on the Drawings or directed by the County. Sheeting shall be plumb and securely braced and tied in position. Sheeting, bracing and cofferdams shall be adequate to withstand all pressures to which the pipeline or structure will be subjected. Pumping, bracing and other work within the cofferdam shall be done in a manner to avoid disturbing any construction of the pipeline or the enclosed masonry. Any movement or bulging which may occur shall be corrected by the Contractor at his own expense so as to provide the necessary clearances and dimensions.
 5. Drawings of the cofferdams and design computations shall be submitted to the County and approved prior to any construction. However, approval of these drawings shall not relieve the Contractor of the responsibility for the cofferdams. The drawings and computations shall be prepared and stamped by a Registered Professional Engineer in the State of Florida and shall be in sufficient detail to disclose the method of operation for each of the various stages of construction, if required, for the completion of the pipeline and substructures.

B. Dewatering, Drainage and Flotation

1. The Contractor shall construct and place all pipelines, concrete work, structural fill, bedding rock and limerock base course, in-the-dry. In addition, the Contractor shall make the final 24" of excavation for this work in-the-dry and not until the water level is a minimum of 18 below proposed bottom of excavation.
2. The Contractor shall, at all times during construction, provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavation and keep such excavations dry so as to obtain a satisfactory undisturbed subgrade foundation condition until the fill, structure, or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural elevations. At all times during the construction operations, the groundwater levels shall be maintained at an elevation 18 inches below the lowest level where structures are being installed.
3. Dewatering shall at all times be conducted in such a manner as to preserve the natural undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation.
4. Wellpoints may be required for dewatering the soil prior to final excavation for deeper in-ground structures or piping and for maintaining the lowered groundwater level until construction has been completed to avoid the structure, pipeline, or fill from becoming floated or otherwise damaged. Wellpoints shall be surrounded by suitable filter sand and no fines shall be removed by pumping. Pumping from wellpoints shall be continuous and standby pumps shall be provided.
5. The Contractor shall furnish all materials and equipment to perform all work required to install and maintain the proposed drainage systems for handling groundwater and surface water encountered during construction of structures, pipelines and compacted fills.

6. Where required, the Contractor shall provide a minimum of two operating groundwater observation wells at each structure to determine the water level during construction of the pipeline or structure. Locations of the observation wells shall be at structures and along pipelines as approved by the County prior to their installation. The observation wells shall be extended to 6 inches above finished grade, capped with screw-on caps protected by 24" x 24" wide concrete base and left in place at the completion of this Project.
7. Prior to excavation, the Contractor shall submit his proposed method of dewatering and maintaining dry conditions to the County for approval. Such approval shall not relieve the Contractor of the responsibility for the satisfactory performance of the system. The Contractor shall be responsible for correcting any disturbance of natural bearing soils for damage to pipeline or structures caused by an inadequate dewatering system or by interruption of the continuous operation of the system as specified.
8. As part of his request for approval of a dewatering system, the Contractor shall demonstrate the adequacy of the proposed system and wellpoint filter sand by means of a test installation. Discharge water shall be clear, with no visible soil particles in a one quart sample. Discharge water shall not flow directly into wetlands or Waters of the State as defined by FDEP and SWFWMD.
9. During backfilling and construction, water levels shall be measured in observation wells located as directed by the County.
10. Continuous pumping will be required as long as water levels are required to be below natural levels.

PART 2 PRODUCTS

2.01 MATERIALS

A. General

1. Materials for use as fill and backfill shall be described below and shall be from an FDOT certified pit. For each material, the Contractor shall notify the County of the source of the material and shall furnish the County, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.
2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

B. Bedding - shall conform to FDOT Standard Specifications for Road and Bridge Construction, Section 901 Coarse Aggregate, and shall be either coarse aggregate of Size No. 57 or coarse sand of Size No. 9. Washed shell size No.57 may be used as an alternate bedding material.

C. Structural Fill

1. Structural fill in trenches shall be used below spread footing foundations, slab-on-grade floors and other structures as backfill within three feet of the below grade portions of structures.

2. Shall be either soil classification A-1, A-2 or A-3, per AASHTO M-145, and shall be free of organic matter, lumps of clay or marl, muck, compressible materials, and rock exceeding 2.5 inches in diameter. Broken concrete, masonry, rubble or other similar materials shall not be used as backfill. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180.
- D. Selected Common Fill - shall have the same material classification and requirements as Structural Fill, as described above.
- E. Common Fill
1. Shall be either soil classification A-1, A-2, A-3, A-4, A-5 or A-6, per AASHTO M-145, and shall be free of organic matter, lumps of clay or marl, muck, compressible materials and rock exceeding 2.5 inches in diameter. Broken concrete, masonry, rubble or other similar materials shall not be used as backfill.
 2. Material falling within the above specification, encountered during the excavation, may be stored in segregated stockpiles for reuse. All material which, in the opinion of the County, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials by the Contractor.
- E. Unsuitable Material - soil classification A-7 and A-8, per AASHTO M-145, shall not be used as backfill material.

PART 3 EXECUTION

3.01 EXCAVATION

- A. Excavate trenches and pits for structures to the elevations indicated on the construction drawings. Take special care to avoid over-excavating or disturbing the bottom of the trench or pit, so that the soil at the bottom of the hole remains in a naturally compacted condition. Excavate to widths sufficient to provide adequate working room to install the required structures. Do not excavate the final layer of soil to the designed grade until just before placing the bedding, foundation, pipe, structure, or masonry work required. Remove boulders, rocks, logs or any unforeseen obstacles encountered.
- B. In case the foundation soil found at the bottom of the trench or pit is soft, plastic or mucky, or does not conform to the soils classification specified as suitable foundation material, over-excavation to a greater depth will be required. Soils not meeting the classification required for foundation material shall be removed to a depth at least four inches below the bottom of the pipe, bedding or structure bottom elevation. Rock, boulders or other hard or lumpy material shall be removed to a depth 12 inches below the bottom of the pipe, bedding or structure bottom elevation. Remove muck, clay or other soft material to a depth as needed to establish a firm foundation.
- C. Where possible, the sides of trenches should be vertical up to at least the spring line of the installed pipe.

- D. Trench excavation shall be performed in accordance with Florida Statute Title XXXIII, Chapter 553, Part III, Trench Safety Act.

3.02 BACKFILLING

- A. Backfill materials shall be placed on solid, firm, naturally compacted or compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, dry or dewatered in place soil foundations.
- B. Where over-excavation is required due to nonconforming soil classification or rocky, unstable, or otherwise undesirable soil conditions, place Structural Fill or Selected Common Fill in the over-excavated zone up to the base of the bedding material layer. Compact the over-excavated zone to 98 percent of the maximum dry density of the material as determined by AASHTO T-180.
- C. When backfilling in an over-excavated zone where moist or watery conditions exist, backfill shall be coarse No. 9 sand or a mixture of No. 57 coarse aggregate with either No. 9 coarse sand, A-1, or A-3 material.
- D. After compaction, backfill material in the over-excavation zone shall form a solid and firm foundation on which to build up successive layers of backfill and structures.
- E. Bedding materials shall be placed on solid, firm soil foundations and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180.
- F. Concrete and masonry structures shall be backfilled using Structural Fill. Backfilling and compaction shall be underneath the structure and carried up evenly on all walls of an individual structure simultaneously. The maximum allowable difference in backfill elevations shall be two feet. No backfilling shall be allowed against concrete or masonry walls until the walls and their supporting slabs have been in place at least seven days or until the specified 28-day strength has been attained. Compaction of Structural Fill underneath the base and along the walls shall be 98 percent of the maximum dry density of the material as determined by AASHTO T-180. The Structural Fill shall be either dried or shall have water added so that the moisture content of the material is within a range that will allow the required density to be achieved.
- G. Trenching backfill for pipe installation shall be Selected Common Fill for the pipe bedding zone. The pipe bedding envelope shall begin at the level four inches, six inches, or nine inches, depending on pipe diameter, below the bottom of the pipe, and shall extend vertically up to a level 12 inches above the top of the pipe. Where the in-place soil material within the four inch, six inch, or nine inch pipe bedding zone beneath the bottom of the pipe meets the soil classification for Selected Common Fill, undercutting of the trench below the bottom of the pipe will not be required. In this case, loosen the soil in the bottom of the trench immediately below the middle third of the pipe diameter, and place the pipe upon it. Where the in-place soil material within the pipe bedding zone does not meet the soil classification for Selected Common Fill, undercutting shall be required, and the bedding zone shall be backfilled with Selected Common Fill. In this case, place the pipe bedding material and leave it in a moderately firm uncompacted condition under the middle

third of the pipe diameter, and compact the outer portions of the trench bottom to 98 percent of the maximum dry density. Soils that were over-excavated due to rocky, soft or otherwise unsuitable soil foundation conditions shall also be replaced with Selected Common Fill. Compaction of Selected Common Fill shall be 98 percent of the maximum dry density as determined by AASHTO T-180. Such backfill material shall have an optimized moisture content that will allow the required density to be achieved.

- H. Pipe sections for gravity flow systems shall be laid with spigots downstream and bells upstream. Excavate for pipe bells before laying pipe. Lay pipe true to the lines and grades indicated on the construction plans. Place backfill material on both sides of the pipe and compact to 98 percent of the maximum dry density of the material as determined by AASHTO T-180. Take special care to effectively fill and compact the material in the haunch areas under the sides of the pipe.
- I. For pipes that are not installed under roadways or driveways, trenching backfill for pipe installation shall be Common Fill above the pipe envelope zone, and shall be compacted to 95 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density. For pipes that are installed under roadways or driveways, trenching backfill for pipe installation shall be Selected Common Fill above the pipe envelope zone, and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density. Selected Common Backfill shall be placed in layers not to exceed 6 inches. Common Backfill shall be placed in layers not to exceed 12 inches.
- J. Backfill compaction tests shall be performed every 500 feet in pipe line trenches and for every utility structure. Test reports shall be presented to the County Inspector.

3.03 GRADING AND CLEAN UP

- A. Surplus and unsuitable soil materials not used on-site shall be removed and disposed of off-site in a manner that is consistent with state and local regulations. In no case shall surplus or unsuitable material be deposited on-site or on adjacent lands.
- B. The surface of backfilled areas shall be graded smooth and true to the lines and grades indicated on the construction plans. No soft spots or uncompacted areas shall be allowed in the work.
- C. Upon completion of the work, leave the work areas and all adjacent areas in a neat and presentable condition, clear of all temporary structures, rubbish and surplus materials. Pile any salvageable materials that have been removed in neat piles for pickup by County crews, unless otherwise directed.

END OF SECTION

SECTION 02223 EXCAVATION BELOW GRADE AND CRUSHED STONE OR SHELL REFILL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. If in the opinion of the County, the material at or below the normal grade of the bottom of the trench is unsuitable for pipe or structure foundation, it shall be removed to the depth directed by the County and replaced by crushed stone or washed shell.

PART 2 PRODUCTS (NOT USED)

PART 3 MATERIALS

3.01 EXCAVATION AND DRAINAGE

- A. Whatever the nature of unstable material encountered or the groundwater conditions, trench stabilization shall be complete and effective.
- B. Should the Contractor excavate below the grade shown on the Contract drawings because of negligence or for his own convenience; due to failure in properly dewatering the trench; disturbs the subgrade before dewatering is sufficiently complete; he shall be directed by the County to excavate below grade. The work of excavating below grade and furnishing and placing the approved refill material shall be performed at the Contractor's expense.

3.02 REFILL

- A. Soils not meeting the classification required for foundation material shall be removed to a depth at least four inches below the bottom of the pipe, bedding or structure bottom elevation. Rock, boulders or other hard or lumpy material shall be removed to a depth 12 inches below the bottom of the pipe, bedding or structure bottom elevation. Remove muck, clay or other soft material to a depth as needed to establish a firm foundation.

END OF SECTION

SECTION 02240 DEWATERING (DURING CONSTRUCTION)

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work to be performed under this Section shall include the design and installation of a temporary dewatering system to dewater subsurface waters. The system shall remain in place until the work for which the dewatering is required is complete.
- B. Related Work Described Elsewhere:
 - 1. Section 01340: Shop Drawings, Project Data and Samples
 - 2. Section 02050: Demolition
 - 3. Division 02: Site Work

1.02 QUALITY ASSURANCE

- A. The temporary dewatering system shall be designed by a firm who regularly engages in the design of dewatering systems and who is fully experienced, reputable and qualified in the design of such dewatering systems. The firm shall have a successful record of operation for a minimum of five (5) years prior to bid date.
- B. The dewatering of any excavation areas and the disposal of water during construction shall be in strict accordance with all local, state, and regulatory agency requirements.
- C. Contractor shall obtain and pay for all local, state, and regulatory agency permits required for installation and operation of the dewatering system and for disposal of water discharged from the dewatering system.

1.03 SUBMITTALS

- A. Materials and Shop Drawings: Shop drawings required to establish compliance with the specifications shall be submitted in accordance with the provisions of Section 01300: Submittals. Submittals shall include at minimum the following:
 - 1. Design notes and drawings.
 - 2. Descriptive literature of the temporary dewatering system.
 - 3. Layout of all piping and pumping systems involved.
 - 4. Copies of all permits required.
 - 5. For deep excavations the contractor shall submit a dewatering plan and calculations signed and sealed by a Florida Professional Engineer.

1.04 CRITERIA

- A. The dewatering system shall be developed to the point that is capable of dewatering such that the construction can be satisfactorily performed at the elevations shown on the Drawings.

- B. Groundwater shall be lowered to be a minimum of 12 inches below the bottom of the pipeline open cut trench. Groundwater shall be lowered to be 2 feet below the bottom of the excavation for manholes and other structures, unless noted otherwise in the geotechnical report.

PART 2 PRODUCTS

2.01 GENERAL

- A. The equipment specified herein shall be standard dewatering equipment of proven ability as designed and manufactured by firms having experience in the design and production of such equipment. The equipment furnished shall be designed, constructed and installed in accordance with the best practices and methods.
- B. The Contractor shall be required to monitor the performance of the dewatering system during the progress of the work and make such modifications as may be required to assure that the systems will perform satisfactorily. Dewatering system shall be designed in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils and to preserve the integrity of adjacent structures.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Dewatering: The Contractor shall install a temporary dewatering system for the removal of subsurface water encountered during construction of the proposed structures and/or piping.

3.02 PROTECTION AND SITE CLEAN-UP

- A. At all times during the progress of the Work the Contractor shall use all reasonable precautions to prevent either tampering with the dewatering system or the entrance of foreign material into the system.
- B. Immediately upon completion of the construction for which the dewatering system was installed, the Contractor shall remove all of his equipment, materials, and supplies from the site of the work, remove all surplus materials and debris, fill in all holes or excavations, and grade the site to elevations of the surface levels which existed before work started.

3.03 DISPOSAL

- A. Contractor is responsible for acquiring and complying with all permits required to discharge the water and shall protect waterways from turbidity during the operation.
- B. Water pumped from the trench or other excavation may be disposed of in storm sewers having adequate capacity, canals or suitable disposal pits, provided that the Contractor has complied with all permit requirements and has permission to do so from the City and County.
- C. In areas where adequate disposal sites are not available, partially backfilled trenches may be used for water disposal only when the Contractor's plan for trench

disposal is approved in writing by the City/Engineer. The Contractor's plan shall include temporary culverts, barricades and other protective measures to prevent damage to property or injury to any person or persons.

- D. No flooding of streets, roadways, driveways or private property will be permitted. Engines driving dewatering pumps shall be equipped with residential type mufflers. Where practical and feasible, electrical "drops" should be used in lieu of portable generators.

END OF SECTION

SECTION 02260 FINISH GRADING

PART 1 GENERAL

1.01 WORK INCLUDED

- A. The Contractor shall finish grade sub-soil.
- B. The Contractor shall cut out areas to receive stabilizing base course materials for paving and sidewalks.
- C. The Contractor shall place, finish grade and compact top soil.

1.02 PROTECTION

The Contractor shall prevent damage to existing fencing, trees, landscaping, natural features, bench marks, pavement and utility lines. Damage shall be corrected at no cost to the County.

PART 2 PRODUCTS

- A. Topsoil: Shall be friable loam free from subsoil, roots, grass, excessive amount of weeds or other organics, stones, and foreign matter; acidity range (pH) of 5.5 to 7.5; containing a minimum of 4 percent and a maximum of 25 percent organic matter. The Contractor may use topsoil stockpiles on site if they conform to these requirements.

PART 3 EXECUTION

3.01 SUB-SOIL PREPARATION

- A. The Contractor shall rough grade sub-soil systematically to allow for a maximum amount of natural settlement and compaction. Uneven areas and low spots shall be eliminated. Debris, roots, branches or other organics, stones, and sub-soil shall be removed by the Contractor and disposed of in a manner consistent with the latest Manatee County Standards as well as any affected regulatory agency. Should contaminated soil be found, the Contractor shall notify the County.
- B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks and shall be compacted to 98 percent of the maximum dry density of the material as determined by AASHTO T-180, and shall have moisture content optimized to allow the required density.
- C. The Contractor shall bring sub-soil to required profiles and contour grades gradually; and blend slopes into level areas.
- D. The Contractor shall slope the structure grade a minimum of two (2) inches in ten (10) feet unless indicated otherwise on the Drawings.
- E. The Contractor shall cultivate sub-grade to a depth of 3 inches where the topsoil is to be placed. He shall repeat cultivation in areas where equipment use has

compacted sub-soil.

- F. The Contractor shall not make grade changes which causes water to flow onto adjacent lands.

3.02 PLACING TOPSOIL

- A. The Contractor shall place topsoil in areas where seeding, sodding and planting is to be performed. He shall place from the following minimum depths, up to finished grade elevations:
 - 1. 6 inches for seeded areas
 - 2. 4-1/2 inches for sodded areas
 - 3. 24 inches for shrub beds
 - 4. 18 inches for flower beds
- B. The Contractor shall use topsoil in a dry state as determined by the County. He shall place the material during dry weather.
- C. The Contractor shall use fine grade topsoil eliminating rough and low areas to ensure positive drainage. He shall maintain levels, profiles and contours of the sub-grades.
- D. The Contractor shall remove stone, roots, grass, weeds, debris, and other organics or foreign material while spreading the material.
- E. The Contractor shall manually spread topsoil around trees, plants and structures to prevent damage which may be caused by grading equipment.
- F. The Contractor shall lightly compact and place the topsoil.

3.03 SURPLUS MATERIAL

- A. The Contractor shall remove surplus sub-soil and topsoil from site at his expense.
- B. The Contractor shall leave stockpile areas and entire job site clean and raked, ready for landscaping operations.

END OF SECTION

SECTION 02276 TEMPORARY EROSION AND SEDIMENTATION CONTROL

PART 1 GENERAL

1.01 DESCRIPTION

- A. The work specified in this Section consists of the design, provision, maintenance and removal of temporary erosion and sedimentation controls as necessary.
- B. Temporary erosion controls include, but are not limited to: grassing, mulching, netting, watering, and the reseeding of on-site surfaces and spoil and borrow area surfaces, interceptor ditches at ends of berms and other such work at those locations which will ensure that erosion during construction will be either eliminated or maintained within acceptable limits as established by the County.
- C. Temporary sedimentation controls include, but are not limited to: silt dams, traps, barriers, and appurtenances at the foot of sloped surfaces which shall ensure that sedimentation pollution will be either eliminated or maintained within acceptable limits as established by the County.
- D. The Contractor is responsible for providing effective temporary erosion and sediment control measures during construction or until final controls become effective.

1.02 REFERENCE DOCUMENTS

- A. Florida Building Code.
- B. FDEP/COE Dredge and Fill Regulations and/or Permit as applicable.
- C. SWFWMD Permit Regulations and/or Permit as applicable.
- D. Florida Stormwater, Erosion and Sedimentation Control Inspector's Manual.

PART 2 PRODUCTS

2.01 EROSION CONTROL

- A. Netting - fabricated of material acceptable to the County.
- B. Seed and sod.

2.02 SEDIMENTATION CONTROL

- A. Bales - clean, seed free cereal hay type.
- B. Netting - fabricated of material acceptable to the County.
- C. Filter stone - crushed stone conforming to Florida Dept of Transportation specifications.

- D. Concrete block - hollow, non-load-bearing type.
- E. Concrete - exterior grade not less than one inch thick.

PART 3 EXECUTION

3.01 EROSION CONTROL

- A. Minimum procedures for grassing shall be:
 - 1. Scarify slopes to a depth of not less than six inches and remove large clods, rock, stumps, roots larger than 1/2 inch in diameter and debris.
 - 2. Sow seed within twenty-four (24) hours after the ground is scarified with either mechanical seed drills or rotary hand seeders.
 - 3. Apply mulch loosely and to a thickness of between 3/4-inch and 1-1/2 inches.
 - 4. Apply netting over mulched areas on sloped surfaces.
 - 5. Roll and water seeded areas in a manner which will encourage sprouting of seeds and growing of grass. Reseed areas which exhibit unsatisfactory growth. Backfill and seed eroded areas.

3.02 SEDIMENTATION CONTROL

- A. The Contractor shall install and maintain silt dams, traps, barriers, and appurtenances as shown on the approved descriptions and working drawings. Deteriorated hay bales and dislodged filter stone shall be replaced by the Contractor at his expense.

3.03 PERFORMANCE

- A. The Contractor, at his own expense, shall immediately take whatever steps are necessary to correct any deficiencies of the temporary erosion and sediment control measures employed if they fail to produce results or do not comply with the requirements of the State of Florida or any other federal, governmental or regulatory agency.

END OF SECTION

SECTION 02315 EXCAVATING, BACKFILLING AND COMPACTING

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope of Work: The work included under this Section consists of clearing, excavating, grading, backfilling and compacting as required for the construction of the structures, piping and appurtenances as shown on the Drawings and specified herein.
- B. Related Work Described Elsewhere:
1. Excavation, Backfill, Fill and Grading for Structures: Section 02220
- C. Definitions:
1. Maximum Density: Maximum weight in pounds per cubic foot of a specific material.
 2. Optimum Moisture: Percentage of water in a specific material at maximum density.
 3. Rock Excavation: Excavation of any hard natural substance which requires the use of explosives and/or special impact tools such as jack hammers, sledges, chisels or similar devices specifically designed for use in cutting or breaking rock, but exclusive of trench excavating machinery.
 4. Suitable: Suitable materials for fills shall be non-cohesive, non-plastic granular local sand and shall be free from vegetation, organic material, marl, silt or muck. The Contractor shall furnish all additional fill material required.
 5. Unsuitable: Unsuitable materials are highly organic soil (peat or muck) classified as A-2-5, A-2-6, A-2-7, A-4, A-5, A-6, A-7 and A-8 in accordance with AASHTO Designation M-145.
- D. Plan For Earthwork: The Contractor shall be responsible for having determined to his satisfaction, prior to the submission of the Contractor's bid, the conformation of the ground, the character and quality of the substrata, the types and quantities of materials to be encountered, the nature of the groundwater conditions, the prosecution of the work, the general and local conditions and all other matters which can in any way affect the work under this Contract. Prior to commencing the excavation, the Contractor shall submit a plan of his proposed operations to the County/Engineer for review. The Contractor shall consider, and the Contractor's plan for excavation shall reflect, the equipment and methods to be employed in the excavation. No claims for extras based on substrata or groundwater table conditions will be allowed.

1.02 SUBMITTALS

- A. Submit six (6) copies of a report from a testing laboratory verifying that any off-site borrow material conforms to the gradation specified.

1.03 QUALITY ASSURANCE

- A. A Testing Laboratory employed by the Contractor will make such tests as are specified. The Contractor shall schedule his work so as to permit a reasonable time for testing before placing succeeding lifts and shall keep the laboratory informed of his progress. The Contractor shall keep a complete record and provide a map of all test locations.
- B. Determination of laboratory moisture-density relationship and maximum density shall be by modified Proctor method of ASTM D-1557. At least one (1) test per soil type shall be made.
- C. Compaction shall be deemed to comply with the Specifications when no tests are below the specified relative compaction.
- D. Tests will be made in locations reviewed and approved by the County/Engineer. If any tests are unsatisfactory, re-excavate and recompact the fill or backfill until the specific compaction is obtained. The Contractor shall make additional compaction tests on each side of unsatisfactory test, at locations approved by the County/Engineer, to determine the extent of re-excavation and recompaction necessary.

1.04 JOB CONDITIONS

- A. Site Information: Subsurface exploration and geotechnical engineering evaluation where provided is for the Contractor's information only. Data on indicated subsurface conditions are not intended as representations or warranties of accuracy or continuity between soil bearings. It is expressly understood that the County will not be responsible for interpretations or conclusions drawn therefrom by the Contractor. Data, where provided, are made available for convenience of the Contractor.
 - 1. Test borings and other exploratory operations may be made by the Contractor at no cost to the Owner.
- B. If, in the opinion of the County/Engineer, conditions encountered during construction warrant a change in the footing elevation, or in the depth of removal of unsuitable material from that indicated on the Drawings, an adjustment will be made in the Contract price, as provided in the Schedule of Cost for Changes in Quantities.

1.05 PROTECTION

- A. Sheeting and Bracing (if required):
 - 1. Furnish, install in place, and maintain such sheeting and bracing as may be required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below that necessary for proper construction, and to protect adjacent structures, power poles, etc. from undermining, and to protect workers from hazardous conditions of other damage. Such support shall consist of braced steel sheet piling, braced wood lagging and soldier beams or other methods. Care shall be taken to prevent voids outside of the sheeting, but if voids are formed, they shall be immediately filled and rammed. Where soil cannot be

- properly compacted to fill a void, lean concrete shall be used as backfill at no additional expense to the County.
2. The Contractor shall construct the sheeting outside the neat lines of the foundation unless indicated otherwise to the extent he deems is desirable for his method of operation. Sheeting shall be plumb and securely braced and tied in position. Sheeting and bracing shall be adequate to withstand all pressure to which the structure or trench will be subjected. Any movement or bulging which may occur shall be corrected by the Contractor at the Contractor's own expense so as to provide the necessary clearances and dimensions.
 3. Where sheeting and bracing is required to support the sides of excavations of structures, the Contractor shall engage a Geotechnical Professional Engineer, registered in the State of Florida, to design the sheeting and bracing.
 4. The installation of sheeting, particularly by driving or vibrating, may cause distress to existing structures. The Contractor shall evaluate the potential for such distress and, if necessary, take all precautions to prevent distress of existing structures due to sheeting installation.
 5. The Contractor shall leave in place to be embedded in the backfill all sheeting and bracing not shown on the Drawings for the purpose of preventing injury to structures, utilities, or property, whether public or private. The County/Engineer may direct that timber used for sheeting and bracing be cut off at any specified elevation.
 6. All sheeting and bracing not left in place shall be carefully removed in such manner as not to endanger the construction or other structures, utilities, or property. All voids left or caused by withdrawal of sheeting shall be immediately refilled with sand by ramming with tools especially adapted to that purpose, or otherwise as may be directed by the County/Engineer.
 7. No wood sheeting is to be withdrawn if driven below mid-diameter of any pipe, and under no circumstances shall any wood sheeting be cut off at a level lower than 1 foot above the top of any pipe.

B. Pumping and Drainage:

1. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed suborder foundation. This condition shall continue until the fills, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels. The Contractor shall engage a Geotechnical Professional Engineer registered in the State of Florida, to design the temporary dewatering systems for all structures. The dewatering system installed shall be in conformity with the overall construction plan, and certification of this shall be provided by the Geotechnical Professional Engineer. The Contractor shall be required to monitor the performance of the dewatering systems during the progress of the work and require such modifications as may be required to assure that the systems are performing satisfactorily.
2. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the suborder soils at proposed bottom of excavation and to preserve the integrity of adjacent structures. Well or

- sump installation shall be constructed with proper sand filters to prevent drawing of finer grained soil from the surrounding ground.
3. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a pit bottom free from standing water.
 4. The Contractor shall take all additional precautions to prevent uplift of any structure during construction.
 5. The conveying of water in open ditches or trenches will not be allowed. Permission to use any storm sewers, or drains, for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. However, the Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the County/Engineer or the authority having jurisdiction, at no cost to the County.
 6. Flotation shall be prevented by the Contractor by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
 7. Removal of dewatering equipment shall be accomplished after the system is no longer required; the material and equipment constituting the system shall be removed by the Contractor.
 8. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on groundwater quality.

PART 2 PRODUCTS

2.01 MATERIALS

A. General:

1. All fill and backfill material shall be subject to the approval of the County/Engineer.
2. All fill and backfill material shall be free of organic material, trash, or other objectionable material. Excess or unsuitable material shall be removed from the job site by the Contractor.

B. Common Fill Material: Common fill shall be sand and shall not contain stones, rock, concrete or other rubble larger than 2 inches in diameter. It shall have physical properties which allow it to be easily spread and compacted.

C. Structural Fill: Structural fill shall be reasonably well graded sand to gravelly sand having the following gradation:

<u>U.S. Sieve Size</u>	<u>Percent Passing by Weight</u>
1 inch	100
No. 4	75-100
No. 40	15-80
No. 100	0-30
No. 200	0-12

D. Class I Soils: Manufactured angular, granular material, 3/8 to 3/64 inches (9.5 mm to 1 mm) size, including materials having significance such as crushed stone or rock, broken coral, crushed slag, cinders, or crushed shells. Sieve analysis for crushed stone is given below separately:

1. Crushed Stone: Crushed stone shall consist of clean mineral aggregate free from clay, loam or organic matter, conforming with ASTM C-33 stone size No. 89 and with particle size limits as follows:

<u>U.S. Sieve Size</u>	<u>Percent Passing by Weight</u>
1/2	100
3/8	90-100
No. 4	20-55
No. 8	5-30
No. 16	0-10
No. 50	0-5

2. Soils defined as Class I materials are not defined in ASTM D-2487.

E. Class II Soils:

1. GW: Well-graded gravels and gravel-sand mixtures, little or no fines. 50 percent or more retained on No. 4 sieve. More than 95 percent (95%) retained on No. 200 sieve. Clean.
2. GP: Poorly graded gravels and gravel-sand mixtures, little or no fines. 50 percent or more retained on No. 4 sieve. More than 95 percent (95%) retained on No. 200 sieve. Clean.
3. SW: Well-graded sands and gravelly sands, little or no fines. More than 50 percent passes No. 4 sieve. More than 95 percent (95%) retained on No. 200 sieve. Clean.
4. SP: Poorly graded sands and gravelly sands, little or no fines. More than 50 percent passes No. 4 sieve. More than 95 percent (95%) retained on No. 200 sieve. Clean.
5. In accordance with ASTM D-2487, less than 5 percent (5%) pass No. 200 sieve.

F. Coarse Sand: Sand shall consist of clean mineral aggregate with particle size limits as follows:

U.S.
Sieve Size

Percent Passing
by Weight

3/8 inch

100

No. 10

85-100

No. 40

20-40

No. 200

0-12

- G. Other Material: All other material, not specifically described, but required for proper completion of the work shall be selected by the Contractor and approved by the County/Engineer.

PART 3 EXECUTION

3.01 PREPARATION

- A. Clearing:
1. The construction areas shall be cleared of all obstructions and vegetation including large roots and undergrowth, within 10 feet of the lines of the excavation.
 2. Strip and stockpile topsoil on the site at the location to be determined by the County/Engineer.

3.02 EXCAVATION

- A. General: Excavations for roadways, structures and utilities must be carefully executed in order to avoid interruption of existing utilities.
- B. Excavating for Roadways/Structures/Utilities:
1. Excavation shall be made to such dimensions as will give suitable room for building the foundations and the structures, for bracing and supporting, for pumping and draining, and for all other work required.
 - a. Excavation for precast or prefabricated structures shall be carried to an elevation 2 feet lower than the proposed outside bottom of the structure to provide space for the select backfill material. Prior to placing the select backfill, the excavation shall be sounded, if not dewatered, using a rigid pole to indicate the satisfaction of the County that excavation has been carried to the proper depth and is reasonably uniform over the area to be occupied by the structure.
 - b. Excavation for structures constructed or cast in place in dewatered excavations shall be carried down to the bottom of the structure where dewatering methods are such that a dry excavation bottom is exposed and the naturally occurring material at this elevation leveled and left ready to receive construction. Material disturbed below the founding elevation in dewatered excavation shall be replaced with 3,000 psi concrete.
 - c. Footings: Cast-in-place concrete footing sides shall be formed immediately after excavation. Forming for footing sides is specified elsewhere.

2. Immediately document the location, elevation, size, material type and function of all new subsurface installation, and utilities encountered during the course of construction.
3. Excavation equipment operators and other concerned parties shall be familiar with subsurface obstructions as shown on the Drawings and should anticipate the encounter of unknown obstructions during the course of work.
4. Encounters with subsurface obstructions shall be hand excavated.
5. Excavation and dewatering shall be accomplished by methods which preserve the undisturbed state of suborder soils. Suborder soils which become soft, loose, "quick" or otherwise unsatisfactory for support of structures as a result of inadequate dewatering or other construction methods shall be removed and replaced by crushed stone as required by the County/Engineer at the Contractor's expense.
6. The bottom of excavations shall be rendered firm and dry before placing any structure. Excavated material not suitable for backfill shall be removed from the site and disposed of by the Contractor.
7. All pavements shall be cut for removal, with saws and approved power tools.
8. Excavated material shall be stockpiled in such a manner as to prevent nuisance conditions. Surface drainage shall not be hindered.
9. All locations and elevations as required herein must be permanently documented by the Contractor, on the Record Drawings prior to the County/Engineer approval of the Application for Payment for that work.
10. When force main pipe or pipe conveying other than non-potable liquid is less than 10 feet from a potable water main, the depth of cover shall be increased to 5 feet or 18 inches below the water main, whichever is greater.

3.03 DRAINAGE

- A. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove promptly and dispose of properly all water entering excavations, and keep such excavations dry so as to obtain a satisfactory undisturbed suborder foundation condition. The dewatering method used shall prevent disturbance of earth below grade.
- B. All water pumped or drained from the work shall be disposed of in a suitable manner without undue interference with other work, without damage to surrounding property, and in accordance with pertinent rules and regulations.
- C. No construction, including pipe laying, shall be allowed in water. No water shall be allowed to contact masonry or concrete within 24 hours after being placed. The Contractor shall constantly guard against damage due to water and take full responsibility for all damage resulting from his failure to do so.
- D. The Contractor will be required at his expense to excavate below grade and refill with approved fill material if the County determines that adequate drainage has not been provided.

3.04 UNDERCUT

- A. If the bottom of any excavation is below that shown on the Drawings or specified because of the Contractor's error, convenience, or unsuitable suborder due to the

Contractor's excavating method, he shall refill to normal grade with fill at his own cost. Fill material and compaction method shall be as directed by the County.

3.05 FILL AND COMPACTION

- A. Compact and backfill excavations and construct embankment according to the following schedule:

STRUCTURES AND ROADWORK

<u>Area</u>	<u>Material</u>	<u>Compaction</u>
Utility trenches, backfill beneath structures	Structural Fill	8 inch lifts, compacted backfill beneath to 95 percent (95%) by Modified Proctor Method
Roadways	Common Fill	6 inch lifts, compacted backfill beneath to 98 percent (98%) by Modified Proctor Method.
Around structures	Structural Fill	8 inch lifts, 95 percent (95%) of Modified Proctor Method. Use light rubber-tired or vibratory plate compactors.
From cleared existing surface to subgrade for paved and gravel surfaces	Common Fill	12 inch lifts, 98 percent (98%) of Modified Proctor Method.

- B. Pipe shall be laid in open trenches unless otherwise indicated on the Drawings or elsewhere in the Contract Documents.
- C. Excavations shall be backfilled to the original grade or as indicated on the Drawings. Deviation from this grade because of settling shall be corrected. Backfill operation shall be performed to comply with all rules and regulations and in such a manner that it does not create a nuisance or safety hazard.
- D. Embankments shall be constructed true to lines, grades and cross sections shown on the plans or ordered by the County/Engineer. Embankments shall be placed in successive layers of not more than 8 inches in thickness, loose measure, for the full width of the embankment. As far as practical, traffic over the work during the construction phase shall be distributed so as to cover the maximum surface area of each layer.
- E. If the Contractor requests approval to backfill material utilizing lifts and/or methods other than those specified here, such request shall be in writing to the County/Engineer. Approval will be considered only after the Contractor has performed tests, at the Contractor's expense, to identify the material used and density achieved throughout the backfill area utilizing the method of backfill requested. The County's approval will be in writing.

END OF SECTION

SECTION 02355 LUMBER LEFT IN PLACE

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish and install shoring and sheeting as necessary to provide adequate safety.

PART 2 PRODUCTS

2.01 MATERIALS

Wood for shoring and sheeting shall be green, rough cut hardwood planking.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall furnish, install and maintain sheeting and bracing required to support the sides of excavations, to prevent any movement which could in any way diminish the width of the excavation below which is necessary for proper construction and to protect adjacent structures from undermining or other damage. If the County determines that insufficient or improper supports have been provided, he may order additional supports to be installed at the expense of the Contractor. Compliance with such orders shall not relieve or release the Contractor from his responsibility for the sufficiency of such supports. Care shall be taken to prevent voids outside of the sheeting. Should voids form, they shall be immediately filled and rammed.
- B. The Contractor shall embed and leave in place all sheeting, bracing and other related items as shown on the Contract Drawings. The County may direct that sheeting and bracing timber be cut off at a specified elevation. No additional payment or compensation shall be made for this work.
- C. Sheeting and bracing not left in place shall be removed carefully in such manner as not to endanger other structures, utilities, property, or proposed construction.
- D. The County may order sheeting and bracing to be left in place; however, this shall not relieve the Contractor from liability for damages to persons or property due to negligence or the failure on the part of the Contractor to leave in place sufficient sheeting and bracing to prevent any caving or moving of the ground.
- E. The Contractor shall receive no payment other than that included in the pipe bid item price for any timber used for sheeting bracing, or other related items.

END OF SECTION

SECTION 02444 FENCING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, material, equipment and incidentals necessary for complete installation of vinyl coated chain link fence system with privacy decorative slatting. The fencing shall be installed according to manufacturer's specifications unless otherwise directed or authorized by the County.
- B. The Contractor's security fencing is at his expense and option and is not covered in this Section.

1.02 QUALITY ASSURANCE

- A. Standards of Manufacture shall comply with the standards of the Chain Link Fence Manufacturer's Institute for "Galvanized Steel Chain Link Fence Fabric" and as herein specified.
- B. Provide each type of steel fence and gates as a complete unit produced by a single manufacturer, including, but not limited to accessories, fittings, fasteners and appurtenances complete and ready for use.
- C. Acceptable Manufacturers: Anchor, Cyclone, or approved equal
- D. Erector Qualifications: The Contractor or approved subcontractor, must have a minimum of two years experience in similar fence installation.

1.03 SUBMITTALS

- A. Product Data:

For Steel Fences and Gates, the Contractor shall submit for review and approval to the County, five (5) copies of the manufacturer's technical data, details of fabrication, installation instructions and procedures for steel fences and gates. The Contractor shall be responsible for a copy of each instruction to be given to the Installer.

- B. Samples:

The Contractor shall submit two samples approximate size 6-inches long, or 6-inches square of fabric material, framework members and typical accessories to the County for review and approval.

- C. Certificates:

The Contractor shall provide manufacturer's certification that materials meet or exceed the Contract Document requirements.

PART 2 PRODUCTS

2.01 GENERAL

- A. The pipe sizes indicated are commercial pipe sizes.
- B. The tube sizes indicated are nominal outside dimension.
- C. Framework and appurtenances shall be finished with not less than minimum weight of zinc per sq. ft. and shall comply with the following:
 - 1. Pipe: ASTM A53 (1.8 oz. zinc psf)
 - 2. Square tubing: ASTM A 123 (2.0 oz. zinc psf)
 - 3. Hardware and Accessories: ASTM A 153 (zinc weight per Table I).
- D. All fence components shall be galvanically compatible.
- E. Vinyl coatings for fabric, posts, rails, gates, and all other fittings and components shall be thermally fused polyvinyl chloride; heavy mil coating per ASTM F 668.

2.02 FABRIC

Fabric shall be 0.148 inch (9 gage) steel wire, 2-inch diamond mesh and both top and bottom salvages shall be twisted and barbed for fabric over 60-inches high. Finish shall be hot dipped galvanized, ASTM A 392, Class II.

2.03 POSTS, RAILS AND BRACES

- A. End, Corner and Pull Posts:

The Contractor shall furnish end, corner and pull posts of the minimum size of 3" (2-1/2-inch min. OD) pipe weighing 3.65 pounds min. per linear ft.
- B. Line Post:

The Contractor shall furnish line posts of the minimum size of 2.5" Post (2-3/8-inch min. OD) pipe weighing 2.72 pounds min. per linear foot. Post shall be spaced 8 foot o.c. maximum, unless otherwise indicated:
- C. Gate Posts:

The Contractor shall furnish 4" (3-1/2-inch min. OD) gate posts for supporting a 6 feet wide, single gate leaf, or one leaf of a double gate installation, for nominal gate width; weighing 5.79 pounds min. per linear foot.
- D. Top Rails:

The Contractor shall furnish 1-5/8-inch min. Sch 40 vinyl coated top rail pipe weighing 2.27 pounds min. per linear, unless otherwise indicated.

E. Post Brace Assembly:

The Contractor shall furnish bracing assemblies at the end, gate, at both sides of corner and pull posts, with the horizontal brace located at mid-height of the fabric. Use 1-5/8-inch min. OD pipe weighing 2.27 pounds min. per linear foot for horizontal brace and 3/8-inch diameter rod with turnbuckles for diagonal truss.

F. Tension Wire:

The Contractor shall furnish tension wire consisting of galvanized 0.177 inch (7 gage) coiled spring wire as per ASTM A824 at the bottom of the fabric only.

G. Barbed Wire Supporting Arms (only when specified):

The Contractor shall furnish pressed steel, wrought iron, or malleable iron barbed wire supporting arms, complete with provisions for anchorage to posts and attaching three rows of barbed wire to each arm. Supporting arms may be attached either to posts or integral with post top weather cap. The Contractor shall provide a single 45 degree arm for each post where indicated.

H. Barbed Wire (only when specified):

The Contractor shall furnish barbed wire. It shall be 2 strand, 12-1/2 gauge wire with 14 gauge, 4-point barbs spaced 5-inch o.c., galvanized, complying with ASTM A121, Class 3.

I. Post Tops:

The Contractor shall furnish post tops. Tops shall be pressed steel, wrought iron, or malleable iron of ASTM F626 designed as a weathertight closure cap (for tubular posts). The Contractor shall furnish one cap for each post unless equal protection is afforded by a combination of post top cap and barbed wire supporting arm. The Contractor shall furnish caps with openings to permit through passage of the top rail.

J. Stretcher Bars:

The Contractor shall furnish stretcher bars. Bars shall be one piece lengths equal to the full height of the fabric, with a minimum cross-section of 3/16-inch x 3/4-inch. The Contractor shall provide one stretcher bar for each gate and end post and two bars for each corner and pull post, except where fabric is integrally woven into the post.

K. Stretcher Bar Bands:

The Contractor shall furnish stretcher bar bands. Bands shall be steel, wrought iron, or malleable iron, a maximum space of 15-inch o.c. to secure stretcher bars to end, corner, pull and gate posts.

2.04 GATES

A. The Contractor shall provide a 6 feet high, 6 feet wide fabricated gate perimeter

frames of 1-5/8-inch min. OD pipe tubular members weighting 2.27 pounds min. per linear foot. Additional horizontal and vertical members shall ensure proper gate operation and attachment of fabric, hardware and accessories. The maximum space of the frame members shall not be more than 8-inches apart.

- B. The Contractor shall assemble gate frames by welding or with special malleable or pressed steel fittings and rivets for rigid connections. He shall use the same fabric width as for the fence, unless otherwise indicated in the Contract Documents or authorized by the County. He shall install the fabric with stretcher bars at vertical edges. The bars may also be used at the top and bottom edges. The contractor shall attach stretchers to the gate frame at a maximum spacing of 15-inch o.c. He shall attach the hardware with rivets or by other means which will prevent removal or breakage.
- C. The Contractor shall install diagonal cross-bracing consisting of 3/8-inch diameter adjustable length truss rods on gates as necessary to ensure frame rigidity without sag or twist.
- D. The Contractor shall install barbed wire above the gates, (only when specified). He shall extend the end members of gate frames 12-inches above the top member which will be prepared for three strands of wire. The Contractor shall provide necessary clips for securing wire to extensions.
- E. Gate Hardware:
 - 1. The Contractor shall furnish the following hardware and accessories for each gate.
 - a. Hinges: Pressed or forged steel or malleable iron to suit gate size, non-lift-off type, offset to permit 180 degrees gate opening. Provide 1-1/2 pair of hinges for each leaf over six feet nominal height.
 - b. Latch: Forked type of plunger-bar type to permit operation from either side of gate with padlock eye as integral part of latch.
 - c. Keeper: Provide keeper for all vehicle gates, which automatically engages the gate leaf and holds it in the open position until manually released.
 - d. Double Gates: Provide gate stops for double gates, consisting of mushroom type of flush plate with anchors. Set in concrete to engage the center drip drop rod or plunger bar. Include locking device and padlock eyes as an integral part of the latch, using one padlock for locking both gate leaves.
 - e. Where gates are between masonry piers, provide "J" with 4-inch square anchor plate to masonry contractor for building in.

2.05 MISCELLANEOUS MATERIALS AND ACCESSORIES

- A. Wire Ties: The Contractor shall tie fabric to line posts. He shall use 9 gauge wire ties spaced 12-inches o.c. For tying fabric to rails and braces, he shall use 9 gauge wire ties spaced 24-inches o.c. For tying fabric to tension wire, he shall use 11 gauge hog rings spaced 24-inches o.c. The finish of ties shall match the fabric finish.

- B. Concrete: The Contractor shall provide portland cement concrete in compliance with ASTM C-150 and the Contract Documents. Aggregates shall comply with ASTM C-33. The Contractor shall mix the materials to obtain a minimum 28-day compressive strength of 3,000 psi, using a minimum of 4 sacks of cement per cubic yard, a maximum size aggregate of 1-inch, a maximum 3-inch slump and air entrainment of 2 percent to 4 percent.
- C. Privacy Decorative Slating (PDS) shall be PVC, bottom locking, non-fin type, sized to match the fabric height and color in both the fence and gates.

PART 3 EXECUTION

3.01 INSTALLATION

- A. The Contractor shall not start the fence installation prior to the final grade completion, and the finish elevations established, unless otherwise authorized by the County.
- B. The Contractor shall repair damaged coatings in the shop or in the field by recoating utilizing manufacturers recommended repair compounds and as applied per manufacturer's recommendations.
- C. Excavation:
 - 1. For post footings, the Contractor shall drill holes in firm, undisturbed or compacted soil of the diameters and spacings shown or called out in the Contract Documents.
 - a. For holes not shown or called out on the Contract Documents, the Contractor shall excavate minimum diameters recommended by the fence manufacturer.
 - b. Post holes shall be in true alignment and of sufficient size to provide a permanent concrete foundation. Concrete shall be poured against undisturbed earth sides and bottom. All holes shall be 48-inches deep with posts and corner posts placed in the concrete to a depth of 36-inches. The gate posts shall be set in the concrete to a depth of 42-inches below the surface in firm, undisturbed soil. Holes shall be well centered on the posts. A minimum diameter of 12-inches shall be required for all corner and line post holes; 18-inches min. shall be required for all gate post holes.
 - c. Excavated soil shall be removed from the County's property.
 - d. If solid rock is encountered near the surface, the Contractor shall drill into rock at least 12-inches for line posts and at least 18-inches for end, pull, corner or gate posts. Hole shall be drilled to at least 1-inch greater diameter than the largest dimension of the post to be place.
 - e. If the Contractor encounters solid rock below solid overburden, he shall drill to the full depth required; however, rock penetration need not exceed the minimum depths specified.

D. Setting Posts:

1. The Contractor shall remove loose and foreign materials from the sides and bottoms of holes, and moisten soil prior to placing concrete.
 - a. Center and align posts in holes above bottom of excavation.
 - b. Place concrete around posts in a continuous pour and vibrate or tamp for consolidation. Check each post for vertical and top alignment and hold in position during placement and finishing operations. The top of concrete shall extend 2-inches above finish grade.
 - c. Trowel finish tops of footings and slope or dome to direct water away from posts. Extend footings for gate posts to the underside of bottom hinge. Set keeps, stops, sleeves and other accessories into concrete as required.
 - d. Keep exposed concrete surfaces moist for at least 7 days after placement, or cure with membrane curing materials, or other acceptable curing method.
 - e. Grout-in posts set into sleeved holes, concrete constructions, or rock excavations with non-shrink portland cement grout, or other acceptable grouting material.

E. Concrete Strength:

The Contractor shall allow the concrete to attain at least 75% of its minimum 28-day compressive strength no sooner than 7 days after placement, before rails, tension wires, barbed wire, or fabric is installed. The Contractor shall not stretch and tension fabric or wires and shall not hang gates until the concrete has attained its full design strength.

F. Top Rails:

The Contractor shall run the rail continuously through post caps or extension arms and bend to radius for curved runs. He shall provide expansion coupling as recommended by fencing manufacturer.

G. Brace Assemblies:

The Contractor shall install braces so that posts are plumb when diagonal rod is under proper tension.

H. Tension Wire:

The Contractor shall install tension wires by weaving through the fabric and tying to each post with not less than 0.177 inch (7 gage) galvanized wire, or by securing the wire to the fabric.

I. Fabric:

The Contractor shall leave approximately 3-inches between finish grade and bottom salvage, except where the bottom of the fabric extends into the concrete.

He shall pull the fabric taut and tie it to posts, rails and tension wires. He shall install fabric on the security side of the fence and anchor it to the framework so that the fabric remains in tension after the pulling force is released.

J. Stretcher Bars:

The Contractor shall thread through or clamp the bars to the fabric 4-inches o.c. and secure them to posts with metal bands spaced 15-inches o.c.

K. Barbed Wire (only when specified):

The Contractor shall install 3 parallel wires on each extension arm on the security side of fence, unless otherwise indicated. He shall pull the wire taut and fasten securely to each extension arm.

L. Gate:

The Contractor shall install gates plumb, level and secure for full opening without interference. He shall install ground-set items in concrete for anchorage, as recommended by the fence manufacturer. He shall adjust hardware for smooth operation and lubricate where necessary.

M. Tie Wires:

The Contractor shall use U-shaped wire, conforming to the diameter of the attached pipe, and shall clasp the pipe and fabric firmly with twisted ends of at least 2 full turns. He shall bend the end of the wire to minimize hazard to persons or clothing.

N. Fasteners:

The Contractor shall install nuts for tension band and hardware bolts on the side of fence opposite the fabric side. Pen ends of bolts or score threads to prevent removal of nuts.

3.02 INSTALLATION

Fence shall be constructed such that each run of fence between corner posts or gate posts has equal spacing between the line posts. Spacing shall not exceed 8 feet.

END OF SECTION

SECTION 02485 SEEDING AND SODDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials and equipment necessary to satisfactorily return all construction areas to their original conditions or better.
- B. Work shall include furnishing and placing seed or sod, fertilizing, planting, watering and maintenance until acceptance by County.

1.02 RELATED WORK NOT INCLUDED

Excavation, filling and grading required to establish elevation shown on the Drawings are included under other sections of these Specifications.

1.03 QUALITY ASSURANCE

- A. It is the intent of this Specification that the Contractor is obliged to deliver a satisfactory stand of grass as specified. If necessary, the Contractor shall repeat any or all of the work, including grading, fertilizing, watering and seeding or sodding at no additional cost to the County until a satisfactory stand is obtained. For purposes of grassing, a satisfactory stand of grass is herein defined as a full lawn cover over areas to be sodded or seeded, with grass free of weeds, alive and growing, leaving no bare spots larger than 3/4 square yard within a radius of 8 feet.
- B. All previously grassed areas where pipelines are laid shall be sodded. All sodding and grassing shall be installed in accordance with these Specifications or as directed by the County.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fertilizer: The fertilizer shall be of the slow-release type meeting the following minimum requirements: 12 percent nitrogen, 8 percent phosphorus, 8 percent potassium; 40 percent other available materials derived from organic sources. At least 50 percent of the phosphoric acid shall be from normal super phosphate or an equivalent source which will provide a minimum of two units of sulfur. The amount of sulfur shall be indicated on the quantitative analysis card attached to each bag or other container. Fertilizer shall be uniform in composition, dry and free flowing delivered to sites in original unopened containers bearing manufacturer's statement or guarantee.
- B. Seeding/Grassing: The Contractor shall grass all unpaved areas disturbed during construction which do not require sod. All grassing shall be completed in conformance with FDOT Specifications, Sections 570 and 981. The grassed areas shall be mulched and fertilized in accordance with FDOT Specifications, except that no additional payment will be made for mulching, fertilizing and/or watering.

- C. Sodding: Sod shall be provided as required on the construction drawings or at locations as directed by the County in accordance with Florida Department of Transportation, Specifications Section 575 and 981. The Contractor shall furnish bahia grass sod or match existing sod. Placement and watering requirements shall be in accordance with FDOT Specifications Section 575, except that no additional payment will be made for placement and/or watering. This cost shall be included in the Contract price bid for sodding.
- D. Topsoil: Topsoil stockpiled during excavation may be used as necessary. If additional topsoil is required to replace topsoil removed during construction, it shall be obtained off site at no additional cost to the County. Topsoil shall be fertile, natural surface soil, capable of producing all trees, plants and grassing specified herein.
- E. Water: It is the Contractor's responsibility to supply all water to the site, as required during seeding and sodding operations and through the maintenance period and until the work is accepted. The Contractor shall make whatever arrangements that may be necessary to ensure an adequate supply of water to meet the needs for his work. He shall also furnish all necessary hose, equipment, attachments and accessories for the adequate irrigation of lawns and planted areas as may be required. Water shall be suitable for irrigation and free from ingredients harmful to plant life.

PART 3 EXECUTION

3.01 INSTALLATION

- A. When the trench backfill has stabilized sufficiently, the Contractor shall commence work on lawns and grassed areas, including fine grading as necessary and as directed by the County.
- B. Finish Grading: Areas to be seeded or sodded shall be finish graded, raked, and debris removed. Soft spots and uneven grades shall be eliminated. The County shall approve the finish grade of all areas to be seeded or sodded prior to seed or sod application.
- C. Areas to be sodded shall be excavated or cut-down to accept the approximate 2” thick sod, so finish grade matches existing. Sod shall not be thrown over top of existing sod or debris.
- D. Protection: Seeded and sodded areas shall be protected against traffic or other use by placing warning signs or erecting barricades as necessary. Any areas damaged prior to acceptance by the County shall be repaired by the Contractor as directed by the County.

3.02 CLEANUP

Soil or similar materials spilled onto paved areas shall be removed promptly, keeping those areas as clean as possible at all times. Upon completion of seeding and sodding operations, all excess soil, stones and debris remaining shall be removed from the construction areas.

3.03 LANDSCAPE MAINTENANCE

- A. Any existing landscape items damaged or altered during construction by the Contractor shall be restored or replaced as directed by the County.
- B. Maintain landscape work for a period of 90 days immediately following complete installation of work or until County accepts project. Watering, weeding, cultivating, restoration of grade, mowing and trimming, protection from insects and diseases, fertilizing and similar operations as needed to ensure normal growth and good health for live plant material shall be included at no additional cost to the County.

3.04 REPAIRS TO LAWN AREAS DISTURBED BY CONTRACTOR'S OPERATORS

Lawn areas planted under this Contract and all lawn areas damaged by the Contractor's operation shall be repaired at once by proper soil preparation, fertilizing and sodding, in accordance with these Specifications.

END OF SECTION

SECTION 02590 WATER SERVICES ON PRIVATE PROPERTY

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals necessary for complete installation of potable water services for and on the lots identified on the Drawings when authorized by the County and Property Owner. The Contractor shall construct water service lines on private property from the proposed County meter to a connection point within the customer's water system. In addition, the Contractor shall remove the existing water meter and box assembly and cap and abandon the existing water service at the service line, or as directed by the County. Backflow Preventers and associated Thermal Expansion Tanks and vacuum breakers on all outside hose bibbs shall be installed by the Contractor where cross connection risks are present, as required by the applicable County Ordinances and Plumbing Codes. Installation of Expansion Tanks will often require the Contractor to access inside existing buildings and coordinate work and timing with individual property owners.

1.02 GENERAL

- A. The work shall include furnishing and installing a pipe, fittings, valves, and appurtenances necessary to convey water from the customer's water meter at the property line to the house service connection, including restoration of all lawns, drives, walkways, plants, customer private property, and other activities necessary to restore the site to a condition equal to or better than that which existed prior to construction. The Contractor shall carefully examine the Drawings and shall be responsible for the proper fittings of materials and equipment in each building and on each lot or site. All work shall comply with local code requirements.
- B. Plumbing fixtures, devices and pipe shall be installed in such a manner to prohibit a cross connection or interconnection between a potable water supply and a polluted supply. The plumbing installation shall further prohibit the backflow of sewage, polluted water, or waste into the water supply system. The Contractor shall install vacuum breakers on all outside hose bibbs where backflow preventers are required.
- C. Required materials not covered by the Specifications shall meet the requirements of the local Plumbing Code, other applicable State and Local Ordinances and Codes, the AWWA, NSF, and shall conform to accepted plumbing practice.
- D. The Contractor shall coordinate all work called for in the Contract Documents with the County Meter Superintendent and other involved parties, and shall establish a work plan to install the new water service lines which results in minimal impact to customer private property.
- E. All work on customer service lines conducted on private property shall be performed by a plumber licensed in Manatee County and experienced in furnishing and installing potable water plumbing systems.

- F. Upon completion of water service construction on private property, the Contractor shall obtain a Building Department inspection and approval to place the system into operation.
- G. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, adjusted and operated.

1.03 SUBMITTALS

- A. The Contractor shall submit to the Engineer for review and approval in accordance with the Contract Documents: complete shop drawings, working drawings, and product data for all materials and equipment furnished under this Section. The Contractor shall meet with each property owner to coordinate the routing of the water service line on private property prior to the commencement of any work and shall document the agreed upon route on a sketch signed and dated by all parties and submit them to the Engineer.

1.04 CODES, ORDINANCES AND PERMITS

- A. The Contractor shall comply with all of the laws, ordinances, and codes, rules and regulations of the local and state authorities having jurisdiction over any of the work specified herein. He shall apply and pay for all necessary permits, including Manatee County Building Permits for all lots. Up to 11 permits at \$75 each may be required, with up to 10 adjacent lots on each permit.
- B. If any part of the Plans and Specifications conflict with existing laws and codes, the Contractor shall call it to the Engineer's attention prior to the commencement of work.

1.05 GUARANTEE

- A. The Contractor shall warrant all labor and materials free from defects for a period of one (1) year from the date of acceptance and shall, upon notification during this period, promptly repair or replace any defective items of material or equipment at no additional cost.

1.06 ACCESSIBILITY

- A. The Contractor shall inform himself fully regarding the peculiarities and limitations of the space available for the installation of all material in this Contract.
- B. The Contractor is responsible for obtaining access to the private properties identified on the Drawings. The County will issue notices to the Owners of the Properties requesting their cooperation with the Contractor.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Refer to Manatee County Utility Standards (Manual) for details. All pipe, fittings, materials, and appurtenances shall be furnished and installed to meet the requirements of this project and the requirements of the Florida Building Code - Plumbing, and Residential Chapter 29 (Water Supply & Distribution).
- B. If required by site specific conditions, the Backflow Preventer, Thermal Expansion Tank, and vacuum breakers shall be in accordance with Manatee County Utility Standards, latest edition and are subject to the approval of the Engineer.
- C. Water service pipe shall be per Section 02620 of these Specifications.
- D. A dielectric coupling shall be provided between ferrous and nonferrous materials.
- E. The Contractor shall furnish certified statements from the manufacturer that the material conforms to the requirements specified above.

PART 3 EXECUTION

3.01 PLANNING AND COORDINATION

- A. The Contractor shall coordinate with each water customer, property owner and the County Meter Superintendent to establish a reasonable plan and location for installation of each new customer water service line. The Contractor shall perform exploratory work and have all materials in hand at the commencement of construction to reduce the risk of delays in completion of the work associated with lack of materials.
- B. The Contractor shall schedule the installation of the new water service lines to coordinate with the installation of the new County water line, water services and water meters as a part of this project. The Contractor shall carefully schedule the work of subcontractor licensed plumbers to ensure that customer water service disruption is minimized and is not interrupted for longer than the period specified in the Specifications. The Contractor shall schedule the inspection of the work by Manatee County Building officials as necessary to allow for timely use of the new customer service.
- C. The County will provide new and/or existing water meters to the Contractor to install in proposed meter boxes. The Contractor shall remove existing meters from meter boxes as part of this Contract, return the meters to the County Meter Division, and shall verify with the County Meter Division which meters shall be reinstalled new and which will be reused. Just prior to removing an existing meter from service, the Contractor shall notify the customer, record the existing meter reading, and record the serial number prior to returning meters to the County meter division.

3.02 PRIVATE WATER SERVICE CONSTRUCTION

- A. The Contractor shall install new 1 inch diameter water service lines at a location on

the customer's property that is agreed to by the property owner, minimizes impact to existing site features and private property improvements and which most directly connects the new water meter location with the connection point for the customers water service.

- B. The new water service connection on private property shall include new customer service line from the new meter location to the agreed upon point of connection with the customer house water service line; piping, fittings, valves, and appurtenances, excavation and backfill as required; restoration of grass, shrubs, drives, walkways, and other customer property damaged by construction and related work required to result in a new customer service line system that meets code requirements.

3.03 STERILIZATION

The entire potable water collection and distribution system shall be thoroughly sterilized with a solution of not less than 50 parts per million of available chlorine. The sterilizing solution shall be allowed to remain in the system for a period of three hours after which time all valves and faucets shall be opened and the system shall be flushed with clean water until the residual chlorine content is not greater than 0.92 parts per million, unless otherwise directed.

END OF SECTION

SECTION 02615 DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install ductile iron pipe and restrained joint ductile iron pipe and cast iron or ductile iron restrained joint fittings, complete, as shown on the Drawings and specified in these Standards.
- B. Fittings are noted on the drawings for the Contractor's convenience and do not relieve him from laying and jointing different or additional items where required.
- C. The Contractor shall furnish all labor, materials, equipment and incidentals required to install push-on joint or restrained joint ductile iron pipe, complete as shown on the Drawings and Specifications.
- D. Newly installed pipe shall be kept clean and free of all foreign matter. All DI pipe installed underground shall be poly wrapped unless noted otherwise on the plans.

1.02 SUBMITTALS

- A. The Contractor shall submit to the County, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all ductile iron pipe and fittings.
- B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ductile iron pipe shall conform to AWWA C150 and AWWA C151. Pipe shall be Pressure Class 350. All ductile iron pipe used in above ground applications shall be Special Thickness Class 53. All pipe materials used in potable water systems shall comply with NSF Standard 61.
- B. Unrestrained joint pipe shall be supplied in lengths not to exceed 21 ft. and shall be either the rubber-ring compression-type push-on joint or standard mechanical joint pipe as manufactured by the American Cast Iron Pipe Company, U.S. Pipe and Foundry Company, or an approved equal.
- C. Flanged pipe and fittings shall be used only for above ground installation and shall be drilled and faced to the American 125 pounds standard template, and in accordance with ANSI B16.1, unless otherwise noted on the Drawings. Gaskets shall be full face and shall be cut in a neat and workmanlike manner and bolts tightened uniformly to distribute the bolt stress evenly and bring the pipe into alignment. The flanges shall be joined utilizing Type 316L stainless steel machine bolts with heavy hexagon heads and nuts conforming to ANSI B18.21. Stainless

steel bolts shall be treated with Never Seize prior to assembly. Pipe supports shall be the adjustable saddle type with a 2" wide hold down strap and shall be stainless steel.

- D. All mechanical joint fittings shall be pressure rated for 350 psi for sizes 4-24 inches and 250 psi for sizes 30 inches and larger. All flanged fittings shall be pressure rated for 250 psi for all sizes. All fittings shall meet the requirements of AWWA C110 or AWWA C153.
- E. Rubber gaskets shall conform to AWWA C111 for mechanical and push-on type joints and shall be Ethylene Propylene Diene Monomer (EPDM) rubber for potable water and reclaimed water pipelines. Standard gaskets shall be such as Fastite as manufactured by American Cast Iron Pipe Company, or an approved equal. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non-chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used where both classes of contaminants are found.
- F. Water Main and Reclaimed Water Main Coatings: All ductile iron pipe used in water and reclaimed water systems shall have a standard thickness cement lining on the inside in accordance with AWWA C104 and a standard 1-mil asphaltic exterior coating per AWWA C151. All ductile iron or gray iron fittings used in water and reclaimed water systems shall have standard thickness cement linings on the inside per AWWA C104 and an asphaltic exterior coating or they shall have factory-applied fusion bonded epoxy coatings both inside and outside in accordance with AWWA C550.
- G. Wastewater Main Coatings: All ductile iron pipe and fittings used in wastewater sewer systems shall have a factory applied dry film thickness 40-mil Protecto 401 or 40-mil Novocoat SP2000W amine cured novalac ceramic epoxy lining on the inside. The interior lining application is to be based on the manufacturer's recommendation for long-term exposure to raw sewage. To ensure a holiday-free lining, documentation must be provided, prior to shipment, showing each section of lined pipe has passed holiday testing at the time of production per ASTM G62. The lining shall have a minimum one year warranty covering failure of the lining and bond failure between liner and pipe.

Exterior coatings for ductile iron pipe and fittings used in wastewater systems shall be either an asphaltic coating per AWWA C151 or a factory-applied epoxy coating per AWWA C550.
- H. Thrust restraint devices shall be provided at all horizontal and vertical bends and fittings, in casings under roads and railroads and at other locations specifically indicated on the construction drawings. Thrust restraint devices shall be either concrete thrust blocks or restraining glands as manufactured by Star Pipe Products, Stargrip 3000 and 3100, Allgrip 3600, or as manufactured by EBAA Iron Sales, Megaflange, 2000 PV, or other approved equal restraining gland products. Restrained joints, where used, shall be installed at bend and fitting locations and at pipe joint locations both upstream and downstream from the bends or fittings at

distances as required by these Standards. Restrained joint pipe fittings shall be designed and rated for the following pressures:

350 psi for pipe sizes up to and including 24" diameter

250 psi for pipe sizes 30" diameter and above

2.02 DETECTION

- A. Pipe shall have a 3-inch wide warning tape of the proper color placed directly above the pipe 12 inches below finished grade or a 6-inch warning tape between 12 inches and 24 inches below finished grade.
- B. Pipe shall have a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color installed along the pipe alignment as detailed in these standards. Tracer wire shall be manufactured by Copperhead Industries or Manatee County approved equal.

2.03 IDENTIFICATION

- A. Each length of pipe and each fitting shall be marked with the name of the manufacturer, size and class, lining type, and shall be clearly identified as ductile iron pipe. All gaskets shall be marked with the name of the manufacturer, size and proper insertion direction.
- B. All ductile iron pipe 12 inches and smaller shall be entirely polyethylene-wrapped blue for water mains, purple (Pantone 522 C) for reclaimed water mains and green for sewer mains, per AWWA C105.
- C. All ductile iron pipe greater than 12 inches shall be spiral wrapped with color coded polyethylene at a six-inch minimum spacing. If soil testing, in accordance with AWWA C105, indicates that the soil at the site is corrosive, the ductile iron pipe shall be entirely polyethylene-wrapped with color coded polyethylene.
- D. Poly-wrap shall be by V-Bio™ Enhanced Polyethylene Encasement (or equivalent).
- E. All above ground potable water mains and appurtenances shall be painted safety blue.

END OF SECTION

SECTION 02616 DISINFECTING POTABLE WATER PIPE LINES

PART 1 GENERAL

1.01 SCOPE OF WORK

The Contractor shall furnish all labor, materials, equipment and incidentals required to clean and disinfect potable water pipe lines. This work is required to place all types of pipe into service as potable water lines.

1.02 CLEANING WATER MAINS

At the conclusion of the work, the Contractor shall thoroughly clean all of the new pipes to remove all dirt, stones, pieces of wood or other material which may have entered during the construction period per Section 02618.

1.03 DISINFECTING & BACTERIOLOGICAL TESTING OF POTABLE WATER PIPE LINES

- A. All record drawing requirements must be submitted to the County prior to starting the bacteriological testing of the water lines.
- B. After the new potable water pipelines have been hydrostatically tested, or after existing potable water pipelines have been modified or repaired, they shall be cleaned, disinfected and sampled and tested for the presence of coliform organisms in accordance with AWWA C651.
- C. The County Inspector shall have been notified and shall be present at the time of the introduction of the chlorine disinfectant and water from the supply system into the main.
- D. At the end of the chlorine contact period, the chlorine residual shall be determined by sampling and testing, and the results shall be reported to the regulatory agencies with the County and State. The pipelines shall then be flushed thoroughly with clean potable water until chlorine measurements show that the concentration is no higher than the chlorine concentration that is acceptable for domestic use.
- E. Discharge flows from cleaning or flushing operations, and heavily chlorinated water from disinfecting operations, shall be disposed of in a manner consistent with US EPA, FDEP and SWFWMD regulations. Chapter 62-302 F.A.C. water quality standard for residual chlorine in Class III waters is <0.01 mg/L (ppm).
- F. After final flushing and before the new main is connected to the distribution system, sampling and analysis of the replacement water shall be performed by an approved laboratory or by the Department of Health. Sampling locations shall be as required by AWWA C651 or as determined by the FDEP representative. Pipelines that are tested and return an unsatisfactory test result shall be reflushed and resampled, or re-disinfected, or otherwise reconditioned, until a satisfactory result is attained.
- G. No potable water main shall be placed into service until the results of the bacteriological tests are satisfactory and the FDEP has provided the County with

a written letter of acceptance. Potable water services, fire service, and fire hydrant leads that are exempt from a permit from the FDEP but still require bacteriological sampling in accordance with Chapter 62-555, Florida Administrative Code, shall not be placed into service until the results of the bacteriological tests are satisfactory and the Manatee County Public Works Engineering Department has provided written acceptance.

- H. Special disinfecting procedures when approved by the County, may be used where the method outlined above is not practical.

END OF SECTION

SECTION 02617 INSTALLATION AND TESTING OF PRESSURE PIPE

PART 1 GENERAL

Reference Section 1.8, Installation of Pipelines in the Manatee County Public Works Utility Standards Part 1-Utility Standards Manual.

1.01 GENERAL

- A. Furnish and install pipe, fittings, valves, fire hydrants, services, and all other appurtenances and incidentals complete and in-place as required by the construction drawings.
- B. Where potable or reclaimed water mains are to be installed under pavement, in parking lots, etc., the main shall be DI or protected by a steel casing pipe.
- C. All pipe crossing state or federal roads or local arterials & thoroughfares shall be installed in a casing pipe.
- D. Services under any kind of pavement shall be Type "L" copper or Schedule 40 stainless steel.
- E. Water mains 16-inches and larger shall be ductile iron. High density polyethylene or PVC (for 16" only). The use of HDPE pipe must be authorized by the County prior to ordering and installation.
- F. Soil testing in accordance with AWWA C105 shall be performed during the design phase to determine if the soil is corrosive to ductile iron pipe. One (1) soil test shall be performed for pipe lengths under 500 lineal feet, with an additional soil test every 500 of additional ductile iron pipe to be installed. The soil testing shall be performed by a Florida licensed geotechnical engineering and signed and sealed report shall be supplied to the County for review prior to installation of the ductile iron pipe for evaluation. The soil testing results shall be used to determine if additional requirements for the installation of ductile iron pipe and/or the restrained joints is warranted.
- G. Ductile iron pipe, with gasket materials as required in these Standards, shall be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents.
- H. Trees shall not be planted or located within 10 feet of any potable water main, reclaimed water main, sanitary force main or gravity sanitary sewer main that is owned and maintained by County. With prior approval, an approved root barrier may be used with 5 feet of clearance.
- I. All distribution waterlines that enter private property become private lines and shall have a back-flow preventer installed at the right-of-way. BFP can be part of a meter assembly or a BFP / detector check assembly.

J. Installation tolerances of Pipe Lines:

1. Direct Bury:

- a. Vertical Alignment = ± 0.5 feet
- b. Horizontal Alignment = ± 1.0 feet

2. Horizontal Directional Drill (Trenchless Technologies):

a. Vertical Alignment:

- 1) max. slope shall not exceed 2% (2.0 feet within a length of 100 feet).
- 2) No reverse curvature within 200 feet
- 3) No vertical deviation greater than ten (10) percent of the proposed depth of cover at that specific station.

b. Horizontal Alignment:

- 1) max. rate of deviation shall not exceed 1.5% (1.5 feet within a length of 100 feet
- 2) No reverse curvature
- 3) Total deviation not to exceed 2.0 feet

1.02 HANDLING AND STORAGE

- A. Prior to installation, all pipe and fittings shall be inspected. Cracked, broken, or otherwise defective materials not in compliance with these standards shall not be used and shall be removed from the project site.
- B. The pipeline installer shall take care in the handling, storage and installation of the pipe and fittings to prevent injury to the materials or coatings. Use proper implements, tools and facilities for the safe and proper protection of the work. Lower the pipe and fittings from the truck to the ground and from the ground into the trench in a manner to avoid any physical damages. Under no circumstances shall the pipe or fittings be dropped onto the ground or into the trenches.
- C. The pipeline installer shall not distribute material on the job site faster than it can be used to good advantage. Unless otherwise approved by the County, installer shall not distribute more than one week's supply of material in advance of laying. Any materials not to be installed within two weeks of delivery shall be protected from the sunlight, atmosphere and weather by suitable enclosures or protective wrapping until ready for installation. Stored PVC pipe shall be placed on suitable racks with bottom tiers raised above the ground to avoid damage. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's written instructions.

1.03 SURVEY MARKINGS

- A. As a marker for the Surveyor, a PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor on the top of pipe for potable water mains, reclaimed water mains

and sanitary force mains at intervals no greater than 200 feet apart and at locations where there is a substantial grade change. The pipe markers shall indicate the pipe diameter and shall be labeled PWM in "safety" blue, RWM in purple, and FM in green, for potable water mains, reclaimed water mains and sanitary force mains, respectively. The Contractor is responsible for making the aforementioned markers available to the Surveyor. The Contractor shall field locate the mains and fittings when markers are not made available to the Surveyor.

- B. As a marker for the Surveyor, a PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor on the top of all pipe fittings (other than sanitary sewer service wyes, potable water saddles and reclaimed water saddles). The markers for fittings shall indicate the type of fitting and shall be labeled PWF in "safety" blue, RWF in purple, and FMF in green, for potable water fittings, reclaimed water fittings, and sanitary force main fittings, respectively. The Contractor is responsible for making the aforementioned markers available to the Surveyor. The Contractor shall field locate the mains and fittings when markers are not made available to the Surveyor.
- C. A PVC pipe marker or 2" x 4" marker shall be inserted by the Contractor at the beginning and end of each horizontal directional drill (HDD). The HDD Contractor shall provide a certified report and bore log indicating the horizontal and vertical location every 25 linear feet or less along the pipe.
- D. A 2" PVC pipe marker with a painted end cap shall be inserted by the Contractor at the ROW line indicating each individual new service location or stub out. The marker shall be a 6 foot length of PVC pipe inserted 2 feet into the ground and shall be painted "safety" blue for potable water, purple for reclaimed water, and green for sewer.

1.04 PROCEDURE FOR TESTING WATER LINES, FORCE MAINS AND RECLAIMED WATER LINES

- A. A 48-hour notice is needed prior to testing. A letter stating the reasons testing should be scheduled ahead of other jobs must accompany all emergency testing requests.
- B. County and Contractor must be present for all testing, except for testing tapping valves and sleeves.
- C. HYDROSTATIC TESTING
 - 1. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7.

1.05 INSPECTION/TESTING PROCEDURE COVERING BORED PIPE LINES OR CASING AND CONDUITS INSTALLED ACROSS PREVIOUSLY TESTED AND/OR COUNTY ACCEPTED WATER AND SEWER PIPE WITHIN DEVELOPMENT PROJECTS UNDER ACTIVE CONSTRUCTION

- A. Prior to testing water and sewer lines, every effort will be made to install sleeves for underground utilities that will cross these water and sewer lines or services.
- B. Where it has not been possible to pre-install sleeves prior to testing and bores or conduits are required, it is the responsibility of the utility company and/or their

Contractor performing the work to provide Manatee County Utility Operations Department or the Engineer of Record with accurate horizontal and vertical as-built information of the sleeves, bores and conduits installed by said utility company. This applies to all bores and conduits crossing water and sewer lines.

- C. Procedures to be followed for installation of conduits, pipe lines and bores that will cross, or be closer than 5'-0" horizontally and 18 inches vertically to, previously tested water and sewer lines that are still under the ownership of the developer/contractor.
1. Notify the County and obtain the best as-built information available. Allow sufficient time for the County to field locate the existing pipe lines.
 2. Submit drawings of proposed location to the County and Manatee County Utility Operations Dept. Utility Locations Section for review.
 3. Obtain a County Right-of-Way Use Permit if the work area is within a dedicated area of right-of-way.
 4. Perform installation in the presence of a County representative. Call (941) 792-8811, ext. 5061 or ext. 5069 with at least two (2) working days notice.
 5. Submit two (2) copies of as-built information to the County to incorporate into the record drawings to be submitted to the County.
 6. Failure to follow steps 2) thru 5) will result in additional charges for retesting the previously tested water and sewer lines.
- D. Procedures to be followed for installation of conduits, pipe lines and bores crossing or closer than 5'-0" horizontally and 18 inches vertically to previously tested water and sewer lines that have been previously accepted by Manatee County:
1. Obtain record drawing information from the County.
 2. If roadway has been dedicated to Manatee County, obtain Right-of-Way Use Permit and copy the Project Management Department Locations Section with proposed location drawing.
 3. Follow procedures in "Sunshine State One-Call", paying special attention to the requirements of Section VII.
- E. Should water or sewer lines be damaged during the bore pipe line or casing installation, the cost of any repairs and retesting will be paid for by the utility company that installed the bore. The actual clearance between a bored casing crossing a water or sewer pipe should not be less than 18 inches.

1.06 DETECTION

- A. Direct buried pipe shall have 3" detectable metallic tape of the proper color placed directly above the pipe and 12" below finished grade or 6" detectable tape between 12" and 24" below finished grade.
- B. Direct buried or horizontal directional drilled non-metallic pipe shall also have tracer wire installed along the pipe alignment. The tracer wire to be used shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

END OF SECTION

SECTION 02618 PIPELINE CLEANING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to clean all new lines 4" and larger, and existing pipelines as specified in this specification and as indicated on the Drawings.
- B. This work shall include the furnishing and installation of all pig launching and retrieval devices and the appropriate pigs for the cleaning procedure, and all necessary excavations, shutdowns, fittings and valves required.

1.02 RELATED WORK

- A. The contractor is responsible for all necessary supply water.
- B. The contractor is responsible for all necessary bypass pumping.
- C. The contractor is responsible for the proper disposal of any materials removed from the pipe lines as a result of the cleaning procedure.

1.03 SUBMITTALS

- A. The Contractor shall submit prior to construction, a cleaning plan, Shop Drawings, and layout diagram for approval to the County.
- B. The Contractor shall submit to the County a list of materials to be furnished, and the names of suppliers.

1.04 QUALIFICATIONS

- A. The Contractor performing this work shall be fully qualified, experienced and equipped to complete this work expeditiously and in a satisfactory manner.
- B. The Contractor shall also be capable of providing crews as needed to complete this work without undue delay.
- C. The County reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

PART 2 PRODUCTS

2.01 GENERAL

- A. The contractor shall be responsible for furnishing pigs in sufficient numbers and sizes, of appropriate densities, coatings and configurations to properly clean the piping systems.
- B. All pigs used for the cleaning of sewer or reclaimed water lines shall not be used

in the cleaning of potable water lines.

2.02 MATERIALS

- A. The pig launching and retrieval equipment shall be of the latest design and construction and shall include the means to maintain constant monitoring of the in-line flows and pressures of the system being cleaned and the constant location of the cleaning pigs in the system. Launching and retrieval systems shall be fabricated, designed and manufactured according to ANSI standards and capable of withstanding working pressures of 150 psi. Launching and receiving devices shall be sized one diameter larger than the system to which it will be attached with a minimum length of 2.5 times the diameter.
- B. The contractor shall have available for immediate use an electronic pig detector for use in the system being cleaned to provide a means of tracking the passage of the pig in the system to locate areas of potential or suspected blockage and other disparities in the system.
- C. The pig shall be constructed of elastomer polyurethane with an open cell construction and a density equal to or suitable for use in the piping system being cleaned. Pig configuration shall consist of a parabolic nose with a concave base and coated with a resilient surface material that will maintain a peripheral seal and will effectively clean the piping system without over abrading the interior pipe wall. Pig characteristics shall include the ability to navigate through 90 degree bends, 180 degree turns, bi-directional fittings, full port valves, reduce its cross sectional area and return to its original design configuration and be propelled by hydraulic pressure.

PART 3 EXECUTION

3.01 PIPELINE CLEANING

- A. The cleaning of the pipe line shall be done by the controlled and pressurized passage of a polyurethane pig of varying dimensions, coatings and densities as determined by the County through the piping system.
- B. A series of pigs shall be entered into the system at a point as near to the beginning as is logistically and mechanically feasible.
- C. A launching assembly shall be used as the entrance point for the pig. This assembly shall allow for the following:
 - 1. The entering of pigs into the system by providing the means to induce flow from an external source, independent of the flows and pressures immediately available from the system, on the back of the pig to develop sufficient pressure to force the pig through the system.
 - 2. A means to control and regulate the flow.
 - 3. A means to monitor the flows and pressures.
 - 4. A means to connect and disconnect from the system without any disruption to the operation of the system.

- D. The pig shall be removed or discharged from the system at a point as near to the end as is logistically and mechanically feasible.
- E. The contractor shall be responsible for the retrieval of the pig at the discharge point. This may include setting a trap that will not disrupt normal flow and operations but will capture the pig and any debris. A retrieval assembly may also be used but said assembly shall be able to connect and disconnect from the system without any disruption to the operation of the system.
- F. Alternative launching and retrieval methods shall be done with the prior approval of the County.
- G. Any pig that cannot progress through the piping system shall be located by the contractor and removed by excavation of the pipe in order to remove the blockage. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.
- H. Any increase in pressure that cannot be accounted for, i.e. fittings or valves or additional cleaning runs, shall be investigated, per the Engineers' approval, by locating the pig at the beginning of the increased pressure and excavating to determine the cause of the pressure increase. All pipe repairs shall be the responsibility of the contractor and shall be performed with as little disruption to the system as possible.
- I. Final flushing of the cleansed lines shall be performed after the last successful run of the pig as determined by the County. The contractor shall be responsible for all applicable flushing and disinfection requirements for potable water lines.

3.02 ACCEPTANCE

- A. The contractor shall maintain and provide a report at the end of the cleaning procedure containing the following:
 - 1. The pressures in the pipe during the pigging procedure.
 - 2. Any inline problems encountered during the procedure including all excavations with detailed locations, reason for the excavation and any corrective measures taken to the pipeline.
 - 3. A record of the pigs used, their sizes, styles and other pertinent information regarding what materials were used during the cleaning.
 - 4. An analysis of the condition of the pipeline before and after the cleaning procedure.

END OF SECTION

SECTION 02620 POLYETHYLENE (HDPE) PIPE AND FITTING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install polyethylene pressure pipe, fittings and appurtenances as shown on the Drawings and specified in the Contract Documents and these Standards.
- B. Newly installed pipe shall be kept clean and free of all foreign matter & gouges.
- C. All pipe shall be correctly color coded / identified.

1.02 QUALIFICATIONS

All polyethylene pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable and qualified in the manufacture of the items to be furnished.

1.03 SUBMITTALS

- A. The Contractor shall submit to the County, within ten days after receipt of Notice to Proceed, a list of materials to be furnished, the names of the suppliers and the appropriate shop drawings for all polyethylene pipe and fittings.
- B. The Contractor shall submit the pipe manufacturer's certification of compliance with the applicable sections of the Specifications.
- C. The Contractor shall submit shop drawings showing installation method and the proposed method and specialized equipment to be used.

PART 2 PRODUCTS

2.01 POLYETHYLENE PRESSURE PIPE

- A. Polyethylene pipe 4" diameter and larger shall be high-density bimodal PE3408/PE 100/PE4710 polyethylene resin with a minimum cell classification of 445574 per ASTM D3350, Class 160, DR 11, Performance Pipe DriscoPlex 4000, or an approved equal, meeting the requirements of AWWA C906. All pipe materials used in potable water systems shall comply with NSF Standard 61. Outside diameters of water, reclaimed water and pressure sewer HDPE pipes shall be ductile-iron sizing system (DIPS).
- B. Polyethylene pipe 3 inches in diameter (for potable water and reclaimed water), and 3 inches in diameter and smaller (for wastewater grinder pump force mains) shall be high-density PE 3408 polyethylene, per ASTM D2737, Pressure Class 160, iron pipe size (IPS) outside diameter, DR 11, Performance Pipe DriscoPlex 4100 or an approved equal, meeting the requirements of ASTM D 3035 and AWWA C901.

- C. Polyethylene tubing 2 inches in diameter and smaller for potable water and reclaimed water shall be high density PE 3408 polyethylene resin per ASTM D2737, Pressure Class 200, Copper Tube Size (CTS), SDR 9, Performance Pipe DriscoPlex 5100, Endot EndoPure, Charter Plastics or an approved equal, meeting the requirements of AWWA C901. Butt fusion or CTS brass connections shall be used. All pipe materials used in potable water systems shall comply with NSF Standard 61.

2.02 JOINTS

- A. Where PE pipe is joined to PE pipe, it shall be by thermal butt fusion. Thermal fusion shall be accomplished in accordance with the written instructions of the pipe manufacturer and fusion equipment supplier. The installer of the thermal butt fused PE pipe shall have received training in heat fusion pipe joining methods and shall have had experience in performing this type of work.
- B. Flanged joints, mechanical joints and molded fittings for 4" and larger pipe shall be in accordance with AWWA C906. Mechanical joints and fittings for 3" and smaller pipe & tubing shall meet the requirements of: AWWA C901, ASTM D 3350 and ASTM D 3140.

2.03 DETECTION

- A. Direct buried HDPE pipe shall have 3" detectable metallic tape of the proper color placed directly above the pipe and 12" below finished grade or 6" detectable tape between 12" and 24" below finished grade.
- B. Direct buried or horizontal directional drilled HDPE pipe shall also have tracer wire installed along the pipe alignment. The tracer wire to be used shall be a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color manufactured by Copperhead Industries or Manatee County approved equal.

2.04 IDENTIFICATION

- A. Pipe shall bear identification markings in accordance with AWWA C906.
- B. Pipe shall be color coded blue for water, purple (Pantone 522 C) for reclaimed water or green for pressure sewer using a solid pipe color or embedded colored stripes. Where stripes are used, there shall be a minimum of three stripes equally spaced.

PART 3 EXECUTION

3.01 INSTALLING POLYETHYLENE PRESSURE PIPE AND FITTINGS

All polyethylene pressure pipe shall be installed by direct bury, directional bore, or a method approved by the County prior to construction. If directional bore is used, or if directed by the County, the entire area of construction shall be surrounded by silt barriers during construction.

3.02

INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7.

END OF SECTION

**SECTION 02622 POLYVINYL CHLORIDE (PVC) PIPE AND FITTINGS
(AWWA SPECIFICATIONS C-900 & C-905)**

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to install the PVC piping, iron fittings and other appurtenances complete and ready for use as indicated on the construction drawings.
- B. Provide and install complete all fittings and appurtenances not noted specifically on the construction plans as required to complete the utility system in accordance with these Standards.

1.02 DESCRIPTION OF SYSTEM

The Contractor shall install the piping in the locations as shown on the Drawings.

1.03 QUALIFICATIONS

All plastic pipe, fittings and appurtenances shall be furnished by a single manufacturer who is fully experienced, reputable, qualified and specializes in the manufacture of the items to be furnished. The pipe and fittings shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications.

1.04 SUBMITTALS

- A. The Contractor shall submit shop drawings to the County including, but not limited to, dimensions and technical specifications for all piping.
- B. The Contractor shall submit to the County, samples of all materials specified herein.
- C. The Contractor shall submit and shall comply with pipe manufacturer's recommendation for handling, storing and installing pipe and fittings.
- D. The Contractor shall submit pipe manufacturer's certification of compliance with these Specifications.

1.05 TOOLS

The Contractor shall supply special tools, solvents, lubricants, and caulking compounds required for proper installation.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Polyvinyl chloride (PVC) pressure pipe, 4 - 12 inches in diameter, shall be Class 235, DR 18, meeting the requirements of AWWA C900 used for potable and reclaimed water. Mains shall be cast-iron-pipe-equivalent outside diameters (also known as ductile iron pipe size (DIPS)). Each length of pipe shall be hydrostatically tested to four times its pressure class of the pipe by the manufacturer in accordance with AWWA C900.
- B. Polyvinyl chloride (PVC) pressure pipe, 14 inches in diameter, shall be ductile iron pipe size (DIPS) outside diameter and shall meet the requirements of AWWA C905. Pipe used in water, sewer, and reclaimed water service shall be DR 18 and Pressure Class 235. Each length of pipe shall be hydrostatically tested at twice its pressure class in accordance with AWWA C905. Pipe shall be furnished in standard lengths of approximately 20 feet.

PVC pipe shall not be used for potable and reclaimed water mains 16 inches and larger.

- C. Polyvinyl chloride (PVC) pressure pipe, 2-3 inches in diameter, shall be Pressure Rated 200, SDR21, conforming to ASTM D2241, and shall have Iron Pipe Size (IPS) outside diameters. SDR 21 PVC pipe 2-3 inches in diameter shall not be used for working pressures greater than 125 psi. PVC pipe shall not be used in applications, which require pipes that are less than 2 inches in diameter for wastewater force mains. PVC Pipe shall not be used in applications which require pipes that are less than 3 inches in diameter for potable water piping and reclaimed water piping.
- D. Standard PVC pressure pipe joints shall be bell and spigot push-on type with elastomeric ring seals. Ring seal gaskets used at push-on joints shall conform to ASTM F 477 and shall be EPDM rubber for potable and reclaimed water pipes.
- E. Lubricant furnished for lubricating the push-on joints in potable water pipes shall be nontoxic, water soluble, shall not support the growth of bacteria, shall have no deteriorating effects on the gasket or pipe material, and shall not impart color, taste, or odor to the water, and shall be an approved substance per NSF 61.
- F. Thrust restraint devices shall be provided at all horizontal and vertical bends and fittings, in casings under roads and railroads and at other locations as indicated on the construction drawings. Thrust restraint devices for PVC pipe and fittings shall be either concrete thrust blocks or restraining glands as manufactured by Star Pipe Products, Stargrip 3000 and 3100, Allgrip 3600, or as manufactured by EBAA Iron Sales, Megaflange, 2000PV or other approved equal restraining gland products. Restrained joints, where used, shall be installed at bend and fitting locations and at pipe joint locations both upstream and downstream from bends or fittings at distances as required by these Standards.
- G. All fittings for PVC pipe shall be ductile iron or gray iron with mechanical joints and shall conform to AWWA C110 or AWWA C153 and to the applicable sections of these Standards for ductile iron and gray iron fittings.
- H. All pipe materials used in potable water systems shall comply with NSF Standard 61.

PART 3 EXECUTION

3.01 INSTALLATION

The Contractor shall install the plastic pipe in strict accordance with the manufacturer's technical data and printed instructions.

3.02 DETECTION

- A. Direct buried pipe shall have 3" warning tape of the proper color placed directly above the pipe 12" below finished grade or 6" warning tape between 12" and 24" below grade.
- B. PVC pipe shall have a solid, 10 gauge, high strength, copper clad steel wire with a polyethylene jacket of appropriate color installed along the pipe alignment as detailed in these standards. Tracer wire shall be manufactured by Copperhead Industries or Manatee County approved equal.

3.03 IDENTIFICATION

- A. PVC pipe shall bear identification markings in accordance with AWWA C900, AWWA C905 or ASTM D2241.
- B. PVC pipe shall be color coded blue for water, purple (Pantone purple 522C) for reclaimed water or green for pressure sewer using a solid pipe color pigment.

3.04 INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

END OF SECTION

SECTION 02623 POLYVINYL CHLORIDE (PVC) PIPE (GRAVITY SEWER)

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, equipment, materials, pipe and incidentals and shall construct gravity sewers, complete, as shown on the drawings and as herein specified.
- B. The work shall include furnishing, laying and testing gravity sewer pipe.

1.02 SUBMITTALS DURING CONSTRUCTION

- A. The Contractor shall submit prior to construction, Shop Drawings, Working Drawings and Samples for approval to the County.
- B. The Contractor shall submit to the County not less than fourteen (14) calendar days after the date of the Notice to Proceed, a list of materials to be furnished, the names of suppliers and an expected schedule of delivery of materials to the site.
- C. The Contractor shall furnish in duplicate to the County sworn certificates that all tests and inspections required by the Specifications under which the pipe is manufactured have been satisfied.
- D. The pipe manufacturer shall inspect all pipe joints for out-of-roundness and pipe ends for squareness. The Contractor shall furnish to the County, a manufacturer's Notarized Affidavit stating all pipe meets the requirements of ASTM, ASCE, ANSI, the Contract Documents, as well as all applicable standards regarding the joint design with respect to square ends and out-of-round joint surfaces.

1.03 INSPECTION AND TESTS

- A. All pipe and accessories installed under this Contract shall be inspected and tested as required by the Standard Specifications to which the material is manufactured. The pipe shall be tested at the place of manufacture or taken to an independent laboratory by the manufacturer.
- B. Each length of pipe shall be subject to inspection and approval at the factory, point of delivery and site of work. Sample of pipe to be tested shall be selected at random by the County or the testing laboratory and shall be delivered by the Contractor to the testing laboratory approved by the County.
- C. When the specimens tested conform to applicable standards, all pipe represented by such specimens shall be considered acceptable based on the test parameters measured. Copies of test reports shall be submitted to the County prior to the pipe installation. Acceptable pipe shall be stamped with an appropriate monogram under the supervision of the testing laboratory.
- D. All pipe test specimens failing to meet the applicable standards shall be rejected. The Contractor may provide two additional test specimens from the same shipment

or delivery for each failed specimen. The pipe shall be acceptable if both of these additional specimens meet the requirements of the applicable standards.

- E. Pipe which has been deemed unacceptable by the County shall be removed from the work site by the Contractor and shall be replaced with acceptable pipe.

PART 2 MATERIALS

2.01 GENERAL

- A. The sizes of gravity sewer pipe shall be shown on the Drawings.
- B. Each length of pipe shall bear the name or trademark of the manufacturer, the location of the manufacturing plant and the class or strength classification of the pipe. The markings shall be plainly visible on the pipe barrel.

2.02 POLYVINYL CHLORIDE (PVC) GRAVITY SEWER PIPE

- A. Polyvinyl chloride (PVC) gravity sewer pipe and fittings, 4-15 inches in diameter, shall be SDR 26, meeting the requirements of ASTM D 3034. Joining of pipe sections and fittings shall be by water-tight push-on joints using elastomeric gaskets in accordance with ASTM D 3212.
- B. Polyvinyl chloride (PVC) pipe, 16-48 inches in diameter, for gravity sewers, shall be DR 25, with cast-iron (CI) outside diameter, meeting the requirements of AWWA C905.
- C. All PVC sewer pipe bell ends shall be field inspected for out-of-roundness and spigot ends shall be field inspected for out-of-roundness and for squareness of the pipe end. Any materials not in conformance with the tolerances of ASTM D 3212 or AWWA C905 shall be removed from the work site.
- D. All PVC sewer pipe sections shall also be field inspected for excessive cross-section deflection. Any pipe section visually found to have a pipe deflection, before installation, of 2 percent of the Base Inside Diameter or greater shall be removed from the work site. After installation and backfill, pipe deflection shall not be allowed to be 5 percent or greater of the Base Inside Diameter. Any length of pipe found installed having excessive deflection shall be dug up and either reinstalled or removed from the work site.
- E. Six inch PVC fittings for sewer laterals shall also be SDR 26, molded in one piece, with elastomeric joints in accordance with ASTM D-3034. Fittings not currently available in molded form may be fabricated in accordance with ASTM D-3034 with manufacturer's standard pipe bells and gaskets.

2.03 JOINING PVC GRAVITY SEWER AND FITTING

- A. The PVC joints shall be of the push-on type with a single rubber gasket conforming to ASTM F 477.
- B. Wyes and riser fittings shall be gasketed connections. Rubber doughnuts are not to be used.

- C. Joints between pipes of different materials shall be made using stainless steel shielded couplings (as provided by Fernco) or Protecto 401 mechanical joint connections. Metal piping shall not be threaded into plastic fittings, valves, or couplings, nor shall plastic piping be threaded into metal valves, fittings, or couplings.

2.04 IDENTIFICATION AND DETECTION

- A. PVC gravity sewer pipe shall bear identification markings in accordance with ASTM D 3034 or AWWA C905.
- B. PVC gravity sewer pipe shall be color-coded green using a solid pipe color pigment.

PART 3 EXECUTION

3.01 PIPE DISTRIBUTION

The Contractor shall not distribute material on the job faster than it can be used to good advantage. He shall unload pipe, which cannot be physically lifted by workers from the trucks, by a forklift or other approved means. He shall not drop pipe of any size from the bed of the truck to the ground. He shall not distribute more than one weeks supply of material in advance of laying, unless otherwise approved by the County.

3.02 PIPE PREPARATION AND HANDLING

- A. The Contractor shall inspect all pipe and fittings prior to lowering them into trench. Cracked, broken, or otherwise defective materials are not acceptable and shall not be used. The Contractor shall clean the ends of the pipe thoroughly. He shall remove foreign matter and dirt from inside of pipe and keep the pipe clean during and after laying.
- B. The Contractor shall use proper implements, tools and facilities for the safe and proper protection of the work. He shall lower the pipe into the trench in a manner to avoid any physical damage to the pipe, remove all damaged pipe from the job site and under no circumstances shall the pipe be dropped or dumped into trenches.

3.03 LINE AND GRADE

- A. The Contractor shall not deviate more than 1/2-inch for line and 1/4-inch for grade from the line design and design grade established by the County provided that such variation does not result in a level or a reverse sloping invert. He shall measure the grade at the pipe invert and not at the top of the pipe. The Contractor shall furnish, set and control the line and grade by laser beam method. Other methods of controlling line and grade may be submitted to the County for approval if using the laser beam method proves to be impractical because of other conditions.
- B. The Contractor shall use the laser beam method of maintaining line and grade. The Contractor shall submit evidence to the County that a qualified operator shall

handle the equipment during the course of construction. A "Caution-Laser Light" placard shall be displayed in a conspicuous place. When "in the pipe" method is used, grade boards shall be installed for the first 50 feet of pipe. The Contractor shall check the line and grade at any additional points at which offset stakes have been placed and when requested by the County. A fan shall be provided to circulate the air if bending of the beam due to air temperature variations becomes apparent with "in the pipe" units. However excessive air velocity shall not be permitted to cause pulsating or vibrating of the beam. If, in the opinion of the County, the beam cannot be accurately controlled, this method of setting line and grade shall be discontinued. When the above ground method is used, the set-up shall be checked with the three grade boards including one set at the upstream manhole. If the laser has a gradient indicator, two boards may be used to check the set-up. The grade board at the up-stream manhole shall be retained to check into as pipe laying progresses.

3.04 PREPARATION OF TRENCH

- A. The Contractor shall provide pipe bedding material under all the pipe for the full trench width. The minimum depth of bedding material below the pipe barrel shall be as follows

Minimum Depth of

<u>Pipe Size</u>	<u>Bedding Under Pipe Barrel</u>
15" & Smaller	4 inches
18" to 36"	6 inches
42" & Large	9 inches

- B. The depth of pipe bedding material under the pipe bell shall not be less than three inches under normal trench conditions.
- C. The Contractor shall hand-grade bedding to proper grade ahead of the pipe laying operation. The bedding shall provide a firm, unyielding support along the entire pipe length.
- D. Should the Contractor excavate the trench below the required depth for pipe bedding material placement without direction from the County, the Contractor shall fill the excess depth with pipe bedding material as specified herein to the proper subgrade.
- E. The Contractor shall excavate bell holes at each joint to permit proper assembly and inspection of the entire joint.

3.05 DEWATERING

The Contractor shall prevent water from entering the trench during excavation and pipe laying operations to properly grade the bottom of the trench and allow for proper compaction of the backfill. Pipe shall not be laid in water.

3.06

LAYING AND JOINTING PIPE AND FITTINGS

- A. The Contractor shall lay pipe upgrade with spigot ends pointing in direction of flow. After a section of pipe has been lowered into the prepared trench, he shall clean the end of the pipe to be joined, the inside of the joint and, if applicable, the rubber ring immediately prior to joining the pipe. The Contractor shall assemble the joint in accordance with the recommendations of the manufacturer of the type of joint used. He shall provide all special tools and appliances required for the jointing assembly.
- B. The Contractor shall lay all pipe uniformly to line and grade so that the finished sewer shall present a uniform bore. Variations from line and grade in excess of the tolerances specified under LINE AND GRADE are not acceptable and the work shall be rejected.
- C. The Contractor shall check the pipe for alignment and grade after the joint has been made. The pipe bedding shall form a continuous and uniform bearing and support for the pipe barrel between joints. Sufficient pressure shall be applied to the joint to assure that the joint is "home" as defined in the standard installation instructions provided by the pipe manufacturer. The Contractor shall place sufficient pipe cover material to secure the pipe from movement prior to installing the next joint to assure proper pipe alignment and joint makeup.
- D. Pipe 21" and smaller intended to be in straight alignment shall be laid so that the inside joint space does not exceed 3/8" in width. If interior joints on 24" and larger pipe laid either in straight alignment or on a curve are greater than 3/8", the Contractor shall thoroughly clean the joint surfaces and fill and seal the entire joint with premixed mortar conforming to ASTM C-387 only after the trench has been backfilled, unless otherwise approved by the County. Trowel smooth on the inside surface. Water shall not be allowed to rise in or around, or pass over any joint before it has substantially set.
- E. When the Contractor lays pipe within a movable trench shield, he shall take all necessary precautions to prevent pipe joints from pulling apart when moving the shield ahead.
- F. The Contractor shall prevent excavated or other foreign material from getting into the pipe during the laying operation. He shall close and lock the open end of the last laid section of pipe to prevent entry of foreign material or creep of the gasketed joints when laying operations cease, at the close of the day's work, or whenever the workers are absent from the job.
- G. The Contractor shall plug or close off the pipes which are stubbed off with temporary plugs.
- H. The Contractor shall take all necessary precautions to prevent the "uplift" or floating of the line prior to the completion of the backfilling operation.
- I. The Contractor shall make connections of non-reinforced pipe to manholes or concrete structures, so that a standard pipe joint is located at a minimum of 18" outside the edge of structure.

- J. When field cutting and/or machining the pipe is necessary, the Contractor shall use only tools and methods recommended by the pipe manufacturer and approved by the County.
- K. Service lateral shall be constructed by the Contractor as shown on the standard sewer details and located approximately as shown on the Contract Drawings.

3.07 LAYING PLASTIC PIPE

- A. Polyvinyl chloride (PVC) pipe shall be installed by the Contractor in accordance with the instructions of the manufacturer, as shown on the Drawings and as called out in the Contract Documents.
- B. The Contractor shall lay the pipe, bedding and backfill to lines and grade shown on the Drawings and called out in the Contract Documents. Blocking under the pipe will not be permitted.
- C. The Contractor shall install a green metallic tape as shown in these Standards below finish grade along the entire pipeline PVC sewer main pipe route.
- D. The Contractor shall use care in the handling, storage and installation of pipe. Storage of pipe on the job site shall be done in accordance with the pipe manufacturer's recommendation.

3.08 BACKFILL IN THE PIPE ZONE

- A. The pipe zone shall be considered to include the full width of the excavated trench from the bottom of the trench to a point above the top outside surface of the barrel of the pipe.
- B. The Contractor shall pay particular attention to the area of the pipe zone from the flow line to the springline of the pipe to insure that firm support is obtained to prevent any lateral movement of the pipe during the final backfilling of the pipe zone.
- C. The Contractor shall take care to insure that the pipe does not rest directly on the bell or pipe joint, but is uniformly supported on the barrel throughout its entire length.
- D. After the pipe is laid by the Contractor to line and grade, he shall place and carefully compact pipe bedding material for the full width of the trench to the springline of the pipe. He shall place the material around the pipe in 6-inch layers and thoroughly hand tamp with approved tamping sticks supplemented by "walking in" and slicing with a shovel to assure that all voids are filled.
- E. The Contractor shall backfill and carefully compact the area above the pipe springline with pipe cover material to a point 12" above the top outside surface of the pipe barrel. Pipe bedding material may, at the Contractor's option, be substituted for pipe cover material.

3.09 EXCESS TRENCH WIDTH

- A. Normal trench widths shall be as shown on the Drawings. If the normal trench width below the top of the pipe is exceeded for any reason, the Contractor shall furnish an adequate support for the pipe. The County may determine that the pipe being used is strong enough for the actual trench width or the Contractor may furnish a stronger pipe or a concrete cradle for approval.
- B. Concrete thickness under the pipe shall be one-third of the nominal diameter of the pipe, but not less than four inches. Concrete block or brick may be used for adjusting and maintaining proper grade and elevation of pipe. After the pipe is laid to line and grade, the Contractor shall place 3,000 psi concrete under the pipe for the full width of the trench to form a cradle of the required length and thickness with the concrete brought up to a level equal to 1/4 of the inside pipe diameter below the springline of the pipe. Start and terminate the concrete cradle at the face of a pipe bell or collar. Do not encase pipe joints at the ends of the concrete cradle.
- C. After the concrete has taken initial set, the Contractor shall place cover material over the concrete cradle and up to a level 12" above the pipe barrel and for the full width of the trench. Cover material shall be placed by hand or by equally careful means.

3.10 CONNECTING DISSIMILAR PIPE MATERIALS

The Contractor shall use the following method to connect dissimilar pipe materials. Use concrete closure collars only when approved by the County and then only to make connections between dissimilar pipe when standard rubber gasketed joints or shielded couplings are impracticable. Before the closure collars are poured, wash the pipe to remove all loose material and soil from the surface on which the concrete will be placed. Wet nonmetallic pipe thoroughly prior to pouring the collars. Wrap and securely fasten a light gauge of sheet metal or building-felt around the pipe to insure that no concrete shall enter the line. Place reinforcement as shown on the plans. Make entire collar in one pour using 3,000 psi concrete and extend a minimum 12" on each side of the joint. The minimum thickness around the outside diameter of the pipe shall be 6". No collar shall be poured in water. After the collars are poured and have taken their initial set, cure by covering with well-moistened earth.

3.11 PIPE BULKHEADS

- A. Connections for future sewers shall be bulkheaded by the Contractor in the following manner:
 - 1. All wyes and bell-and-spigot pipe sewers 18" in diameter or smaller shall be bulkheaded with caps or disc stoppers with factory-fabricated resilient joints. The disk or cap shall be banded or otherwise secured to withstand all test pressures without leakage.
 - 2. Connections 21" and 24" in diameter shall be bulkheaded with a four-inch brick wall, using clay brick or concrete brick. The wall shall be capable of withstanding all test pressures without leakage.

3. Connections 27" in diameter and larger shall be bulkheaded with an eight-inch wall, using clay brick or concrete brick. The wall shall be capable of withstanding all test pressures without leakage.

3.12 AIR TEST FOR GRAVITY SEWERS - GENERAL

- A. Gravity sewers shall be required to pass the low pressure air test. All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.10.
- B. Air loss rates may be measured by the County. These tests shall be performed by the Contractor under the observation of the County Inspector.
- C. The groundwater height above the installed pipe shall be determined by attaching a transparent plastic tube to a pipe nipple in the manhole and using the plastic tube as a manometer. A test hole may be dug directly above the sewer main for visual inspection.
- D. The ends of branches, laterals, tees, wyes and stubs included in a test section shall be plugged to prevent air leakage. All plugs shall be secured to prevent blowout due to internal pressure. A test section is defined as the length of sewer between manholes.
- E. The Contractor shall repair all visible leaks in manholes and pipe, even if the leakage test requirements are met.

3.13 TELEVISION INSEPTION OF GRAVITY SEWERS

- A. TV inspection of the entire length of the inside of new gravity sewer mains shall be conducted by the Contractor. The County Inspector shall have been notified and shall be present during the TV inspection.
- B. The sewer pipelines shall be thoroughly cleaned of all dirt, debris or obstructions before the TV inspection. Water shall be added to the upstream manhole until it is seen flowing from the most downstream point of the system to be inspected.
- C. The TV camera shall be a self-propelled, 360 degree pan-head, high resolution, color type and shall have dual DVD recording capability. The camera shall be equipped with a depth gauge calibrated to ¼-inch increments to accurately record the depth of the water in the pipeline. A calibration report shall be submitted with each digital video disk (DVD), which shall include a drawing of the depth gauge, indicating the marks on the gauge, and what depth each mark represents.
- D. The County Inspector shall be present and will observe the TV monitor along with the camera operator as the camera progresses through the pipe. All pipelines will be inspected with the camera progressing in an upstream direction when possible. The camera operator shall record the manhole numbers and the distance the camera has progressed from the downstream manhole as the inspection proceeds. The operator shall stop the progress of the camera and record the distance at all locations along the pipeline where unusual or defective features are encountered. The operator shall record the distance and depth of the water in the pipe at all

locations where the depth is greater than or equal to 75% of the maximum depth as listed in the table below. The camera operator shall make records where cracked, dented or deformed pipe is found, or at joints that are not properly installed, or where infiltration is observed, or at any other abnormality or where any other defective feature is encountered.

- E. Pipe grade between manholes shall not deviate by more than the maximum depth as list below from the design grade line, as measured with the television (TV) camera’s depth gauge during the TV inspection, provided that such deviation does not result in a level or a reverse slope. Joint deflection and longitudinal pipe deflection between manholes that exceeds the maximum depth or more than two deflections that exceed 75% of the maximum depth, as measured with the television camera’s depth gauge during the TV inspection, shall not be accepted.

Pipe Sizes	Water Holding Depth (inches)	
		Maximum
8 inch to 15 inch		1.00
18 inch to 21 inch		2.00
24 inch and greater		2.50

- F. At the end of the inspections, or at the end of the day, one original digital video disk (DVD) of the TV record shall be submitted to the County Inspector along with the written inspection report and depth gauge calibration for evaluation. The County’s representative shall be the sole judge of whether any information imparted by the TV test DVD will cause the County to accept or reject the pipe test section.

3.14 PIPE RING DEFLECTION TESTING OF GRAVITY SEWERS (MANDREL)

- A. The Contractor shall perform a pipe ring deflection test on all new gravity sanitary sewer mains. The rigid ball or mandrel used for the ring deflection test shall have a diameter not less than 95 percent of the base inside diameter or average inside diameter of the pipe depending on which is specified in the ASTM C 3034, to which the pipe is manufactured. The test shall be performed without mechanical pulling devices.
- B. The allowable ring deflection is 5 percent of the inside pipe diameter. Pipes that have a ring deflection that exceeds this amount shall not be accepted.

3.15 FINAL SEWER CLEANING

- A. Prior to final acceptance and final manhole-to-manhole inspection of the sewer system by the County, the Contractor shall flush and clean all parts of the system, remove all accumulated construction debris, rocks, gravel, sand, silt and other foreign material from the sewer system at or near the closest downstream manhole.
- B. During the final manhole-to-manhole inspection of the sewer system, the County may require the Contractor to reflush and clean any section or portion of the line if any foreign matter is still present in the system.

END OF SECTION

SECTION 02627 SANITARY SEWER MANHOLE REHABILITATION

PART 1 GENERAL

1.01 DESCRIPTION

- A. This specification consists of all work, materials, labor and equipment required for manhole rehabilitation for the purpose of eliminating infiltration and exfiltration, providing corrosion protection, adjusting final grade of manhole top, repair of voids and restoration of the structural integrity of the manhole. All such work shall comply with these Specifications and the specific product manufacturer's recommendations. Any conflict between the product manufacturer's recommendations and any portion of the Contract Documents shall be resolved prior to beginning the work.

1.02 PRODUCT AND MANUFACTURER QUALIFICATION REQUIREMENTS

- A. Since sewer products are intended to have a 50-year design life, and in order to minimize the County's risk, only proven products with substantial successful long term track records will be allowed. At a minimum, products and installers must meet all of the following criteria to be deemed commercially acceptable:
1. For a Product to be considered commercially acceptable, the product must have a minimum of two (2) million square feet and ten (10) year history of successful wastewater collection system installations in the United States. In addition, products must provide Third Party Test Results supporting the long-term performance and structural strength of the product and such data shall be satisfactory to the Owner. No product will be allowed without Independent Third-Party Testing verification.
 2. For an installing Contractor to be considered commercially acceptable, the installer must have a certification from the manufacturer as a licensed and fully trained installer of the product. The installer must also have a minimum of one (1) million square feet of successful wastewater collection system installations on underground concrete/masonry structures and ten (10) years of rehabilitation experience.

1.03 SUBMITTALS:

- A. Product
1. Technical data sheets showing the physical and chemical properties.
 2. Material Safety Data Sheets (MSDS).
 3. Third Party Testing results.
 4. Verification of minimum installation requirements set forth in section 1.02.A.1 above.
- B. Installer
1. Verification of "certified applicator" status.

2. Verification of minimum installation requirements set forth in section 1.02.A.2 above.
- C. Written certification from the product manufacturer that each of the proposed rehabilitation products is compatible with each other.
- D. Submit with Each Project:
1. Description, layout, and application sequencing plan.
 2. Rehabilitation system application requirements including material handling and storage requirements, mixing and proportioning requirements (as applicable), maximum pot life, film/coating thickness, curing, testing and certification requirements of all rehabilitation materials. Product Material Safety Data Sheets.
 3. Detailed instructions and methodology for finishing all pipe and manhole connections to rehabilitated manholes to prevent infiltration and exfiltration.
 4. Wastewater Flow Control/Bypassing Plan.
 5. Confined Space Entry Plan/Permit.
 6. Plan for capturing extraneous debris during rehabilitation processes and debris disposal.

1.04 MATERIALS

- A. Refer to the latest Manatee County Public Works Utility Standards Section 12 Precast Concrete Manholes and Wetwells for material requirements and details.

1.04.1 CEMENTITIOUS MORTOR

- A. Mortar shall be made of one part Portland cement and two parts clean sharp sand. Cement shall be Type 1 and shall conform to ASTM C 150. Sand shall meet the requirements of ASTM C 144.

1.04.2 PATCHING MATERIAL

- A. A quick setting fiber reinforced cementitious material shall be used as a patching material and is to be mixed and applied according to manufacturer's recommendations.

1.04.3 HYDRAULIC CEMENT

- A. A rapid setting, high-early-strength, cementitious product specifically formulated for leak control shall be used to stop water infiltration. The material shall be mixed and applied according to the manufacturer's recommendations.

1.04.4 CHEMICAL GROUT

- A. A chemical grout shall be used for stopping very active infiltration and filling voids.

1.04.5 LINER MATERIAL

A. CEMENTITIOUS MATERIAL

1. Cementitious liner products shall be used to form a structural monolithic liner covering all interior manhole surfaces and shall have the following minimum requirements:
 - a. Compressive Strength (ASTM C109): 7,000 psi, 28days
 - b. Tensile Strength (ASTM C496): 700 psi, 28 days
 - c. Flexural Strength (ASTM C293): 1,300 psi, 28 days
 - d. Shrinkage (ASTM C596): 0.02% at 28 days
 - e. Minimum Bond (ASTM C952): 200 psi, 28 days
2. Refer to Section 09970 Surface Protection Spray System of the specifications.

When used as the final rehabilitation liner material (no epoxy liner), product shall be made with calcium aluminate cement. Calcium aluminate is not required when the cementitious liner is used as the underlayment for a protective coating liner application.

B. PROTECTIVE COATING LINER MATERIAL

1. The protective coating liner is to be applied where corrosion is anticipated. The protective coating liner material shall be applied over the completed cementitious liner material (without the calcium aluminate). The liner shall be spray applied or spin cast. The manufacturer of the selected protective coating liner material shall approve in writing that their protective coating liner is compatible with cementitious repair and liner material.
2. The protective coating liner material shall conform to Section 09970 Surface Protection Spray Systems of the specifications.

C. WATER

1. Water shall be clean and potable.

1.04.6 INTERNAL MANHOLE CHIMNEY SEAL MATERIAL

- ##### A.
- An aromatic urethane rubber material or flexible epoxy mastic used to prevent leakage of water into the manhole through the frame joint area and the area above the manhole cone and shall have the following minimum requirements:

1. Elongation (ASTM D412): 600%
2. Tensile Strength (ASTM D412): 1,150 psi
3. Adhesive Strength (ASTM D903): 175 lb. /in.
4. Tear Resistance (ASTM D1004): 155 lb. /in.

The seal shall extend from the inside of the manhole frame down to the cone or corbel of the manhole.

1.04.7 EXTERNAL MANHOLE SEAL WRAP

- A. External Manhole Seal Wrap: When work consists of adjusting manholes or cone replacements, an external seal wrap shall be installed to the outside of concrete risers, steel risers and joints of the precast manhole in order to eliminate infiltration. The external seal wrap shall conform with Manatee County Public Works Department Utility Standards Section 12 and be installed in accordance with the details of the Contract Documents and the manufacturer's recommendations.

1.05 PREPARATION

- A. Perform traffic control in accordance with the approved traffic control submittal.
- B. Store materials in accordance with manufacturer's recommendations.
- C. Schedule and perform the work in a manner that does not cause or contribute to overflows or spills of sewage from the sewer system.
- D. Install devices to prevent extraneous material from entering the sewer system and to prevent upstream line from flooding the manhole. If extraneous material or debris falls into a "live" manhole during adjustment operations, the Contractor shall remove debris at no cost to the Owner.
- E. Dispose of wastes in accordance with applicable regulations.
- F. Schedule and perform any bypass pumping that will be necessary to properly rehabilitate the manhole.
- G. If present in the manhole, Contractor shall remove all access steps. Removal shall consist of neatly cutting steps flush with the wall prior to any lining installation. Contractor shall be responsible for proper disposal of steps.
- H. For manholes that are located within pavement areas and require resetting or replacement of concrete riser rings, cones, and /or frames, the Contractor shall sawcut, remove, and replace a 6 ft. x 6 ft. square or round section of pavement and base for rehabilitation operations. Costs for removal and replacement of pavement and base beyond these limits shall be borne by the Contractor.

1.06 INSTALLATION

- A. Prior to any lining all other miscellaneous work must be complete.
- B. Prior to man entry into any structure to be rehabilitated, proper ventilation and strict confined space OSHA regulations shall be followed. Failure to do so shall be grounds for removal from the project.

1.06.1 CONE REPLACEMENT

- A. The Contractor shall replace existing deteriorated manhole cone section with new precast concrete cone section. A preformed rubber gasket shall be placed in all keyways between existing manhole riser section and cone joints. Prior to

backfilling, rubber external seal wraps shall be applied to the cone and manhole section joint, riser rings and frame in accordance with Manatee County Public Works Department Utility Standards. If the existing manhole is of brick construction, the cone shall be set in a full bed of mortar on the top course of bricks.

1.06.2 RISER RINGS

- A. The Contractor shall replace existing, deteriorated riser rings with new precast concrete riser rings. All manholes designated to receive casting adjustment and/or alignment shall be adjusted to meet existing finished grade unless an alternative elevation is specified. A cementitious mortar shall be placed in between individual precast concrete riser rings, and precast concrete riser ring and cone joints. The mortar shall be struck smooth with the interior surface of the manhole and floated with a sponge float to a surface profile of 8-10 mils. Prior to backfilling, rubber external seal wraps shall be applied to the cone and manhole section joint, riser rings and frame in accordance with Manatee County Public Works Department Utility Standards.

1.06.3 MANHOLE FRAME AND COVER

- A. Existing frames and covers which must be removed to facilitate manhole rehabilitation, riser reconstruction, and/or casting alignment or grade adjustments shall be salvaged, cleaned and given two coats of an approved bituminous coating by the Contractor for replacement unless determined to be defective by County. If manhole frame and/or cover are determined to be defective, Contractor shall replace with new frame and/or cover. Replacement frames and/or covers shall be furnished and installed in accordance with the Contract Documents. Frames shall be set in full mortar bed. The mortar shall be struck smooth with the interior surface of the manhole and floated with a sponge float to a surface profile of 8-10 mils.

1.06.3.A MANHOLE FRAME AND COVER ADJUSTMENT RINGS

- A. Existing manhole covers, which must be adjusted to existing or new pavement surfaces, shall be adjusted by modifying the existing precast concrete adjustment rings to bring the entire existing ring and cover to grade.
- B. No manhole cover adjustment rings shall be allowed.

1.06.4 CEMENTITIOUS LINER

- A. Active leaks shall be stopped using hydraulic cement or chemical grout as necessary. Installation shall be in accordance with the manufacturer's recommendations.
- B. All manholes to be lined shall be cleaned and scarified with a minimum of 5,000 psi water jet at a minimum water temperature of 180 degrees F. The water jet shall hit the manhole wall surface at as near perpendicular angle as possible. Cleaning the manhole walls from the ground surface without the appropriate angled nozzles will not be accepted. Manhole surface build-up of debris and loose manhole construction materials shall be removed during the cleaning process.

- C. The intent of the surface preparation and cleaning work is to remove debris, films (oil, greases, etc. or unsound, deteriorated concrete and to provide a structurally sound, clean surface that will enable lining materials to bond to the original substrate at adhesion strengths of that specified herein, a substrate pH of 8.3 is the minimum pH that will be considered acceptable to demonstrate that the surface preparation and cleaning have been properly performed.
- D. Additional aggressive surface preparation and cleaning methods may be necessary to remove carbonated cementitious lining concrete or contaminants that remain after the cleaning performed as described above. The Contractor shall test the pH of the cleaned manhole interior surface at various locations of the manhole and when the results indicate a pH less than 8.3 then additional surface preparations and cleaning will be required. As a minimum level of effort the Contractor shall either dry sand blasting or pneumatic jackhammering with a bushing bit followed by a minimum 5,000 psi water blast.
- E. Any bench, invert or service line repairs shall be made at this time using quick setting grout or repair mortar per the manufacturer's recommendations.
- F. Invert repair shall be performed on all inverts with visible damage or where infiltration is present. After blocking flow through the manhole and thoroughly cleaning the invert, quick setting patch material shall be applied to the invert in an expeditious manner. The finished invert surfaces shall have a smooth surface and form a continuous monolithic conduit with the sewer pipe entering and leaving the manhole. The bench and invert shall form a watertight seal with the manhole walls, base and pipe seal.
- G. Wastewater flow shall be controlled by methods which prevent contact with the new bench and invert for 6-8 hours after mortar placement. If 6-8 hours set time is not possible, a fast setting, high early strength mortar shall be used with provisions for flow control until concrete has set.
- H. Fill all cracks, holes and joints that have voids using non-shrink grouts in accordance with the manufacturer's recommendations.
- I. Apply Cementitious Liner Material per the Manufacturer's recommendations. Apply Cementitious Liner material so that the final thickness is 0.5-inch minimum or per the thickness required by the manufacturer's minimum specification, whichever is greater. The material shall start at the bottom of the manhole frame and extend to the water level of the invert.
- J. Finishing: Trowel the surface of the liner to create a uniform smooth finish. Caution shall be taken to prevent over working the material. Once the initial cure has taken place, the exposed surface area should be given a broom finish. Thickness may be verified at any point with a wet gage.
- K. If the cementitious lining material is not immediately coated with a protective coating liner, apply a seal coat compatible with the repair material to aid in curing and minimize recontamination of the substrate prior to application of the protective coating liner material.

1.06.5 PROTECTIVE COATING LINER

- A. Prior to any protective coating lining perform all work shown in Section 1.06.4 above.
- B. Remove any curing compounds, sealers or contaminates prior to protective coating lining.
- C. Apply protective coating lining material in accordance with the manufacturer's recommendations over the waterproofing/structural repair material shown in Section 1.06.4.
- D. Apply protective coating lining material to all internal surface area of the structure.
- E. Apply protective coating lining material in accordance to Section 09970 Surface Protection Spray System of the specifications.

1.06.6 INTERNAL MANHOLE CHINMEY SEALANT

- A. Perform all work shown in Sections 1.06.4 and 1.06.5 (if 1.06.5 is required) prior to any Internal Manhole Chimney Sealant.
- B. Clean all contaminates from manhole frame by sandblasting or mechanical methods as recommended by the chimney sealant manufacturer.
- C. Install Internal Manhole Chimney Sealant in accordance with the manufacturer's recommendations. The Contractor shall contact the manufacture for thickness recommendations; however, the final liner material shall be made no less than 170 mils.

1.06.7 EXTERNAL MANHOLE SEAL WRAP

- A. When Work consists of adjusting sewer manholes or cone replacement, an external seal wrap shall be installed to the outside of concrete risers, steel risers and joints of the precast manhole in order to eliminate infiltration. Frame and cover shall be completely coated prior to installation of the external seal wrap. The external seal wrap shall be installed in accordance with the details of the Contract Documents and the manufacturer's recommendations.

1.06.8 MANHOLE INSERT

- A. If existing manhole is not equipped with a watertight manhole insert, Contractor shall furnish and install a new manhole insert per Manatee County Public Works Utility Standards Section 12 and in accordance with the manufacturer's recommendations.
- B. If existing manhole is equipped with a watertight manhole insert to prevent intrusion of storm water, the insert shall be cleaned and reinstalled by the Contractor, unless determined to be defective by the County. If insert is determined to be defective, Contractor shall furnish a new watertight manhole insert and install in accordance

with manufacturer's recommendations at the completion of manhole rehabilitation operations.

1.07 TESTING

- A. After completion of any rehabilitation operation and prior to backfilling (if required), the Contractor shall conduct the following tests on the manholes:
 - 1. Visual Inspection: The County and Contractor shall make a final visual inspection. Any deficiencies in the finished system shall be marked and repaired.
- B. If a protective coating liner is applied, the following additional tests will be required:
 - 1. Wet Film Thickness Gage: During application a wet film thickness gage, meeting ASTM D4414 - Standard Practice for Measurement of Wet Film Thickness of Organic Coatings by Notched Gages, shall be used to ensure a monolithic coating and uniform thickness during application.

1.08 WARRANTY

- A. The Contractor shall guarantee the work to be free of defects in materials and workmanship for five-year period, unless otherwise stated, after completion and acceptance of the work. The Contractor shall repair defects in materials or workmanship, which may develop during the warranty period; and any damage to other work caused by such defects or discovered within the same period at no additional cost to the County.

1.08.1 WARRANTY INSPECTIONS

- A. Conduct visual inspection prior to expiration of warranty to determine integrity of rehabilitation materials and water-tightness.
 - 1. Complete post inspection during first high groundwater period (spring or fall) following acceptance of work.
 - 2. Contractor should accompany County on inspections.
 - 3. Inspect a minimum of 25 percent of the manholes rehabilitated at locations selected by County.
 - a. Infiltration and Inflow: None
 - b. Structural Repair: Sound
 - c. If more than one manhole fails warranty inspection, inspect all manholes with similar characteristics.
 - d. Repair defects in accordance with Warranty.

END OF SECTION

SECTION 02640 VALVES AND APPURTENANCES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. All of the types of valves and appurtenances shall be products of well-established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these standards as applicable. Valves used in waterworks applications shall comply with Section 8 of NSF Standard 61 for mechanical devices.
- C. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaimed water, wastewater, etc., depending on the applications.
- D. All valves and appurtenances shall be of the size shown on the drawings and, to the extent possible, all equipment of the same type on the project shall be from a single manufacturer.
- E. All valves and appurtenances shall have the name of the manufacturer, year of the valve and the working pressure for which they are designed cast in raised letters upon some visible part of the body.
- F. Special tools, if required for the normal operation or maintenance, shall be supplied with the equipment.
- G. All hand actuated buried valves shall have three-piece adjustable valve boxes and 2-inch square AWWA operating nuts. Provide stainless steel extension stems and alignment rings where needed to bring the operating nut to within 4 feet below the box lid.
- H. Water and reclaimed water system isolation valves shall be gate valves for sizes 2-inch through 12-inch and shall be butterfly valves for sizes 16-inch and larger.
- I. Isolation valves for sewer force main pipelines shall be gate valves, unless otherwise noted on the plans. Tapping valves shall be used for tapping force mains. Plug valves shall be full port, have a 100% circular cross section, and must have prior written authorization from the County for use.
- J. Valves shall open when turning the operating nut or wheel counterclockwise and shall close when turning clockwise.
- K. All bonnet bolts, gland bolts, flange connection bolts, nuts, washers, and other trim hardware exposed to the outside environment shall be stainless steel. Thrust collar

tie-rod bolts shall be stainless steel. All MJ-type underground bolts, nuts, and washers shall be COR-TEN or stainless steel.

- L. All valves shall have a factory applied, holiday free, fusion bonded epoxy coating on the interior and exterior unless otherwise noted in the plans or the following specification. All other painted items exposed to sunlight, including field painted box lids, etc., shall be painted the appropriate color with an epoxy type paint.
- M. No valves with a break-way stem shall be allowed.
- N. The equipment shall include, but not be limited to, the following:
 - 1. Gate valves (Sec. 2.01)
 - 2. Combination Pressure Reducing and Pressure Sustaining with Check Valves Option (Sec. 2.02)
 - 3. Ball Valves (Sec. 2.03)
 - 4. Butterfly Valves (Sec. 2.04)
 - 5. Plug Valves (Sec. 2.05)
 - 6. Valve Actuators (Sec. 2.06)
 - 7. Air Release Valves (Sec. 2.07)
 - 8. Valves Boxes (Sec. 2.08)
 - 9. Corporation Stops and Saddles (Sec. 2.09)
 - 10. Flange Adapters and Plain End Couplings (Sec. 2.10)
 - 11. Hose Bibs (Sec. 2.11)
 - 12. Swing Check Valves (Sec. 2.12)
 - 13. Hydrants (Sec. 2.13)
 - 14. Restrained Joints (Sec. 2.14)
 - 15. Tapping Sleeves and Tapping Valves (Sec. 2.15)
 - 16. Tracer Wire Boxes (Sec. 2.16)

1.02 SUBMITTALS

- A. Submit to the County within 30 days after execution of the contract a list of materials to be furnished, the names of the suppliers and the date of delivery of materials to the site.
- B. Complete shop drawings of all valves and appurtenances shall be submitted to the County for approval in accordance with the Specifications.

1.03 TOOLS

Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 GATE VALVES

- A. Where indicated on the drawings or necessary due to locations, size, or inaccessibility, chain wheel operators shall be furnished with the valves. Such operators shall be designed with adequate strength for the valves with which they

are supplied and provide for easy operation of the valve. Chains for valve operators shall be galvanized.

- B. Gate valves installed underground shall be provided with a box cast in a concrete pad and a box cover. Stainless steel or equivalent valve extension stems shall be provided to place the valve operating nut no more than 4 feet deep. One valve wrench, 6 feet in length, shall be provided for every 15 valves installed.
- C. Gate valves 2 inches to 14 inches in diameter shall be resilient seated, manufactured to meet or exceed the requirements of AWWA C509 or AWWA C515 and shall be UL listed and FM approved where applicable. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve.
- D. The valves shall have a non-rising stainless steel stem to eliminate lead content. All bolts, nuts and washers shall be stainless steel to eliminate exterior corrosion and maintain fastener strength. Manufacturer shall use Never-Seez or equivalent during assembly of bolt and nut sets to prevent galling of similar metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the thrust collar. Valves that are located above grade and located in valve vaults shall be OS&Y with flanged joints.
- E. The wedge shall be ductile iron fully encapsulated with an EPDM rubber. The Elastomer type shall be permanently indicated on the disc or body of the valve. The resilient sealing mechanism shall provide zero leakage at the water working pressure when installed with the line flow in either direction.
- F. The valve body, bonnet, and bonnet cover shall meet or exceed all the requirements of AWWA C515.
- G. Valves meeting AWWA C515 requirements shall be rated for an operating pressure of 250 psi and shall be tested in accordance with AWWA C515.
- H. The valves are to have 2-inch cast or ductile iron AWWA operating nuts and shall open left or counterclockwise.
- I. The valves shall be covered by a Manufacturer's 10 year warranty on manufacturer's defects and reasonable labor costs for replacement. Warranty shall become effective from the date of purchase by the end user and delivered within 30 days from the receipt of the purchase order. For publicly owned and maintained utilities, the end user is Manatee County Government.
- J. Gate valves shall be assembled and tested in a certified ISO 9001:2000 manufacturing facility within the United States and provide their certification of meeting internationally recognized quality control procedures.

2.02 COMBINATION PRESSURE REDUCING & PRESSURE SUSTAINING WITH CHECK VALVE OPTION

- A. Pressure sustaining and check valve shall be pilot operated diaphragm actuated valve with cast iron body, bronze trim, and 125-pound flanged ends. The valve shall be hydraulically operated, diaphragm type globe valve. The main valve shall

have a single removable seat and a resilient disc, of rectangular cross section, surrounded on three and a half sides. No external packing glands are permitted and there shall be no pistons operating the main valve or any controls. The valve shall be equipped with isolation valves to service the pilot system while permitting flow if necessary. Main valve and all pilot controls shall be manufactured in the United States of America. Valve shall be single chamber type, with stainless steel stem.

- B. Valve shall automatically reduce pressure for the downstream distribution network and sustain a minimum pressure in the high pressure main regardless of distribution demand, and as an option, shall also close when a pressure reversal occurs for check valve operations. The pilot system shall consist of two direct acting, adjustable, spring loaded diaphragm valves.
- C. Valve shall be cast iron or ductile iron with main valve trim of brass and bronze. The pilot control valves shall be cast brass with 303 stainless steel trim. Valve shall be similar in all respects to Cla-Val Company, Model 92-01 or a similar control valve such as Bernad Model 723, GA Industries Model 4700 or an approved equal.

2.03 BALL VALVES

- A. Ball valves for water and reclaimed water, in sizes 3/4-inch through 2-inch, shall be brass body, stem and ball per ASTM B 62, alloy 85-5-5-5, full port, full flow, 1/4-turn check, ball curb valves, rated for 300 psi, Mueller 300 (as specified in the table below), Ford B-Series, or approved equal, with compression, pack joint, flare, threaded or flanged ends as required. Ball valves for wastewater, 2-inch through 3-inch, shall be 316 stainless steel body, cap, stem and ball per ASTM A351, full port, full flow, 1/4-turn check, ball valves, steam rated for 150 psi, pressure rating 1,000 psi CWT, Apollo 76F or approved equal, with threaded or flanged ends as required.

Curb Stops for Water and Reclaimed Water

Pipe Material	Type of Connection	Model
HDPE	Compression x FIP	B-25170 *
HDPE	Pack Joint x FIP	P-25170 *
Copper	Compression x FIP	B-25170
Copper	Flare x FIP	B-25166
Stainless Steel	FIP x FIP Thread	B-20200
* Insert required, part number per manufacturer product information		

- B. All valves shall be mounted in such a position that valve position indicators are plainly visible. Above grade ball valves shall have a vinyl coated lever handle. Lever handle, handle nut, and lever packing gland shall be 304 or 316 stainless steel.
- C. Potable plastic service pipe material and compression and pack joint connectors shall not be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents. Appropriate service tubing shall apply.

2.04 BUTTERFLY VALVES

- A. Butterfly valves shall conform to AWWA C504, Class 250 B, Mueller Lineseal XP11, DeZurik AWWA, Pratt HP-250II, or an approved equal.
- B. Valve seats shall be an EPDM elastomer. Valve seats 24 inches and larger shall be field adjustable and replaceable without dismounting operator disc or shaft and without removing the valve from the line. Valves 20 inches and smaller shall have bonded or mechanically restrained seats as outlined in AWWA C504.
- C. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The hydrostatic test for Class 250 valves shall be performed with an internal hydrostatic pressure equal to 500 psi applied to the inside of the valve body of each valve. During the hydrostatic test, there shall be no leakage through the metal, the end joints or the valve shaft seal. The leakage test for the Class 250 valves shall be performed at a differential pressure of 250 psi and against both sides of the valve. No adjustment of the valve disc shall be necessary after pressure test for normal operation of valve. All valves shall be leak-tight in both directions.
- D. Butterfly valve actuators shall conform to AWWA C504. Gearing for the actuators shall be totally enclosed in a gear case. Actuators shall be capable of seating and unseating the disc against the full design pressure and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.
- E. The valve shaft shall be constructed of 18-8, ASTM A-276, Type 304 stainless steel and designed for both torsional and shearing stresses when the valve is operated under its greatest dynamic or seating torque. Shaft shall be of either a one piece unit extending full size through the valve disc and valve bearing or it may be of a stub shaft design. Shaft bearings shall be teflon or nylon, self-lubricated type.
- F. Gearing for the operators shall be totally enclosed in a gear case in accordance with paragraph 3.8.3 of the above mentioned AWWA Standard Specification.
- G. Operators shall be capable of seating and unseating the disc against the full design pressure of velocity, as specified for each class, into a dry system downstream and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.
- H. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform with all requirements of this Specification and the AWWA standard.
- I. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.05 PLUG VALVES

- A. Plug valves shall be eccentric, non-lubricating type with integral plug and shafts and shall be furnished with end connections and with actuating mechanisms as called for on the construction plans or as otherwise required. Valves shall seal

bubble-tight or water drop-tight in both directions when tested according to the Leakage Test method of AWWA C504 with a hydrostatic pressure of 150 psi.

- B. Plug valves shall also be subjected to the internal, full body Hydrostatic Test of AWWA C504 at a pressure two times the rated pressure or a minimum pressure of 300 psi, whichever is greater. During the test, there shall be no leakage through the metal, or through the end joints or shaft seal, nor shall any part of the valve be deformed. Plug valves shall be Kennedy or Dezurik.
- C. Flanged valve ends shall be faced and drilled according to ANSI B 16.1, Class 125. Mechanical joint valve ends shall conform to AWWA C111. Threaded ends shall conform to the NPT requirements of ANSI B1.20.1.
- D. The plug valve body, bonnet and gland shall be ductile iron per ASTM A 126, Class B. The integral plug and shafts shall be cast iron ASTM A 126, Class B, or 316 stainless steel. The entire plug, except for the shafts, shall be covered with nitrile (Buna N) rubber. The rubber compound shall have been vulcanized to the metal plug and shall have a peel strength of not less than 75 pounds per inch when tested according to ASTM D 429, method B. The valve seat shall be at least 90 percent pure nickel, welded-in overlay into the cast iron body. The top and bottom bearings shall be 316 stainless steel.
- E. Plug valves shall have a full port area of 100 percent of the nominal pipe size area.
- F. Valves shall have worm gear type actuators with 2-inch square operating nuts.
- G. Plug valves shall be installed side-ways with plug shaft horizontal so that the plug rotates upward when it opens, with the flow entering the seat end of the valve.
- H. Plug valves shall be coated inside with Protecto 401 or amine-cured novolac ceramic epoxy or another two-part epoxy suitable for sanitary sewer service which has been approved by Manatee County.

2.06 VALVE ACTUATORS

- A. Butterfly valve and plug valve actuators.

Butterfly valve and plug valve actuators shall conform to the requirements for actuators presented in AWWA C 504 and shall be either manual or motor operated. Actuators shall be capable of seating and unseating the disc against the full design pressure and velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Actuators shall be rigidly attached to the valve body.

- B. Manual Actuators.

Manual actuators shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Actuators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions. They shall turn counter-clockwise to open valves. Manual

actuators shall be of the traveling nut, self-locking type or of the worm gear type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Valves located above grade shall have handwheel and position indicator, and valves located below grade shall be equipped with a 2-inch square AWWA operating nut located at ground level and cast iron extension type valve box.

C. Motor Actuators (Modulating)

- 1) The motor actuated valve controller shall include the motor, actuator unit gearing, limit switch gearing, limit switches, position transmitter which shall transmit a 4-20 mA DC signal, control power transformer, electronic controller which will position the valve based on a remote 4-20 milliamp signal, torque switches, bored and key-wayed drive sleeve for non-rising stem valves, declutch lever and auxiliary handwheel as a self-contained unit.
- 2) The motor shall be specifically designed for valve actuator service using 480 volt, 60 Hertz, three phase power as shown, on the electrical drawings. The motor shall be sized to provide an output torque and shall be the totally enclosed, non-ventilated type. The power gearing shall consist of helical gears fabricated from heat treated alloy steel forming the first stage of reduction. The second reduction stage shall be a single stage worm gear. The worm shall be of alloy steel with carburized threads hardened and ground for high efficiency. The worm gear shall be of high tensile strength bronze with hobbled teeth. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout. Preference will be given to units having a minimum number of gears and moving parts. Spur gear reduction shall be provided as required.
- 3) Limit switches and gearing shall be an integral part of the valve control. The limit switch gearing shall be made of bronze and shall be grease lubricated, intermittent type and totally enclosed to prevent dirt and foreign matter from entering the gear train. Limit switches shall be of the adjustable type capable of being adjusted to trip at any point between fully opened valve and fully closed valve.
- 4) The speed of the actuator shall be the responsibility of the system supplier with regard to hydraulic requirements and response compatibility with other components within the control loop. Each valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing. The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Gear limit switches must be geared to the driving mechanism and in step at all times whether in motor or manual operation. Provision shall be made for two additional rotors as described above, each to have two normally open and two normally closed contacts. Each valve controller shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve, should excessive load be met by obstructions in either direction of travel. The torque switch shall be provided with double-pole contacts.
- 5) A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operations, but must be responsive to manual operation at all times except when being electrically

operated. The motor shall not rotate during hand operation nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve operator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. This movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running. The gear limit switches and torque switches shall be housed in a single easily accessible compartment integral with the power compartment of the valve control. All wiring shall be accessible through this compartment. Stepping motor drives will not be acceptable.

- 6) The motor with its control module must be capable of continuously modulating over its entire range without interruption by heat protection devices. The system, including the operator and control module must be able to function, without override protection of any kind, down to zero dead zone.
- 7) All units shall have strip heaters in both the motor and limit switch compartments. The actuator shall be equipped with open-stop-close push buttons, an auto-manual selector switch, and indicating lights, all mounted on the actuator or on a separate locally mounted power control station.
- 8) The electronics for the electric operator shall be protected against temporary submergence.
- 9) Actuators shall be Limitorque L120 with Modutronic Control System containing a position transmitter with a 4-20MA output signal or equal.

D. Motor Actuators (Open-Close)

- 1) The electronic motor-driven valve actuator shall include the motor, actuator gearing, limit switch gearing, limit switches, torque switches, fully machined drive sleeve, declutch lever, and auxiliary handwheel as a self-contained unit.
- 2) The motor shall be specifically designed for valve actuator service and shall be of high torque totally enclosed, nonventilated construction, with motor leads brought into the limit switch compartment without having external piping or conduit box.
- 3) The motor shall be of sufficient size to open or close the valve against maximum differential pressure when voltage to motor terminals is 10% above or below nominal voltage.
- 4) The motor shall be pre-lubricated, and all bearings shall be of the anti-friction type.
- 5) The power gearing shall consist of helical gears fabricated from heat treated steel and worm gearing. The worm shall be carburized and hardened alloy steel with the threads ground after heat treating. The worm gear shall be of alloy bronze accurately cut with a hobbing machine. All power gearing shall be grease lubricated. Ball or roller bearings shall be used throughout.
- 6) Limit switches and gearing shall be an integral part of the valve actuator. The switches shall be of the adjustable rotor type capable of being adjusted to trip at any point between fully opened valve and fully closed valve. Each

valve controller shall be provided with a minimum of two rotor type gear limit switches, one for opening and one for closing (influent valves require additional contacts to allow stopping at an intermediate position). The rotor type gear limit switch shall have two normally open and two normally closed contacts per rotor. Additional switches shall be provided if shown on the control and/or instrumentation diagrams. Limit switches shall be geared to the driving mechanism and in step at all times whether in motor or manual operation. Each valve actuator shall be equipped with a double torque switch. The torque switch shall be adjustable and will be responsive to load encountered in either direction of travel. It shall operate during the complete cycle without auxiliary relays or devices to protect the valve should excessive load be met by obstructions in either direction of travel. Travel and thrusts shall be independent of wear in valve disc or seat rings.

- 7) A permanently mounted handwheel shall be provided for manual operation. The handwheel shall not rotate during electric operation except when being electrically operated. The motor shall not rotate during hand operation, nor shall a fused motor prevent manual operation. When in manual operating position, the unit will remain in this position until motor is energized at which time the valve actuator will automatically return to electric operation and shall remain in motor position until handwheel operation is desired. Movement from motor operation to handwheel operation shall be accomplished by a positive declutching lever which will disengage the motor and motor gearing mechanically, but not electrically. Hand operation must be reasonably fast. It shall be impossible to place the unit in manual operation when the motor is running.
- 8) Valve actuators shall be equipped with an integral reversing controller and three phase overload relays, Open-Stop-Close push buttons, local-remote-manual selector switch, control circuit transformer, three-phase thermal overload relays and two pilot lights in a NEMA 4X enclosure. In addition to the above, a close coupled air circuit breaker or disconnect switch shall be mounted and wired to the valve input power terminals for the purpose of disconnecting all underground phase conductors.
- 9) The valve actuator shall be capable of being controlled locally or remotely via a selector switch integral with the actuator. In addition, an auxiliary dry contact shall be provided for remote position feedback.
- 10) Valve A.C. motors shall be designed for operation on a 480 volt, 3-phase service. Valve control circuit shall operate from a fuse protected 120 volt power supply.
- 11) Motor operators shall be as manufactured by Limatorque Corporation, Type L120 or approved equal.

2.07 AIR RELEASE VALVES

- A. Air release valves shall be automatic float operated, GA Industries fig-929 for sewer applications, Fig-920 for water and reclaimed water application, or an approved equal, with inlet size and working pressure ratings as required and NPT connections.
- B. Valve bodies shall be ductile iron per ASTM A 126, Class B. The orifice, float and linkage shall be stainless steel. The seat shall be (Buna N) nitrile elastomer.

2.08 VALVE BOXES

- A. Buried valves shall have adjustable cast iron or HDPE valve boxes. Lids shall be cast iron drop type, and shall have “WATER”, “SEWER”, or “RECLAIM”, as applicable, cast into the top. Lids will be painted “safety” blue for potable, purple for reclaimed, and green for sanitary sewer.
- B. Cast iron boxes shall be two-piece, or three-piece, as required, screw type, Tyler Pipe, 6850 Series, Box 461-S through 668-S, with extensions, as required to make the desired box length, or an approved equal. Bottom barrel shall be 5-1/4 inches inside diameter, with a flanged bottom with sufficient bearing area to prevent settling.
- C. HDPE boxes shall be two-piece, adjustable, 1/4-inch thick minimum heavy wall, high density polyethylene, with cast iron top and stainless steel adjustable stem, Trench Adapter, as manufactured by American Flow Control, or an approved equal. Bottom barrel shall have flanged bottom to prevent settling. All bolts, screws and pins shall be stainless steel.
- D. Reclaimed Valve Boxes shall be square 9-inch x 9-inch load bearing marked “Reclaimed Water” and painted Pantone 522C purple.
- E. All valves shall either have operating nuts within 4 feet below the top of the lid or shall have extension stems with centering guides to provide an extended operating nut within 4 feet below the lid. Extension stems shall be fixed to the valve operating nut with a stainless steel fastener.
- F. All potable water, sewer, and reclaimed water grade-adjustment risers shall be cast iron material just like the valve box. No plastic or steel risers shall be allowed.
- G. A centering device BoxLok or equal shall be installed in the valve box.
- H. Stand pipe shall match color code of the system being installed, (blue for potable, Pantone purple 522 C for reclaimed, and green for sanitary sewer).

2.09 CORPORATION STOPS AND SADDLES

- A. Corporation stops for connections to ductile iron and PVC water and reclaimed water mains shall be all red brass, alloy 85-5-5-5, per ASTM B 62, and shall conform to AWWA C800. 1-inch through 2-inch corporation stops shall be ball type, 300 psi working pressure rated, with AWWA MIP threaded inlets and compression, pack joint, flare, or FIP threaded joint outlets, Mueller as shown in the table below, or an approved equal. All joints made to CTS size HDPE tubing shall use stainless steel insert stiffeners.

Corporation Stops

Pipe Material	Type of Connection	Mueller 300 Model
HDPE	Compression x AWWA IP Thread	B-25028 (Saddle) *
HDPE	Compression x AWWA Taper Thread	B-25008 (Direct Tap) *
HDPE	Pack Joint x AWWA IP Thread	P-25028 (Saddle) *

HDPE	Pack Joint x AWWA Taper Thread	P-25008 (Direct Tap) *
Copper	Compression x AWWA IP Thread	B-25028 (Saddle)
Copper	Pack Joint x AWWA Taper Thread	B-25008 (Direct Tap)
Copper	Pack Joint x AWWA IP Thread	P-25028 (Saddle)
Copper	Pack Joint x AWWA Taper Thread	P-25008 (Direct Tap)
Copper	Flare x AWWA IP Thread	B-25025 (Saddle)
Copper	Flare x AWWA Taper Thread	B-25000 (Direct Tap)
Stainless Steel	FIP Thread x AWWA IP Thread	B-20046 (Saddle)
Stainless Steel	FIP Thread x AWWA Taper Thread	B-20045 (Direct Tap)
* Insert required, part number per manufacturer product information		

- B. Potable plastic service pipe material and compression and pack joint connectors shall not be used in soil that is contaminated with low molecular-weight petroleum products, aromatic hydrocarbons, chlorinated hydrocarbons or organic solvents. Appropriate service tubing shall apply.
- C. Water and reclaimed water service connections to PVC and DIP mains shall be made using red brass saddles, alloy 85-5-5-5, per ASTM B 62. Straps, washers and nuts shall be brass or stainless steel. No ductile iron, cast iron or steel saddles will be allowed. Saddles shall be Smith Blair 325 Bronze saddles with Stainless Steel or brass extra wide strap or equivalent.
- D. Connections to PVC sanitary force mains for services up to 2 inches shall be made using Romac Style 306 double bolt stainless steel service saddles or equivalent.
- E. Service and air release valve (ARV) connections to HDPE water, reclaimed water and sewer mains may be made using Romac Style 306H saddle or approved equal. All saddles shall be properly sized per the manufacturer product information and be installed according to the manufacturer's written instructions. Connections to HDPE mains shall not be made using narrower saddles similar to the Smith-Blair 325.

2.10 FLANGED ADAPTERS AND PLAIN END COUPLINGS

Plain end couplings and adapters shall be fusion-bonded epoxy coated carbon steel with Ethylene Propylene Diene Monomer (EPDM) rubber gaskets and stainless steel nuts, bolts and spacers. Acrylonitrile butadiene (NBR) gaskets shall be used for potable water mains that are located in soil that is contaminated with low molecular-weight petroleum products or non-chlorinated organic solvents or non-aromatic organic solvents. Fluorocarbon (FKM) gaskets shall be used for potable water mains that are located in soil that is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons. Fluorocarbon (FKM) gaskets shall be used for potable water mains if the soil is contaminated with aromatic hydrocarbons or chlorinated hydrocarbons, and is also contaminated with low molecular-weight petroleum products or organic solvents. Couplings shall be Dresser Style 38, or another approved equal. Flange adapters shall have a plain end compression seal similar to the style 38, with an ANSI 125 Class flange on the opposite end, and shall be Dresser Style 128W or an approved equal. Stainless steel backup rings shall be used for force mains that are located in corrosive environments including wetwells and valve vaults.

2.11 HOSE BIBS

Hose bibs shall be 3/4" or 1" brass, polished chromium plated brass, with vacuum breaker as noted on the drawings.

2.12 SWING CHECK VALVES

- A. Check valves shall be swing type, weighted lever, conforming to AWWA C508. Valves shall be iron-body, bronze-mounted, single disk, 175 psi working pressure for 2- through 12-inch, 150 psi for 14- through 30-inch, with ANSI B16.1 Class 125 flanged ends, by Mueller; No. A-2600-6-01 (sewer), No. A-2602-6-01 (water), or AVK Series 41, or an approved equal.
- B. When there is no flow through the line, the disc shall hang lightly against its seat in practically a vertical position. When open, the disc shall swing clear of the waterway.
- C. Check valves shall have bronze seat and body rings, extended bronze or stainless steel hinge pins and stainless steel nuts and bolts on bolted covers.
- D. Valves shall be so constructed that disc and body seat may easily be removed and replaced without removing the valve from the line. Valves shall be fitted with an extended hinge arm with outside lever and weight.

2.13 HYDRANTS

Hydrants shall be dry barrel, nostalgic style, and shall be AVK Series 2780, American Darling B-84-B, Mueller Super Centurian 250, or approved equal and shall conform to AWWA C502 and UL/FM certified, and shall in addition meet the specific requirements and exceptions which follow:

- A. Hydrants shall be according to manufacturer's standard pattern or nostalgic style and of standard size and shall have one 5-inch Storz connection or equivalent with two 2½- inch hose nozzles.
- B. Hydrant inlet connections shall have mechanical joints for 6-inch pipe.
- C. Hydrant valve opening shall have an area at least equal to that area of a 5 1/4-inch minimum diameter circle and be obstructed only by the valve rod. Each hydrant shall be able to deliver 500 gpm minimum through its two 2 1/2 -inch hose nozzles when opened together with a loss of not more than 2 psi in the hydrant per AWWA C502.
- D. The upper and lower stem rod shall be stainless steel and shall have a breakable stem-rod coupling of stainless steel or cast iron or ductile iron with a fusion bonded epoxy coating, with stainless steel pins and clips.
- E. Hydrants shall be hydrostatically tested as specified in AWWA C502 and shall be rated at 250 psi minimum.
- F. The operating nut shall be 1½ -inch pentagon shaped with a protective weather cover, and open counter clockwise.

- G. All nozzle threads shall be American National Standard.
- H. Each nozzle cap shall be provided with a Buna N rubber washer.
- I. All hydrants shall be traffic break away type and allow for 360 degree rotation to position the Storz connection/nozzle in the desired direction after installation.
- J. Hydrants must be capable of being extended without removing any operating parts.
- K. Hydrant extensions shall be fusion bonded epoxy coated inside and outside with a stainless steel stem. The breakaway coupling can be fusion bonded epoxy coated or stainless steel. Only one hydrant extension is allowed per hydrant.
- L. Weepholes shall be excluded from fire hydrants.
- M. Hydrant main valve closure shall be of the compression type opening against the pressure and closing with the pressure. The main valve shall be faced or covered with EPDM elastomer, which shall seat on a bronze ring.
- N. Hydrant bonnets, weather cover, nozzle section, caps and shoe shall be cast iron or ductile iron and shall be holiday free fusion-bonded epoxy coated at the factory, per AWWA C550, inside and outside. Lower barrel shall be fusion bonded epoxy coated inside and outside. Aboveground parts shall also have a top coat of Sherwin-Williams Acrolon 218 HS acrylic polyurethane or approved equal; color Safety Yellow for fire hydrants that are connected to the potable water system or Pantone 522C purple for fire hydrants that are connected to the reclaimed water system.
- O. Exterior nuts, bolts and washers shall be stainless steel. Bronze nuts may be used below grade.
- P. All internal operating parts shall be removable without requiring excavation.

2.14 RESTRAINED JOINTS

- A. Pipe joints shall be restrained by poured-in-place concrete thrust blocks or by other mechanical methods, including tie rods, Stargrip and Allgrip, as manufactured by Star Pipe Products or Megaflange and 2000 PV, as manufactured by EBAA Iron Sales. Flanged joints may be used above ground.
- B. All T-bolts, bolts, nuts, washers, and all thread rods shall meet ASTM A-588 requirements (Cor-ten or equivalent) "weathering steel" or be 316 stainless steel. The use of rebar with welded thread is prohibited.

A certification from the supplier shall be provided to the County during the shop drawing review process ensuring all T-bolts, bolts, nuts, washers, and all thread rods meet the A-588 requirements and shall state the project name and contractor in the certification letter. If stainless steel is to be used, no certification letter is required.

- C. Restrained joints may also be Lok-Ring, as manufactured by American Cast Iron Pipe Company, or an approved equal.

- D. Restrained joint designs, which require wedges and/or shims to be driven into the joints in order to disassemble the pipe shall not be allowed.

2.15 TAPPING SLEEVES AND VALVES

- A. Tapping valves shall meet the requirements of AWWA C509/C515 with ductile iron body and shall be rated for a pressure of 250 psi. The valves shall be flanged with alignment ring by mechanical joint with a nonrising stainless steel stem. All bolts, nuts and washers shall be stainless steel. Manufacturer shall use Never-Seez or equivalent during assembly of bolt and nut sets to prevent galling of similar metals. Stem seals shall be provided and shall be of the O-ring type, two above and one below the valve's thrust collar. Valve shall be designed for vertical burial and shall open counterclockwise. Operating nut shall be AWWA standard 2-inch square for valves 2 inches and up. Valves shall have an unobstructed waterway equal to or greater than the full nominal diameter of the valve to accommodate full size shell cutter. Gaskets shall cover the entire area of the flange surface and be 1/8-inch minimal thickness of red rubber. The wedge shall be ductile iron fully encapsulated with EPDM rubber. All bolts, nuts and washers between the sleeve and valve shall be stainless steel.
- B. Tapping sleeves and saddles shall be stainless steel, seal to the pipe by the use of a gasket compounded for water or sewer and shall be able to withstand a pressure test of 180 psi for water lines or 150 psi for sewer force mains for one hour with no leakage in accordance with AWWA C110. A stainless steel 3/4-inch NPT test plug shall be provided for pressure testing. All bolts joining the two halves shall be stainless steel and shall be included with the sleeve or saddle; Romac SST III or Romac SST-H.

2.16 TRACER WIRE TEST STATION BOXES

Tracer wire test station boxes shall be provided at plug valves, butterfly valves, blowoff valves, gate valves, fire hydrants and backflow preventers as indicated in these Standards. Tracer wire test station boxes for yard service shall be 2 ½ inch diameter, 15 inch length, ABS plastic with a cast iron rim and lid, P200NFGT as manufactured by Bingham & Taylor, or equal approved by Manatee County. Where test boxes will be in streets or subject to vehicular traffic, use B&T Model P525RD, 5 ¼ -inch diameter or equal, centered in a separate concrete pad similar to a valve box pad.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage occurring to the above items before they are installed shall be repaired to the satisfaction of the County.
- B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the County.

- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.
- D. Pipe for use with flexible couplings shall have plain ends as specified in the respective pipe sections.
- E. Flanged joints and mechanical joints shall be made with high strength, low alloy Corten or 316 stainless steel bolts, nuts and washers.
- F. Prior to assembly of split couplings, the grooves as well as other parts shall be thoroughly cleaned. The ends of the pipes and outside of the gaskets shall be moderately coated with petroleum jelly, cup grease, soft soap or graphite paste, and the gasket shall be slipped over one pipe end. After the other pipe has been brought to the correct position, the gasket shall be centered properly over the pipe ends with the lips against the pipes. The housing sections then shall be placed. After the bolts have been inserted, the nuts shall be tightened until the housing sections are firmly in contact, metal-to-metal, without excessive bolt tension.
- G. Prior to the installation of sleeve-type couplings, the pipe ends shall be cleaned thoroughly for a distance of 8". Soapy water may be used as a gasket lubricant. A follower and gasket, in that order, shall be slipped over each pipe to a distance of about 6" from the end.
- H. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and the top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

3.02 HYDRANTS

- A. Hydrants shall be set at the locations designated by the County and/or as shown on the Drawings and shall be bedded on a firm foundation. A drainage pit on crushed stone as shown on the Drawings shall be filled with gravel or crushed stone and satisfactorily compacted. During backfilling, additional gravel or crushed stone shall be brought up around and 6" over the drain port. Each hydrant shall be set in true vertical alignment and shall be properly braced. Concrete thrust blocks shall be placed between the back of the hydrant inlet and undisturbed soil at the end of the trench. Minimum bearing area shall be as shown on the plans. Felt paper shall be placed around the hydrant elbow prior to placing concrete. CARE MUST BE TAKEN TO ENSURE THAT CONCRETE DOES NOT PLUG THE DRAIN PORTS. Concrete used for backing shall be as specified herein.
- B. When installations are made under pressure, the flow of water through the existing main shall be maintained at all times. The diameter of the tap shall be a minimum of 2" less than the inside diameter of the branch line.

- C. The entire operation shall be conducted by workmen thoroughly experienced in the installation of tapping sleeves and valves, and under the supervision of qualified personnel furnished by the manufacturer. The tapping machine shall be furnished by the Contractor if tap is larger than 12" in diameter.
- D. The Contractor shall determine the locations of the existing main to be tapped to confirm the fact that the proposed position for the tapping sleeve will be satisfactory and no interference will be encountered such as the occurrence of existing utilities or of a joint or fitting at the location proposed for the connection. No tap will be made closer than 30" from a pipe joint.
- E. Tapping valves shall be set in vertical position and be supplied with a 2" square operating nut for valves 2" and larger. The valve shall be provided with an oversized seat to permit the use of full sized cutters.
- F. Tapping sleeves and valves with boxes shall be set vertically or horizontally as indicated on the Drawings and shall be squarely centered on the main to be tapped. Adequate support shall be provided under the sleeve and valve during the tapping operation. Sleeves shall be no closer than 30" from water main joints. Thrust blocks shall be provided behind all tapping sleeves. Proper tamping of supporting earth around and under the valve and sleeve is mandatory. After completing the tap, the valve shall be flushed to ensure that the valve seat is clean.

3.03 SHOP PAINTING

Ferrous surfaces of valves and appurtenances shall receive a coating of rust-inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.04 FIELD PAINTING

All metal valves and appurtenances specified herein and exposed to view shall be painted safety blue.

3.05 INSPECTION AND TESTING

All pipelines shall remain undisturbed for 24 hours to develop complete strength at all joints. All pipelines shall be subjected to a hydrostatic pressure and leak testing. Refer to Manatee County Public Works Utility Standards Part 1-Utility Standards Manual Section 1.8.7. Prior to testing, the pipe lines shall be supported in a manner approved by the County to prevent movement during tests.

All leaks shall be repaired, and lines retested as approved by the County.

END OF SECTION

DIVISION 3 CONCRETE

SECTION 03200 CONCRETE REINFORCEMENT

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Reinforcing steel bars and welded steel wire fabric for cast-in-place concrete, complete with tie wire.
- B. Support chairs, bolsters, bar supports and spacers, for reinforcing.

1.02 QUALITY ASSURANCE

Perform concrete reinforcing work in accordance with ACI 318 unless specified otherwise in this Section.

1.03 REFERENCES

- A. ACI 318 - Building Code Requirements for Reinforced Concrete.
- B. ASTM A185 - Welded Steel Wire Fabric for Concrete Reinforcement.
- C. ASTM A615 - Deformed and Plain Billet Steel Bars for Concrete Reinforcement.
- D. CRSI 63 - Recommended practice for placing reinforcing bars.
- E. CRSI 65 - Recommended practice for placing bar supports, specifications and nomenclature.
- F. ACI 315 - American Concrete Institute - Manual of Standard Practice.

1.04 SHOP DRAWINGS

- A. Submit shop drawings in accordance with Contract Documents.
- B. Indicate bar sizes, spacings, locations and quantities of reinforcing steel and wire fabric, bending and cutting schedules and supporting and spacing devices.
- C. Manufacturer's Literature: Manufacturer's specifications and installation instructions for splice devices.

PART 2 PRODUCTS

2.01 REINFORCING

- A. Reinforcing steel: Grade 60, Minimum Yield Strength 60,000 psi, deformed billet steel bars, ASTM A615; plain finish.
- B. Welded steel wire fabric: Deformed wire, ASTM A497; smooth wire ASTM A185

in flat sheets; plain finish.

2.02 ACCESSORY MATERIALS

- A. Tie wire: Minimum 16 gauge annealed type, or patented system accepted by County.
- B. Chairs, bolsters, bar supports, spacers: Sized and shaped for strength and support of reinforcing during construction conditions.
- C. Special chairs, bolsters, bar supports, spacers (where adjacent to architectural concrete surfaces): Stainless steel type sized and shaped as required.

2.03 FABRICATION

- A. Fabricate concrete reinforcing in accordance with ACI 315.
- B. Locate reinforcing splices, not indicated on Drawings, at points of minimum stress. Location of splices shall be reviewed by County.
- C. Where indicated, weld reinforcing bars in accordance with AWS D12.1.

PART 3 EXECUTION

3.01 PLACEMENT

- A. Reinforcing shall be supported and secured against displacement. Do not deviate from true alignment.
- B. Before placing concrete, ensure reinforcing is clean, free of loose scale, dirt, or other foreign coatings which would reduce bond to concrete.

3.02 QUALITY ASSURANCE

- A. Acceptable Manufacturers: Regularly engaged in manufacture of steel bar and welded wire fabric reinforcing.
- B. Installer Qualifications: Three years experience in installation of steel bar and welded wire fabric reinforcing.
- C. Allowable Tolerances:
 - 1. Fabrication:
 - a. Sheared length: +1 in.
 - b. Depth of truss bars: +0, -1/2 in.
 - c. Stirrups, ties and spirals: $\pm 1/4$ in.
 - d. All other bends: ± 1 in.
 - 2. Placement:
 - a. Concrete cover to form surfaces: $\pm 1/4$ in.

- b. Minimum spacing between bars: 1 in.
 - c. Top bars in slabs and beams:
 - 1) Members 8 in. deep or less: $\pm 1/4$ in.
 - 2) Members more than 8 in.: $\pm 1/2$ in.
 - d. Crosswise of members: Spaced evenly within 2 in. of stated separation.
 - e. Lengthwise of members: Plus or minus 2 in.
3. Maximum bar movement to avoid interference with other reinforcing steel, conduits, or embedded items: 1 bar diameter.

3.04 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Deliver reinforcement to project site in bundles marked with metal tags indicating bar size and length.
- B. Handle and store materials to prevent contamination.

3.05 INSTALLATION

- A. Placement:
 - 1. Bar Supports: CRSI 65.
 - 2. Reinforcing Bars: CRSI 63.
- B. Steel Adjustment:
 - 1. Move within allowable tolerances to avoid interference with other reinforcing steel, conduits, or embedded items.
 - 2. Do not move bars beyond allowable tolerances without concurrence of County.
 - 3. Do not heat, bend, or cut bars without concurrence of County.
- C. Splices:
 - 1. Lap splices: Tie securely with wire to prevent displacement of splices during placement of concrete.
 - 2. Splice devices: Install in accordance with manufacturer's written instructions.
 - 3. Do not splice bars without concurrency of County, except at locations shown on Drawings.
- D. Wire Fabric:
 - 1. Install in longest practicable length.
 - 2. Lap adjoining pieces one full mesh minimum, and lay splices with 16 gauge wire.
 - 3. Do not make end laps midway between supporting beams, or directly over beams of continuous structures.
 - 4. Offset end laps in adjacent widths to prevent continuous laps.

- E. Cleaning: Remove dirt, grease, oil, loose mill scale, excessive rust, and foreign matter that will reduce bond with concrete.
- F. Protection During Concreting: Keep reinforcing steel in proper position during concrete placement.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 GENERAL

1.01 WORK INCLUDED

- A. Poured-in-place concrete slabs, thrust blocks, pile caps and pipe support cradles.

1.02 QUALITY ASSURANCE

- A. Perform cast-in-place concrete work in accordance with ACI 318, unless specified otherwise in this Section.

1.03 TESTING LABORATORY SERVICES

- A. Inspection and testing will be performed by the testing laboratory currently under contract to Manatee County in accordance with the Contract Documents.
- B. Provide free access to work and cooperate with appointed firm.
- C. Submit proposed mix design of each class of concrete to inspection and testing firm for review prior to commencement of work.
- D. Tests of cement and aggregates may be performed to ensure conformance with requirements stated herein.
- E. Three concrete test cylinders will be taken for every 100 cu. yds. or part thereof of each class of concrete placed each day. Smaller pours shall have cylinders taken as directed by the County.
- F. One slump test will be taken for each set of test cylinders taken.

1.04 REFERENCES

- A. Florida Building Code (FBC) 2020 Edition
- B. ACI 301 - Structural Concrete for Buildings
- C. ACI 318 - Building Code Requirements for Reinforced Concrete
- D. ACI 350 - Code Requirements for Reinforced Concrete
- E. ASTM C33 - Coarse Aggregate
- F. ASTM C150 - Portland Cement
- G. ASTM C260 - Air Entraining Admixtures for Concrete
- H. ASTM C94 - Ready-Mixed Concrete
- I. ACI 304 - Recommended Practice for Measuring, Mixing, Transporting and Placing

Concrete

- J. ACI 305 - Recommended Practice for Hot Weather Concreting

PART 2 PRODUCTS

2.01 CONCRETE MATERIALS

- A. Cement: Moderate-Type II, High early strength-Type III, Portland type, ASTM C150.
- B. Fine and Coarse Aggregates: ASTM C33.
- C. Water: Clean and free from injurious amounts of oil, alkali, organic matter, or other deleterious material.

2.02 ADMIXTURES

- A. Air Entrainment: ASTM C260.
- B. Chemical: ASTM C494 Type A - water reducing admixture.

2.03 ACCEPTABLE MANUFACTURERS

Acceptable Products:

1. Pozzolith
2. WRDA

2.04 ACCESSORIES

- A. Non-shrink grout: Premixed compound consisting of non-metallic aggregate, cement, water reducing and plasticizing agents; capable of developing minimum compressive strength of 2400 psi in 2 days and 7000 psi in 28 days.

2.05 CONCRETE MIXES

- A. Mix concrete in accordance with ASTM C94.
- B. Provide concrete of following strength:
 1. Required concrete strengths as determined by 28 day cylinders shall be as shown on the Drawings, but shall not be less than 3000 psi.
 2. Design Mixtures: Submit concrete mixture proportions, characteristics and location for use for each concrete mixture. Submittal shall include documentation indicating the proposed concrete proportions will produce an average compressive strength equal to or greater than the required average compressive strength and shall consist of field strength records (field test data) or trial mixtures in accordance with ACI 301, 4.2.3.4.a or 4.2.3.4.b, respectively. Submit alternate design mixtures when characteristics of materials, project conditions, weather, test results, or other circumstances warrant adjustments.

3. Indicate amounts of mixing water to be withheld for later addition at Project site.
 4. All mixes shall be in accordance with FDOT Specifications.
- C. Use set-retarding admixtures during hot weather only when accepted by County.
 - D. Add air entraining agent to concrete mix for concrete work exposed to exterior.

2.06 FORMS

- A. Forms shall be used for all concrete masonry, including footings. Form shall be so constructed and placed that the resulting concrete will be of the shape, lines, dimensions, appearance and to the elevations indicated on the Drawings.
- B. Forms shall be made of wood, metal, or other approved material. Wood forms shall be constructed of sound lumber or plywood of suitable dimensions, free from knotholes and loose knots; where used for expose surfaces, boards shall be dressed and matched. Plywood shall be sanded smooth and fitted with tight joints between panels. Metal forms shall be of an approved type for the class of work involved and of the thickness and design required for rigid construction.
- C. Edges of all form panels in contact with concrete shall be flush within 1/32-inch and forms for plane surfaces shall be such that the concrete will be plane within 1/16-inch in four feet. Forms shall be tight to prevent the passage of mortar and water and grout.
- D. Forms for walls shall have removable panels at the bottom for cleaning, inspection and scrubbing-in of bonding paste. Forms for walls of considerable height shall be arranged with tremies and hoppers for placing concrete in a manner that will prevent segregation and accumulation of hardened concrete on the forms or reinforcement above the fresh concrete.
- E. Molding or bevels shall be placed to produce a 3/4-inch chamfer on all exposed projecting corners, unless otherwise shown on the Drawings. Similar chamfer strips shall be provided at horizontal and vertical extremities of all wall placements to produce "clean" separation between successive placements as called for on the Plans.
- F. Forms shall be sufficiently rigid to withstand vibration, to prevent displacement or sagging between supports and constructed so the concrete will not be damaged by their removal. The Contractor shall be entirely responsible for their adequacy.
- G. Forms, including new pre-oiled forms, shall be oiled before reinforcement is placed, with an approved nonstaining oil or liquid form coating having a non-paraffin base.
- H. Before form material is re-used, all surfaces in contact with concrete shall be thoroughly cleaned, all damaged places repaired, all projecting nails withdrawn, all protrusions smoothed and in the case of wood forms pre-oiled.
- I. Form ties encased in concrete shall be designed so that after removal of the projecting part, no metal shall be within 1-inch of the face of the concrete. That

part of the tie to be removed shall be at least 1/2-inch diameter or be provided with a wood or metal cone at least 1/2-inch in diameter and 1-inch long. Form ties in concrete exposed to view shall be the cone-washer type equal to the Richmond "Tyscru". Throughbolts or common wire shall not be used for form ties.

PART 3 EXECUTION

3.01 PLACING CONCRETE

- A. Place concrete in accordance with ACI 304.
- B. Notify County minimum 24 hours prior to commencement of concreting operations.
- C. Verify anchors, seats, plates and other items to be cast into concrete are placed, held securely and will not cause hardship in placing concrete. Rectify same and proceed with work.
- D. Maintain records of poured concrete items. Record date, location of pour, quantity, air temperature and test samples taken.
- E. Ensure reinforcement, inserts, embedded parts, formed expansion and contraction joints are not disturbed during concrete placement.
- F. Prepare previously placed concrete by cleaning with steel brush and applying bonding agent. Apply bonding agent in accordance with manufacturer's recommendations.
- G. Pour concrete continuously between predetermined construction and control joints. Do not break or interrupt successive pours such that cold joints occur.
- H. In locations where new concrete is dowelled to existing work, drill holes in existing concrete, insert steel dowels and pack solidly with non-shrink grout.
- I. Excessive honeycomb or embedded debris in concrete is not acceptable. Notify County upon discovery.
- J. Conform to ACI 305 when concreting during hot weather.

3.02 SCREEDING

- A. Screed surfaces level, maintaining flatness within a maximum deviation of 1/8" in 10 feet.

3.03 PATCHING

- A. Allow County to inspect concrete surfaces immediately upon removal of forms. Patch imperfections as directed. All patching procedures shall be submitted to and approved by the County prior to use.

3.04 DEFECTIVE CONCRETE

- A. Modify or replace concrete not conforming to required lines, details and elevations.

- B. Repair or replace concrete not properly placed resulting in excessive honeycomb and other defects. Do not patch, fill, touch-up, repair, or replace exposed architectural concrete except upon express direction of County for each individual area.

3.05 CONCRETE FINISHING

- A. Provide concrete surfaces to be left exposed, columns, beams and joists with smooth rubbed finish.

3.06 CURING AND PROTECTION

- A. Beginning immediately after placement, protect concrete from premature drying, excessively hot or cold temperatures and mechanical injury. Maintain concrete with minimal moisture loss at relatively constant temperature for a period of 7 days or until concrete strengths reaches 75% of the 28 day design strength.

- B. Protection against moisture loss may be obtained with spray on curing compounds or plastic sheets. Protection against heat or cold may be obtained with insulated curing blankets or forms.

3.07 CONCRETE DRIVEWAY RESTORATION

- A. Concrete driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.

3.08 CONCRETE SIDEWALK RESTORATION

- A. Concrete sidewalks across driveways shall be restored with 6 inches of 3,000 psi concrete with W2.5 X W2.5, 6X6 wire mesh. Place ½ inch expansion joint between back of curb and new concrete. Area beneath restoration shall be mechanically tamped prior to placing concrete.
- B. Concrete sidewalks outside of driveways shall be restored with 4 inches of 3,000 psi concrete per FDOT Design Standards, Sections 522 & 310

END OF SECTION

SECTION 03350 CONCRETE FINISHES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to finish cast-in-place concrete surfaces as specified herein.

1.02 SUBMITTALS

- A. Submit to the County as provided in the Contract Documents, the proposed chemical hardener manufacturer's surface preparation and application procedures.

1.03 SCHEDULE OF FINISHES

- A. Concrete for the Project shall be finished in the various specified manners either to remain as natural concrete or to receive an additional applied finish or material under another Section.
- B. The base concrete for the following conditions shall be finished as noted and as further specified herein:
 - 1. Exterior, exposed concrete slabs and stairs - broomed finish.
 - 2. Interior, exposed concrete slabs - steel trowel finish.
 - 3. Concrete on which process liquids flow or in contact with sludge - steel trowel finish.
 - 4. Concrete where not exposed in the finished work and not scheduled to receive an additional applied finish or material - off-form finish.
 - 5. Provide concrete surfaces to be left exposed such as walls, columns, beams and joists with smooth rubbed finish.

1.04 RESPONSIBILITY FOR CHANGING FINISHES

- A. The surface finishes specified for concrete to receive additional applied finishes or materials are the finishes required for the proper application of the actual products specified under other Sections. Where different products are approved for use, it shall be the Contractor's responsibility to determine if changes in finishes are required and to provide the proper finishes to receive these products.
- B. Changes in finishes made to accommodate product different from those specified shall be performed at no additional cost to the County. Submit the proposed new finishes and their construction methods to the County for approval.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Portland cement and component materials required for finishing the concrete surfaces shall be as specified in the Contract Documents.

- B. Hardener shall be Lapidolith as manufactured by Sonneborn Building Products or approved equal. Hardener shall be used on all floors, stair treads and platforms.

PART 3 EXECUTION

3.01 FORMED SURFACES

- A. Forms shall not be stripped before the concrete has attained a strength of at least 50 percent of the ultimate design strength. This is equivalent to approximately five "100 day-degrees" of moist curing.
- B. Care shall be exercised to prevent damaging edges or obliterating the lines of chamfers, rustications, or corners when removing the forms or doing any work adjacent thereto.
- C. Clean all exposed concrete surfaces and adjoining work stained by leakage of concrete, to the satisfaction of the County.
- D. Off-form finish. Fins and other projections shall be removed as approved. Tie cone holes and other minor defects shall be filled with non-shrink grout specified under the Contract Documents.

3.02 FLOORS AND SLABS

- A. Floors and slabs shall be screeded to the established grades and shall be level with a tolerance of 1/8-inch when checked with a 10 foot straight edge, except where drains occur, in which case floors shall be pitched to drains as indicated. Failure to meet either of above shall be cause for removal, grinding, or other correction as approved by the County.
- B. Following screeding as specified above, power steel trowel as follows:
 - 1. Immediately after final screeding, a dry cement/sand shake in the proportion of 2-sacks of portland cement to 350-pounds of coarse natural concrete sand shall be sprinkled evenly over the surface at the rate of approximately 500 pounds per 1,000 square feet of floor. Neat, dry cement shall not be sprinkled on the surface. This shake shall be thoroughly floated into the surface with an approved disc type power compacting machine weighing at least 200 pounds if a 20-inch disc is used or 300 pounds if a 24-inch disc is used (such as a "Kelly Float" as manufactured by the Weisner-Rapp Corporation of Buffalo, New York). A mechanical blade-type float or trowel is not acceptable for this work.
NOTE: This operation (application of the cement/sand shake) may be eliminated at the discretion of the County if the base slab concrete exhibits adequate fattiness and homogeneity.
 - 2. In lieu of power steel troweling, small areas as defined by the County shall be compacted by hand steel troweling with the dry cement/sand shake as ordered.
 - 3. The floor or slab shall be compacted to a smooth surface and the floating operation continued until sufficient mortar is brought to the surface to fill all voids. The surfaces shall be tested with a straight edge to detect high and low spots which shall be eliminated.

4. Compaction shall be continued only until thorough densification is achieved and a small amount of mortar is brought to the surface. Excessive floating shall be avoided.
- C. After Paragraph 3.02 A and B procedures are accomplished, floors and slabs for particular conditions shall be completed as scheduled in one of the following finishes:
1. Wood float finish. Hand wood float, maintaining the surface tolerance to provide a grained, nonslip finish as approved.
 2. Broomed finish. Hand wood float maintaining the surface tolerance and then broom with a stiff bristle broom in the direction of drainage to provide a nonslip finish as approved.
 3. Steel trowel finish. Hand steel trowel to a perfectly smooth, hard even finish free from high or low spots or other defects as approved.
- D. Floors, stair treads and platforms shall be given a floor hardener. Application shall be according to manufacturer's instructions.

3.03 APPROVAL OF FINISHES

- A. All concrete surfaces will be inspected during the finishing process by the County.
- B. Surfaces which, in the opinion of the County, are unsatisfactory shall be refinished or reworked until approved by the County.

END OF SECTION

SECTION 03420 PRECAST POLYMER CONCRETE STRUCTURES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all materials, labor and equipment necessary to construct polymer concrete manholes and/or wet wells as shown on the Drawings and as specified herein.
- B. Precast polymer concrete structures shall be manufactured from chemical-resistant polymer concrete with fiber-reinforced polymer (FRP) or steel reinforcement bars. Structures shall be manufactured by an established national manufacturer exclusively producing polymer concrete sanitary sewer manholes and wet wells.
- C. Drop manholes, manholes immediately upstream of a lift station wet well and the next two upstream manholes, manholes with gravity sewers greater than 12 inches in diameter, force main termination manholes and the two downstream manholes, and manholes with opposing turbulent flows as defined in the Manatee County Utility Standards, and all lift station wet wells shall be manufactured from polymer concrete as specified herein.
- D. The manufacturer, dimensions, material and construction methods shall be available for inspection and approved by the County in advance of construction. The County reserves the right to inspect the facilities of the supplier and the manufacturer if they are different.
- E. These Specifications are intended to give a general description of what is required, but do not purport to cover all of the structural design details which will vary in accordance with the requirements of the plans. It is, however, intended to cover the furnishing, shop testing, delivery and complete installation of all precast structures whether specifically mentioned in these Specifications or not.
- F. The supplier of the precast items shall coordinate his work with that of the Contractor to ensure that the units will be delivered and installed in the excavation provided by the Contractor, in accordance with the Contractor's construction schedule.
- G. The Contractor will ensure coordination of the precast structures fabrication with the supplier to achieve the proper structural top slab openings, spacings and related dimensions for the selected equipment frames and covers. The top slabs, frames, covers, and subsurface structures outside of roadways shall be of sufficient strength to safely support HS-20 loading in accordance with AASHTO unless noted otherwise.

1.02 SUBMITTALS

- A. The contractor shall submit the following items to the County for review and approval:

1. Shop drawings of structure sections, top and bottom slabs, construction details, reinforcement methods, jointing methods, materials, dimensions, rim and invert elevations, and component parts.
2. Summary of criteria used in design including, as minimum, material properties, loadings, load combinations and dimensions assumed.
3. Include certification from manufacturer that polymer concrete structure design meets or exceeds the load and strength requirements of ASTM C478 and ASTM C857, reinforced in accordance with ACI 440.1R if applicable.
4. Frames, grates, rings, and covers.
5. Materials to be used in fabricating pipe drop connections.
6. Materials to be used for pipe connections.
7. Materials to be used for stubs and stub plugs, if required.
8. Proof of independent Chemical Resistance testing conducted in accordance with the Standard Specifications for Public Works Construction (California Greenbook) Section 211-2 or ASTM C267 Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes.
9. Signed and sealed shop drawings and structural calculations by a Florida registered Professional Engineer showing structure meets designated strengths per ASTM standards referenced below.
10. Signed and sealed buoyancy calculations by a Florida registered Professional Engineer with a Factor of Safety of 1.25 without incorporating soil friction. Allowable soil bearing capacities, earth pressures and hydrostatic loads pertinent to the subsurface design shall be as specified in the project geotechnical report as prepared by Terracon (Project No. HC205091, dated May 26, 2021).

1.03 INSPECTION

- A. The quality of all materials, the process of manufacture and the finished sections shall be subject to inspection and approval by the County or authorized representative of the County. Such inspection may be made at the place of manufacture, on site, or both locations. The polymer concrete section may be inspected prior to unloading from the delivery truck and marked by the inspector showing acceptance or rejection. However, discovery of failure at any time to meet the requirements of these Specifications is cause for rejection.
- B. Sections rejected after delivery to the job shall be marked for identification and shall be removed from the job at once. All sections which are damaged after delivery as determined by the County, shall be rejected. Sections already installed, shall be removed and replaced entirely at the Contractor's expense.
- C. At the time of inspection, the sections shall be examined for compliance with the standards referenced below, latest revision, these Specifications and with the approved manufacturer's drawings. All sections shall be inspected for general appearance, dimension, blisters, cracks, roughness, soundness, etc. The surface shall be free of defect.
- D. Imperfections may be repaired subject to the approval of the County and after demonstration by the manufacturer that strong and permanent repairs result.

1.04

REFERENCES

ASTM C33 (most current) Standard Specification for Concrete Aggregates
ASTM C267 (most current) Standard Test Methods for Chemical Resistance of Mortars, Grouts, and Monolithic Surfacing and Polymer Concretes

ASTM C443 (most current) Standard Specification for Joints for Concrete Pipe and Manholes Using Rubber Gaskets

ASTM C478 (most current) Standard Specification for Precast Reinforced Concrete Manhole Sections

ASTM C497 (most current) Test Methods for Concrete Pipe, Manhole Sections, or Tile

ASTM C579 (most current) Standard Test Methods for Compressive Strength of Chemical-Resistant Mortars, Grouts, Monolithic, Surfacing, and Polymer Concretes

ASTM C580 (most current) Standard Test Method for Flexural Strength and Modulus of Elasticity of Chemical-Resistant Mortars, Grouts, Monolithic Surfacing, and Polymer Concretes

ASTM C857 (most current) Standard Practice for Minimum Structural Design Loading for Underground Utility Structures

ASTM C923 (most current) Standard Specifications for Resilient Connectors between Concrete Manholes Structures and Pipe

ASTM C990 (most current) Standard Specification for Joints for Concrete Pipe, Manholes and Precast Box Sections using Preformed Flexible Joint Sealants

ASTM D648 (most current) Test Method for Deflection Temperature of Plastics Under Flexural Load in Edgewise Position, if applicable

ASTM D2584 (most current) Test Method for Ignition Loss of Cured Reinforced Resins

ASTM D6783 (most current) Standard Specification for Polymer Concrete Pipe

ACI 350 (most current) Code Requirements for Environmental Engineering Concrete Structures & Commentary

ACI 440.1R (most current) Guide for the Design and Construction of Structural Concrete Reinforced with Fiber-Reinforced Polymer (FRP) Bars, if applicable
ACI 548.6R (most current) Polymer Concrete: Guidelines for Structural Applications

California Greenbook Standard Specifications for Public Works Construction Section 211-2

PART 2 PRODUCTS

2.01 MANHOLE AND/OR WET WELL MATERIALS

- A. Design shall be of sufficient strength to safely support HS-20 loading in accordance with AASHTO.
- B. Provide polymer concrete sections, monolithic top and bottom base sections, and related components referencing to ASTM C478 and ASTM C857. ASTM C478 and ASTM C857 material and manufacturing is allowed compositional and dimensional differences required by a polymer concrete product. Manholes shall be designed based upon live and dead load criteria in ASTM C857.
- C. Provide base riser section with monolithic floors, unless shown otherwise.
- D. Provide riser sections joined with bell and spigot or tongue and groove smooth wall design seamed with butyl mastic and joint lubricated rubber gaskets conforming to ASTM C990 so that on assembly, base, riser and top section make a continuous and uniform structure.
- E. Construct riser sections for polymer concrete structures from standard polymer concrete sections of the diameter indicated on drawings. Use various lengths of polymer concrete manhole or wet well sections in combination to provide correct height with the fewest practical joints.
- F. Design wall sections for depth and loading conditions with wall thickness as designed by polymer concrete manufacturer. Wall thicknesses shall be as stated by manufacturer based upon loading conditions and material properties. The riser walls shall have a minimum thickness of 2 inches and the cone walls shall have a minimum thickness of 5 inches.
- G. Provide tops to support AASHTO HS-20 or vehicle loading or loads as required and receiving frame, covers, or hatches, as indicated on drawings.
- H. Minimum clear distance between two wall penetrations shall be a minimum of 6 inches on 48-inch to 72-inch diameter structures and a minimum of 8-inches on larger diameter structures. A clearance of 6 inches is required between wall penetration and joint.
 - 1. Wall thickness shall be designed to resist hydrostatic pressures with a minimum safety factor of 2.0 for full depth conditions from grade to invert.
 - 2. The wall thickness of risers and conical tops shall be not less than that prescribed by the manufacturer's design by more than 5%. A wall greater than the prescribed design shall not be cause for rejection.
 - 3. Wall thickness shall be as required by structural design performed by manufacturer. Wall thickness design calculations shall be provided, signed and sealed by a licensed Professional Engineer in the state of Florida.
- I. Polymer concrete shall have a minimum unconfined compressive strength 28-

day strength of 9,000 psi when measured in accordance with ASTM C497.

- J. Structures shall have engineered and rated lifting devices that shall not penetrate completely through the wall. All openings shall be patched with non-shrink polymer grout as recommended by manufacturer.

2.02 MANHOLE FRAMES AND LIDS

- A. Frames and lids shall be heavy duty composite with minimum three (3) 316 stainless steel locking bolts. All frames and lids shall be designed for a AASHTO HS-20 design or 300 psf loading, whichever produces the greater stress.

2.03 MANHOLE INSERTS

- A. All sanitary sewer manholes installed shall require watertight rainwater protection inserts. Neoprene gaskets shall be installed under the insert lip to insure a leakproof seal.

2.04 MANHOLE INVERTS

- A. Benched inverts shall be factory-built polymer concrete and shall be monolithically cast or shall be a secondary casting in a cured base section as per ASTM C478.
- B. The width of the invert channel shall be the same as the inside diameter of the connected sewer pipes and shall have a "U" - shaped cross-section with the bottom of the channel shaped to correspond with the lower half of the pipe. The depth of the channel shall be a minimum of half the inside diameter of the connected pipes.
- C. The channel shall be formed smooth and streamlined, and, where the flow changes directions, shall have true curves of the largest radius possible within the manhole base. The maximum change of direction of flow within a manhole shall be 90 degrees.
- D. The channel invert slope shall be uniform through the manhole and shall have a minimum vertical drop of 1-inch from the inlet(s) to the outlet.

2.05 DESIGN CRITERIA:

- A. Polymer Concrete risers, cones, flat lids, grade rings and base sections shall be designed by manufacturer to meet loading requirements of ASTM C478, ASTM C857 and ACI 350 as modified for polymer concrete manhole and wet well design as follows:
 - 1. Polymer Concrete Mix Design shall consist of thermosetting resin, sand, and aggregate. No Portland cement shall be allowed as part of the mix design matrix. All sand and aggregate shall be inert in an acidic environment.
 - 2. Reinforcement - Shall use acid resistant reinforcement (FRP Bar) in

accordance with ACI 440.1R or steel in accordance with ASTM C478 as applicable for polymer concrete design.

3. The wall thickness of polymer concrete structures shall not be less than that prescribed by the manufacturer's design by less than 95% of stated design thickness.
4. Thermosetting Resin - The resin shall have a minimum deflection temperature of 158° F when tested at 264 psi (1.820 mPa) following Test Method D648. The resin content shall not be less than 7% of the weight of the sample as determined by test method D2584. Resin selection shall be suitable for applications in the corrosive conditions to which the polymer concrete structures will be exposed.
5. AASHTO HS-20 design or 300 psf loading, whichever produces the greater stress applied to manhole cover and transition and base slabs.
6. Polymer manholes shall be designed based upon live and dead load criteria in ASTM C857 and ACI 350.
7. Unit soil weight per the project geotechnical report referenced in Section 1.02.A.10 above portions of manhole or wet well, including base slab projections.
8. Internal liquid pressure based on unit weight of 63 pcf.
9. Dead load of manhole or wet well sections fully supported by transition and base slab.

PART 3 EXECUTION

- A. Each polymer concrete manhole or wet well component shall be free of all defects, including indentations, cracks, foreign inclusions and resin starved areas that, due to their nature and degree or extent, detrimentally affect the strength and serviceability of the component part. The nominal internal diameter of manhole or wet well components shall not vary more than 1%. Variations in height of two opposite sides of risers and cones shall not be more than 5/8 inch. The under run in height of a riser or cone shall not be more than ¼ in/ft of height with a maximum of ½ inch in any one section.
- B. Marking and Identification - Each manhole or wet well shall be marked with the following information - Manufacturer's name or trademark, Manufacturer's location and Production Date.
- C. Manhole or wet well joints of a bell and spigot or smooth wall tongue and groove design shall be assembled with a butyl rubber sealant, an elastomeric sealing gasket, and external joint wrap so that on assembly the manhole or wet well base, riser, and top sections make a continuous and uniform structure meeting the requirements of ASTM C443. Joint sealing surfaces shall be free of dents, gouges and other surface irregularities that would affect joint integrity.
- D. Construct invert channels to provide smooth flow transition with minimal disruption of flow at pipe connections. Invert slope through manhole or wet well as indicated on drawings. All precast base slabs to be cast monolithically. Polymer concrete bench and channel are to be factory constructed with all resin aggregate material. Extended ballast slab requirements for buoyancy concerns can be addressed with cementitious concrete material. Any modifications

required in the bench or channel during construction shall be used with non-shrink polymer grout.

- E. Provide cast-in resilient connectors conforming to requirements of ASTM C923 installed at the factory. All connectors are to be water tight. Install resilient connectors at each pipe entering and exiting the structure in accordance with manufacturer's instructions. The external take down clamp and its hardware shall be 316 stainless steel. Cold joint pipe stub grouting shall not be allowed.
- F. All pipe penetrations shall be made in the factory unless otherwise specified in the plans.

3.01 QUALITY CONTROL

- A. Manufacturer of manholes or wet wells shall employ manufacturing methods and material formulation in use for a minimum of five (5) years. Manufacturer shall provide at least two (2) references of projects of similar size and scope.

3.02 GROUTING

- A. All materials needed for grouting and patching shall be non-shrink polymer grout. All holes in sections used for handling and annular spaces, around influent and effluent pipes, shall be filled using the materials listed above.

3.03 INTERNAL JOINT SEALANTS

- A. A butyl rubber sealant shall be applied to the interior of manhole and wet well bell and spigot or tongue and groove smooth wall joints per manufacturer's recommendations.

3.04 EXTERNAL JOINT WRAP

- A. Gasketed bell and spigot joint: If the joint design has the risers' outer walls offset from each other, an 18-inch wide heat shrinkable joint wrap shall be centered over all these joints including the chimney to cone section per manufacturer's recommendations.
- B. Gasketed tongue and groove smooth wall joint: If the joint design has the risers' outer walls flush with each other, a 12-inch non-shrink elastomeric plastic joint wrap shall be centered over all these joints including chimney to cone section per manufacturer's recommendations.

3.05 CERTIFICATION

- A. As a basis of acceptance, the manufacturer shall provide an independent certification consisting of a copy of the manufacturer's test reports along with a copy of the test results certifying that representative manhole or wet well samples have been tested, and inspected in accordance with the provisions of this Specification and meet all requirements of same, to include but not limited to the load and strength requirements of ASTM C478 and ASTM C857.

PART 4 MANHOLE AND/OR WET WELL CONSTRUCTION

- A. POLYMER CONCRETE MANHOLE AND/OR WET WELL INSTALLATION: The Contractor shall set section vertical and in true alignment. All structures shall meet the following installation tolerances: The finished structure shall not be out of plumb by more than 3/8 inches per 10 feet of height.
- B. GRADE ADJUSTMENT: The Contractor shall set polymer concrete corrosion proof grade rings on top of manhole slabs and polymer concrete manhole cones to provide grade adjustment in setting manhole frames. Contractor shall use manufacturer recommended sealant between rings. Contractor shall ensure a watertight seal by removing debris, stones, and dirt between rings.
- C. BACKFILL: Unless otherwise shown on the Drawings or specified in the above referenced project geotechnical report, a minimum distance of one (1) foot from the outside surface and extending from the bottom of the excavation to the top of the reducer section shall be backfilled using select material as specified in the Contract Documents. The material chosen shall be free of large lumps or clods, which will not readily break down under compaction. This material will be subject to approval by County.
- D. BACKFILL PROCEDURE: The Contractor shall place backfill in maximum layers of 12-inches loose measure and mechanically tamp to 98% Standard Proctor Density, unless otherwise approved by County. Flooding shall not be permitted. Backfill shall be placed in such a manner as to prevent any wedging action against the structure.
- E. A minimum of an 12-inch #57 stone or crushed concrete compacted to 98% density, AASHTO T-180 shall be placed as a foundation for the structure's base slabs.
- F. Allow joints to set for 24 hours before backfilling. Backfilling shall be done in a careful manner, bringing the fill up evenly on all sides. The Contractor shall install the precast sections in a manner that will result in a watertight joint. Leaking joints are not acceptable.
- G. MARKING AND IDENTIFICATION: Each structure shall be marked on the inside and outside with the following information:
 - 1. Manufacturer's name or trademark.
 - 2. Manufacturer's factory location.
 - 3. Manufacturer's serial number.
 - 4. Total length.
- H. Holes or penetrations in the polymer concrete sections required for handling or other purposes shall be plugged with a non-shrink polymer grout approved by the manufacturer.
- I. Where holes must be cut in the precast sections to accommodate pipes, cutting shall be done prior to setting them in place to prevent any subsequent jarring which may loosen the joints.

J. Frames and hatches specified and furnished shall be cast in the cover slab prior to setting. Normal installation shall include 6-inch to 12-inch of concrete grade rings between the top of the cone section and the cover plate ring slab.

K. TESTING

1. After each manhole and/or wet well is constructed to grade and prior to backfilling, each structure shall be tested for water tightness.

a. Plug pipe lines and perform vacuum test. Observing all recommended safety measures, induce a backpressure of 5.0 psi equivalent to 10-inch Hg (mercury). The assembly is considered satisfactory if the vacuum loss is less than 1-inch Hg for the length of time listed in the following table:

Time of Test (Seconds)			
Depth (Feet)	Structure Diameter (Feet)		
	4	5	6 or Larger
4	10	13	16
8	20	26	32
12	30	39	48
16	40	52	64
20	50	65	80
24	60	78	96
T (Seconds)	5	6.5	8

Note: Add "T" seconds for each additional 2'-0" of depth.

2. Failure to pass one of these tests requires the contractor to correct the problems and retest. The Contractor shall replace leaking gaskets and/or polymer concrete sections and retest the completed manhole/or wet well. No structure will be accepted without successfully passing this test.

L. STUB LINES: The Contractor shall provide stub lines where shown on the Drawings or as directed by the County for the connection of future sewer lines to manholes and/or wet well. Provide bell end enclosed with an approved plug at the end of each stub line. Bell of stub line shall be as close to structure exterior surface as practical. The Contractor shall accurately reference each stub line for direction and record along with the actual invert elevation. He shall furnish the County two copies of the above specified data on stub lines.

M. CONNECTION TO EXISTING STRUCTURES: All piping entering existing manholes and/or wet well shall have a jack-in resilient pipe to manhole seals per ASTM C923. The external take down clamp and its hardware shall be 316 stainless steel. The internal expansion band and its hardware shall be minimum 304 stainless steel.

- N. **PROTECTION FROM FLOODWATER INFLOW:** Wastewater sewer systems shall be designed to prevent flood or surface waters from entering the collection system. Manhole rims and clean-out tops shall be elevated 4 inches above the 100-year flood level, or 8 inches above the 25-year flood level, or 4 inches above the surrounding unpaved ground surface within a 20-foot radius, whichever is highest, or the manhole covers and clean-out lids shall be designed and installed with factory-made watertight, tamper proof, sealing devices.

The wet well and valve vault top and entrance hatches shall be set at least 4 inches above the 100-year flood plain elevation, or 8 inches above the 25-year flood plain elevation, or 6 inches above the surrounding grade, or 12 inches above the adjacent roadway crown elevation, whichever is highest. Where this is not practical, deviation from the above must be approved by the County on a case-by-case basis.

- O. **DROP MANHOLES:** Drop manholes shall be provided for sewers entering a manhole at an elevation 24 inches or more above the manhole lowest invert. Where the drop is less than 24 inches, the invert shall have an elevated U-channel to prevent solids deposition. Drop manholes shall be constructed with an outside drop connection and the entire outside drop connection shall be encased in concrete.

PART 5 WARRANTY

- A. Manufacturer shall provide a fifty (50) year warranty that the polymer concrete structure will not fail due to corrosion.

END OF SECTION

SECTION 03500 LIFT STATION SPECIFICATION

PART 1 GENERAL

- A. Furnish all labor, materials, equipment and incidentals required to install complete automatic, underground lift stations with all required equipment installed in a polymer concrete wet well and adjacent above-ground valve assembly (and meter). The principal items of equipment shall include three submersible motor-driven sewage pumps, valves, internal piping, variable frequency drives, automatic pumping level controls, control panel and telemetry (most current model). All materials shall be new, without defects and of the best quality. All materials furnished and all work done shall be in strict accordance with the National Electrical Code and all local requirements and codes.
- B. An on-site electric generator equipped with an automatic power transfer switch shall be installed. Onsite fuel tanks shall not exceed 540 gallons.

1.01 STRUCTURES AND EQUIPMENT

- A. Pump Station Wet Well.

All wet wells 6 feet diameter and larger, and all pump stations that are owned and maintained by Manatee County, shall be precast polymer concrete, in accordance with Section 03420, designed to accommodate the peak hour development flow from all contributing areas. The wet well shall have a minimum of 4 feet from the lowest invert to the wet well bottom. The pump station wet well size shall be determined using the following formula to determine the minimum volume between the off-level elevation and the influent invert elevation:

$$\text{MIN. VOLUME (GALS.)} = \text{PUMP CAPACITY (G.P.M.)} \times 4$$

Wet well diameters shall be 6 feet or larger. The minimum wall thickness for polymer concrete wet wells shall be per Specification Section 03420.

The pump station wet well size and control equipment shall be designed to limit the pumping cycles of each pump to a maximum of 5 starts per hour for duplex stations and 3 starts per hour for triplex stations. Pump stations discharging through pipes 12 inches or larger shall have more than two variable speed pumps. The pump cycle off level shall be no lower than the top of the sewage pumps. The lead pump on level shall be no higher than 18 inches below the invert elevation of the influent pipe for duplex stations, and no higher than 24 inches below the invert for triplex stations.

All pump stations shall have a single gravity-flow influent pipe discharging into the wet well. Multiple gravity pipelines and force mains upstream shall all terminate at a separate polymer concrete manhole before flowing into the pump station wet well. The influent gravity sewer shall be aligned, so that the inflowing stream drops into the front side of the wet well opposite from the riser side, within an angle of 25 degrees on either side of the centerline passing between both pumps in a duplex station, or between two of the three pumps in a triplex station. As an option to the to the influent gravity sewer main entering the wet well directly between the pumps,

a plastic composite/fiberglass drop bowl and pipe (Reliner/Duran, Inc. or equal) shall be installed, as shown on Detail US-20.

B. Above-ground Valve Assembly

An above-ground valve assembly and concrete pad with three gate valves, two weighted lever swing check valves, and a pump-out connection shall be constructed adjacent to the wet well. Tri-plex stations have four gate valves and three check valves. The pump-out connection shall be equipped with a gate valve and an male aluminum quick-coupler; 4-inch for 4 inch or smaller valve assemblies; 6 inch for all others, unless otherwise specified on the plans. All valves shall have factory applied, fusion bonded epoxy coating on interior and exterior. All bolt, nuts & washers in or on the wet well or valve assembly shall be 316 stainless steel

The valve assembly shall be supported by 316 stainless steel adjustable, flange-type, pipe supports anchored to the structure/valve pad. 6-#5 rebar shall be epoxy doweled into the wet well 3-4 inches and cast into the valve assembly slab 3-4 feet.

C. Entrance Hatches

The lift station wet well shall be equipped with an aluminum access cover of adequate size to permit easy removal and installation of sewage pumps and equipment. The wet well access cover shall be a minimum 36" x 48" single (preferred) or double door. The dimensions of the hatch will vary depending on the internal discharge pipe size and internal configuration, the actual required dimensions of the hatch shall be confirmed with the pump manufacturer prior to ordering. The access covers shall be constructed of aluminum with a minimum load rating of AASHTO HS20 or a uniform live load of 300 lbs./sq. ft., whichever produces the greater stress, and equipped with 316 stainless steel hinges, a recessed lifting handle which lies flush with the door surface, and a 316 stainless steel staple which may be used to secure the door with a padlock when closed. The doors shall have a raised diamond thread pattern to provide a skid-resistant surface and shall open to 90 degrees and lock automatically in that position, with a handle to release the doors for closing.

D. Sewage Pump Assemblies

Each pumping station shall have a minimum of three identical, totally submersible sewage pump assemblies which are rated and suitable for continuous duty, underwater operation. These units and their associated power and signal cables shall have watertight integrity to a depth of 65 feet. The pump, pump motor and associated components shall all be the products of the same manufacturer. Pump assemblies shall be painted after assembly with an approved air dry enamel which will adequately protect the exterior housings from the corrosive environment in the wastewater sewer system. Coating thickness shall be a minimum of 4 mils.

Pumps shall be selected to operate within 10 percent of the Best Efficiency Point (BEP). The overall lift station system shall be designed to allow for the selected pumps to operate within 10 percent of their BEP.

Factory testing of the pump assemblies shall be required and as a minimum, shall include:

1. All tests recommended by the manufacturer.
2. Verify the integrity of assembly and connections (no leaks, tightness of hardware, proper alignment, assembly, etc.) and that the nameplate and specified pump and pump motor (HP, Voltage, Phase and HZ) correspond.
3. The motor windings and seal housing chambers shall be hi-potted to test for insulation defects and moisture content. Check the resistance of the stator windings with a bridge to verify that the readings of all three phases are basically equal and within tolerance.
4. Energize pump motor, verify direction of rotation and that it corresponds to the nameplate.
5. Provide a written report of all testing with the shipped pump.

All pump assemblies shall be warranted against defects in workmanship and materials for whichever is the greater of: a 5-year pro-rated warranty from the date of purchase or as provided in the Defect Security Agreement with the County.

Month 0 -18 = 100% Month 19-31 = 75% Month 32-45 = 50% Month 46-60 = 25%

Pump motors shall have the following electrical characteristics: 230 -volt for 20 HP and lower or 460 -volt for greater than 20 HP, 3 phase, 60 hertz, minimum service factor of 1.15, continuous duty, maximum NEMA LRA/HP code of J, and NEMA Design B. Pump motors shall be non-overloading throughout the entire range of operation. The pump motors are to be induction motors which are built with moisture resistant Class F insulation. Each motor shall be capable of a minimum of 10 starts per hour without degradation of the windings. The pump motor shaft shall be made from a single, solid, forging of 303 (or better grade) stainless steel, tapered, keyed, and supported by a minimum of one heavy duty upper radial ball bearing and a minimum of one heavy duty lower thrust bearing. The bearings shall have a minimum B-10 life rating of 60,000 hours. The shaft and shaft extension shall be of minimum length and maximum diameter to reduce shaft deflection and prolong bearing life. The pump motor shall be designed for pumping at a maximum sump ambient of 40 degrees C (104 degrees F). The stator of the pump motor shall be copper wound (aluminum stator windings are not permitted) and equipped with at least two heat sensors (klixons installed in the stator end turns) which will shut the motor off in case of excessive heat built up. The heat sensors shall be connected in series with the motor starter coil so the starter is tripped if the heat sensor opens. The pump motor housing shall be oil or air filled type for cooling purposes. Oil filled motors shall use pure dielectric insulating oil. The pump motor shall be capable of operating at +/- 10% of rated voltage and +/- 5% of rated frequency without excessive heating. The pump motor shall not exceed a rise by resistance of 90 degrees C at full load over the entire performance curve. It shall be able to operate intermittently a full load while unsubmerged without damage. Power cables and signal cables shall be continuous (without splices from the pump motor to the power supply). Power cables shall be sized for operation at the rated service factor. The power cable shall be a single, multi-conductor, STW-A type that is epoxy potted and compression fitted for water tight sealing into the pump cable entry. As a minimum, the nameplate for the pump motor shall include:

MODEL/SERIAL NUMBER, HORSEPOWER, VOLTAGE, FULL LOAD AMPS, FULL LOAD RPM, PHASES, FREQUENCY, NEMA LRA CODE, NEMA DESIGN, INSULATION CLASS, AMBIENT TEMPERATURE, LEAD CONNECTIONS FOR DIRECTION OF ROTATION, TYPE OF DUTY, TYPE OF BEARINGS, and PUMP IMPELLER SIZE. All electrical components used in or in conjunction with the sewage pump assembly shall be UL approved when UL approval is available for that type component.

The pumps shall be capable of pumping raw, unscreened sewage and able to pass a minimum 3-inch solid. Each pump shall have an enclosed cast iron or ductile iron impeller and shall be equipped with a bronze wear ring. The pump lifting cover, stator housing, and volute casing shall be gray cast iron, ASTM A48, Class 30. Castings shall have smooth surfaces that are devoid of blow holes or other casting defects. The pump lifting bail shall have a minimum of 4-inch diameter clear opening and shall be cast as part of the motor cover or fabricated from 316 stainless steel. All fasteners exposed to raw sewage shall be 316 stainless steel. The backside of the impeller shall have pump-out vanes to keep contaminants out of the seal area. The impeller shall be dynamically balanced, and shall be single - or multi-vaned, with an enclosed or recessed, non-clogging design. There shall be a maximum clearance of .125 inches between the seal housing and the top of the impeller. The pump shall have a minimum of two mechanical seals mounted in tandem with an oil chamber between the two seals. The oil chamber of each pump shall be equipped with an electric seal fail sensor which shall be connected to an indicating light at the control panel to annunciate a seal failure and a set of relay contacts for purposes of remote notification via the County RTU system. The unit shall be designed so that when the outer seal fails, the contaminants that enter shall not enter the bearing housing and cause damage to the bearings. The inner seal shall be replaceable without disassembly of the motor housing and without the need for special tools. As a minimum, the rotating seal faces shall be carbon and the stationary seal faces shall be ceramic. All pumps shall be center-line discharge type constructed so that the discharge flange supports the full weight of the pump. Pump assemblies shall be complete with ductile iron or gray cast iron BPIU discharge base elbows that are bolted directly to a base plate which is bolted directly to the wet well floor, guide flange adapter and guide rails. The discharge elbow shall have an automatic coupling end facing the pump and an ANSI Class 125 flanged end ready for connection to the flange of the riser pipe. The design of the pump assembly installation shall be such that the pump will be automatically connected to the discharge piping when lowered into place along the guide rails, and shall seal leak-tight to the discharge base elbow by the weight of the pump assembly resting in the installed position. The pump base elbow shall be mounted on an ASTM A588 (COR-TEN) steel mounting plate that is level and is bolted to the wet well floor using 3/4-inch 316 stainless steel threaded rods with Hilti HVA anchors or approved equal anchors and shall have base ell mounting bolts of 3/4-inch 316 stainless steel that are mounted in place and welded to the plate. The pump guide rails for each pump shall be constructed of two separate whole length sections of 2 inch Schedule 40, 316 stainless steel pipe set 4 inches on center.

The pump assemblies shall be easily removed for inspections or service, requiring no fasteners to be removed or disconnected, and no need for personnel to enter the confined space of the wet well, by simply hauling up on the lift chains. The lifting chains shall be type 316 stainless steel, and shall be 1/4-inch for pumps less than 25 HP and 3/8-inch for pumps 25 HP and greater, or as required by the pump assembly weight. Chains shall be attached to the pump lifting bails using stainless steel shackles and shall extend to the inside top of the wet well. All rails and mounting hardware shall be 316 stainless steel.

E. Riser and Fittings

All force main piping and fittings within the wet well from the pump base elbow to the check valve, shall be DR-11 HDPE; only molded HDPE fittings shall be used upstream of the check valves. The HDPE discharge piping from the pump base ells (in the wet well) and to the valve assembly check valves shall be connected using HDPE flange adapters with 316 stainless steel backup rings. No ductile iron bodied fittings shall be located between the pump base elbow and the check valves. All HDPE connections shall be thermal fused. All piping downstream of the tee/cross in the valve assembly to the first underground fitting shall be ductile iron pipe, after which PVC DR-18 shall be used.

All flanged fittings shall use 316 stainless steel bolts, nuts and washers. All threads shall be treated with Bostik Never-Seez anti-seizing compound or approved equal. All bolts on the flange connection at the pump base ells shall have two nuts with a lock washer between them or a nylon lock nut.

All stainless steel fasteners shall be treated with Never-Seez prior to assembly and torque according to the fitting manufacturer's recommendation.

The riser pipes shall be attached to riser pipe brackets by 316 stainless steel U-bolts. The U-bolts shall be tightened to secure the riser pipe as to grip the pipe without deforming the pipe when bolted to the brackets. The riser pipe brackets shall be constructed of 316 stainless steel 2 inch tubing (or 2 inch 316 stainless steel angle) with 6"x6"x1/4" 316 stainless steel plates welded to each end and attached to the wet well walls by two (min) 316 stainless steel anchors.

F. Hardware

A multi hook stainless steel hanger shall be installed inside the wet well access opening for supporting the float switches and pump electric cables. The multi hook hanger shall be constructed from 1/4-inch x 2-inch type 316 stainless steel flat stock with individual hooks constructed of 1/4-inch type 316 stainless steel rod stock. Individual hangers shall be installed on each side of the upper guide rail bracket for each pump to support the pump lifting chain and power cable. The lifting chain hook shall be constructed from 3/8-inch type 316 stainless steel rod stock. The pump power cable hook shall be constructed from 1/4-inch x 1-inch type 316 stainless steel flat stock.

G. Painting and Coating

All paint and other coatings shall be applied in accordance with the product manufacturer's specifications for the surfaces being coated. All ductile iron body valves shall have a factory applied fusion bonded epoxy coating inside and outside. All ductile iron fittings shall have an approved factory applied epoxy coating inside and outside. No field-applied paintings or coatings shall be applied to the valves or fittings.

H. Stilling Well (where required)

A stilling well may be required, and if so, shall be a 6" PVC stilling well mounted such that the top is available to an open hatch cover. The bottom of the stilling well shall have two 316 stainless steel bolt all the way through both sides, passing through the center of the pipe, approximately 4" from the base of the pipe. It shall have 1/2-inch diameter holes drilled around the circumference at a rate of one hole per inch of length for at least the full wetted height. All mounting hardware shall be 316 stainless steel.

I. Magnetic Flow Meter (where required)

A flow meter may be required, and if so, shall be rated for continuous submergence, 0.05% accuracy with a polyurethane liner, flush electrodes, FM Class 1, Division 2, Groups A, B, C & D and shall be constructed for a flanged mount. Meter shall be supplied with a like size spool piece. The exterior control module/transmitter shall be mounted either inside or adjacent to the lift station control panel on the same support structure per the Lift Station Supervisor.

2.01 ELECTRICAL

A. Service and Metering

The Contractor shall be responsible and shall pay for any permits, fees, and inspections required by the local power company for service installations. Three phase power shall be used unless otherwise approved by the County. Service for pump motors of 20 horsepower or smaller shall be 230 volts. For motors greater than 20 horsepower, the service voltage shall be 460. No phase converters will be accepted. All lift stations shall be equipped with a knife-type fused safety switch in a NEMA 4X stainless steel enclosure, lockable in the ON and OFF position, between the service meter and the control panel to permit servicing of the main breaker without removing the service meter. All meter bases shall be aluminum. Minimum service size shall be 100 amp. Conduit connections to the disconnect shall be sealed using Myers conduit hub connectors (disconnect side).

B. Conductors

All power conductors shall be single conductor, 600 volt, type THW or THHN stranded copper. Minimum conductor size shall be #12 AWG. ALUMINUM WIRE IS NOT PERMITTED. All control wiring shall be single conductor #14 AWG, 600 volt, type THHN stranded copper. All terminations and interconnections of control wiring shall be by means of compression-type lugs of the nylon self insulated type with an inner bronze insulation grip sleeve on identified terminal strips. All control

wiring shall be color coded as indicated on the standard details.

C. Conduit

All power conductors from the utility source to the service meter shall be enclosed in PVC Schedule 80 conduit below ground and aboveground (NO I.M.C. ALLOWED). All lift stations shall be equipped with one conduit to the wet well for each pump power cables and a separate conduit to the wet well for the control (floatball) and signal cables. In lift stations with large horsepower pumps and pumps equipped with sensor cables, the conduit size and quantity shall be determined by the County. All conduit to the lift station wet well shall be minimum 2" Schedule 80 PVC and shall be run by the shortest route possible. All terminations shall be made inside the electrical control panel. All flexible conduit shall be non-metallic.

D. Control Panel

All pump stations shall have one automatic control panel, one telemetry control unit enclosure with specified TCU (most current model) with assigned radio frequency and one junction control box for motor control, floats, seal fail and transducer. The control panel will be ordered through Barney's Pump of Lakeland, FL. The telemetry control cabinet will be ordered through Data Flow Systems (DFS), part# RJ1816HPL. Specify if 480V 3 phase is needed. Enclosure must be ordered with 'NO" tower mounting brackets.

All cabinets shall be white in color unless specified otherwise. The 304 S.S. control cabinet and junction box shall be powder coated white.

The Order Numbers and specification are listed below.

Barney's Pumps approved panels by Manatee County

Part#	STD. FLA	MCB/ECB	PCB	Starter	Size (Starter or OL)	Note:
ManCoCP240_1_3_VFD	24 (Input)	100	40	FRN003E1S-7U	N/A	11A Max Pump FLA (VFD)
ManCoCP240_1_5_VFD	42.7 (Input)	125	70	FRN010E1S-2U	N/A	19A Max Pump FLA (VFD)
ManCoCP240_3_2_SSC	8.3	100	15	SSR	3-12A	Solid State Starter
ManCoCP240_3_3_SSC	9.5	100	15	SSR	3-12A	Solid State Starter
ManCoCP240_3_5_SSC	15.3	100	25	SSR	10-40A	Solid State Starter
ManCoCP240_3_7.5_SSC	25.2	100	40	SSR	10-40A	Solid State Starter
ManCoCP240_3_10_SSC	29.5	100	50	SSR	10-40A	Solid State Starter
ManCoCP240_3_15_SSC	44.2	125	70	SSR	25-100A	Solid State Starter
ManCoCP240_3_20_FVNR	54.4	175	90	14HUG32AF	Size 3	Elect-mech starter
ManCoCP240_3_25_FVNR	68	200	100	14HUG32AF	Size 3	Elect-mech starter

ManCoCP480_3_2_SSC	4.1	100	15	SSR	3-12A	Solid State Starter
ManCoCP480_3_3_SSC	4.8	100	15	SSR	3-12A	Solid State Starter
ManCoCP480_3_5_SSC	7.8	100	15	SSR	3-12A	Solid State Starter
ManCoCP480_3_7.5_SSC	12.6	100	20	SSR	10-40A	Solid State Starter
ManCoCP480_3_10_SSC	14.7	100	25	SSR	10-40A	Solid State Starter
ManCoCP480_3_15_SSC	22.1	100	40	SSR	10-40A	Solid State Starter
ManCoCP480_3_20_SSC	27.2	100	50	SSR	10-40A	Solid State Starter
ManCoCP480_3_25_SSC	34	100	60	SSR	10-40A	Solid State Starter
ManCoCP480_3_30_SSC	40.1	110	70	SSR	25-100A	Solid State Starter
ManCoCP480_3_40_FVNR	52.2	125	80	14HUG32AF	Size 3	Elec-mech Starter
ManCoCP480_3_50_FVNR	70.5	175	110	14HUG32AF	Size 3	Elec-mech Starter

All part numbers include junction box

Fuji Inverters/VFD's only

Part number for cabinets that are single phase does not include inverters - sold seperately.

The control panel, telemetry control cabinet, and motor cable junction box along with the safety switch box and electric utility power meter, shall be attached to horizontal support channels with stainless steel fastening systems designed for use with the support channel. The horizontal channels shall be 1-5/8 inch, 12 gage (or thicker) solid stainless steel channels (Uni-strut, B-Line or County approved equal), attached with stainless steel 3/8-inch all thread rod with stainless steel flat washers and nuts to two vertical 3 inch diameter stainless steel, schedule 40 posts. The 3 inch vertical pipe shall have plastic end caps or stainless steel end caps at the top and shall be anchored in concrete adjacent to the pump station wet well. See County Standard, "Sewage Pump Station Meter & Electrical Details". No fittings shall enter from the top or back of the control panel. All fittings shall enter the side or bottom of the control panel and shall penetrate the control panel with Myers Hubs.

The overall control panel shall be a minimum of 30"x 36"x 12" deep and of adequate size to completely cover (without crowding) all wiring and components mounted inside it. It shall have provisions for the mounting of all basic and optional controls and instrumentation. Install engraved nameplates defining door mounted hardware. The electrical control panel shall have a complete wiring schematic which is laminated in plastic and attached to the inside of the outer control panel door.

All components shall be installed per the most current NEMA and NEC regulations and standards. The components shall be industrial NEMA rated (I.E.C. is not acceptable) and UL approved when UL approval is available for that particular type component. The components of the panel shall be held in place with stainless steel, slotted, plan head machine screws with star type washers. The panel shall be tapped to accept the mounting screws of the components and no self-tapping type screws shall be used. The control panel shall have the following items installed on the back plane or on aluminum "high hats" attached to the back plane, so the body of the component is flush with the dead front door to allow operation

and reset of the components without opening the dead front door: main power breaker, emergency power circuit breaker, individual pump circuit breakers, control circuit breaker and G.F.I. duplex receptacle circuit breaker. The control panel shall have the following items installed directly to the back plane: individual motor starters, power distribution blocks, neutral bar assembly, grounding bar/lugs, terminal strips, 2 inch PVC panduit for control and telemetry wiring and fuses, and surge suppressor. The control panel shall have one G.F.I. duplex receptacle installed on the dead front door. The exterior of the control panel shall have one emergency generator receptacle, one flashing red light, and one audible alarm with reset button. The individual placement of all the components of the control panel shall be installed as indicated in the standard details.

E. Ratings

The controls shall be rated for the supply voltage (230 or 460 volts), 3 phase, 60 hertz. In the event that three phase power is not available at the location of the control panel, the cabinet shall be either ManCOCP240 1 3 VFD (3 hp) or ManCoCP240 1 5 VFD (5 hp) inverters. All control voltage to the wet well shall not exceed 24 volts DC.

F. Wiring Method

All power conductors from the main circuit breaker to all other circuit breakers shall be connected via a Square D model LBA363206, Marathon #1333555, or equal power distribution block. All electrical panel components shall have individual neutral wires. All neutral wiring shall be connected via a Square D model SN12-125 neutral assembly. Wiring is to be continuous with no splices between connections. Provide a Square D model PK9GTA grounding bar at the bottom of the backplate. This grounding bar will be the central connection point of all ground wires for the system with the exception of the pump power cords and surge arresters. The pump power cords and surge arresters shall be grounded via individual ground lugs that are to be attached to the control panel back plane. Provide two 12 terminal, Ideal Model 89-208 terminal strips to make electrical connections in the control panel. One terminal strip shall be used exclusively for 24 volt connections (TB-1) and the other shall be used exclusively for 120 volt connections (TB-2). The power distribution block, neutral assembly, grounding bar and terminal strips shall be located as indicated in the standard details. Use stainless steel screws and fasteners for all wiring connections.

G. Circuit Breakers

The panels shall be equipped with main and emergency circuit breakers for a minimum size of service of 100 amps. The main and emergency circuit breakers shall be interlocked so that when one is in the open position, the other circuit breaker must be in the closed position. There shall also be an individual circuit breaker for each pump, a control circuit breaker, a 20 amp circuit breaker for site lighting, a 20 amp circuit breaker for the flow meter (re-pump stations only) and a minimum 20 amp circuit breaker for the 120 volt GFI protected convenience outlet that is mounted on the inner control panel door. All circuit breakers shall be mounted in the control panel per the standard details. The circuit breakers shall be of the heavy duty thermal magnetic trip variety. For circuit breakers up to 100 amps,

use Square D series QOU or County approved equal. For circuit breakers greater than 100 amps, use Square D "Mag Guard" series with adjustable trip for the pumps, main and emergency breakers shall be Square D QBL, HGL, or JGL.

H. Motor Starters

Pump motors shall each have a NEMA-rated, solid state or magnetic starter sized as called for on the construction plans. No starter smaller than NEMA size 1 shall be used. Starters shall be solid state, full voltage, non-reversing type. These starters shall be Siemens series ESP-100 or County approved equal with special phase loss protection and a special factory coating of the solid state circuit boards which prevents hydrogen sulfide damage. The starters shall be equipped with under voltage release and overload protection on all three phases. The motor starter contacts (if used) shall be constructed so that they may be easily replaced without removing the starter unit from its mounted position. The overload reset device shall be operable without having to open the inner swing panel.

I. Lightning Arresters

There shall be a Ditek DTK Series lightning arrester/surge suppressor installed on the incoming power source. It shall be mounted on the bottom exterior or placed inside of the safety switch enclosure and connected to the LOAD SIDE of the safety switch and overload reset.

The main circuit breaker and the RTU circuit breaker shall also each have a Ditek CM+Series lightning arrester/surge suppressor connected to the load side of the breaker wiring. These lightning arresters/surge suppressors shall be mounted with the supplied adhesive strip on the back of the "high hat" supporting the breakers. The exact model lightning arresters/surge suppressors shall be based on the voltage and number of phases of the protected circuits.

J. Liquid Level Switches and Sensors

A minimum of four float switches are to be installed in the wet well to monitor and control liquid level height. The switches shall be a single pole mechanical type switch (as manufactured by MDI, Connery Manufacturing, or County approved equal). They shall be designed to actuate when the longitudinal axis of the float is horizontal, and deactuate when the liquid level falls one inch below the actuation elevation. The switching arrangement shall be normally open when deactivated. The output leads shall be connected in the control panel as shown in the standard details. The control voltage to the level switches shall be 24 volts DC and the switches shall be sized to operate at that voltage. In addition to the above, pump stations that re-pump sewage flows (directly or indirectly) from other pump stations shall have a Dylux model GXS3-PP300-A49-B49(50)-C01 pressure transmitter mounted inside a stilling well as the primary level sensor.

The wiring connecting the cable junction box to the wet well floats shall be a continuous length (no splices) of flexible rate 600 volt, minimum diameter of #18, type S.O. cable. The float switches shall have all connections made inside the junction box using crimp on spade terminals that are landed to the terminal strip. The wiring shall be installed so there is a minimum of four feet, and a maximum of 6 feet, of excess cable in the wet well for relocation of the float switches.

K. Alarms

Each pump station shall have one flashing red light to signal high level conditions. A flasher unit shall be installed and mounted in the control panel enclosure to operate the led flashing light attached to the unistrut.

L. Generator Receptacle

A generator receptacle to permit the installation of a portable emergency generator as the power source when the local utility power company power supply is lost shall be installed on the outside of the control panel as indicated on the standard details. It shall be directly connected to the emergency circuit breaker inside the control panel. The emergency and main circuit breakers shall have a mechanical interlink between them which shall allow only one source to supply power to the control panel at any given period of time. The generator receptacles shall be:

<u>Power Supply</u>	<u>Required Receptacle</u>
0-100 Amp, 230 Volt	Russell Stoll JRSB1044FR
100-200 Amp, 230 Volt	Russell Stoll JRSB2044FR
0-200 Amp, 460 Volt	Russell Stoll JRSB2034HR

M. Seal Leak Moisture Detector

Provide for each pump a moisture sensing sensor which will detect when moisture has penetrated the seal chamber. The moisture seal detector shall be connected to the County RTU system to notify lift station maintenance personnel when a seal has allowed moisture to enter the oil chamber of the pump. An indicating lamp is to be mounted in the control panel as illustrated in the standard details to also signal the seal failure.

N. Telemetry Control Unit

The remote terminal/pump control unit shall be a complete TAC Pack TCU system as manufactured by Data Flow Systems, Inc. The unit is to be a fully programmable, dual function device. It shall be used to monitor and control SCADA equipment and it shall have all the necessary hardware and software to control three pump motor starters. Its operation is based on level inputs from a minimum of four float ball switches in the wet well. It shall have the ability to control pump alternation, activate and deactivate remote and local alarms, and communicate with the HT3 SCADA System. It shall be equipped with RTU surge protection and a transient filter shield. The unit shall have an uninterruptible power source and contain all the components and be electrically connected as indicated in the standard details. It shall be equipped with an antenna tower with supporting mast and coaxial cable that is required by the manufacturer for that particular system. The battery backup will be contained with the TCU in its own enclosure. The installation shall include the required FCC licensing. The antenna and mast shall be rated for ASCE 7-16, 154 mph, Risk Category III, Exposure C wind loads. Tower heights above 20 feet must be Rohn RG-45 series.

Pump stations that re-pump sewage flows (directly or indirectly) from other pump stations will also require an Analog Monitor Module to receive input from the force main pressure transducer and flow meter.

Telemetry control and remote terminal/pump control units are not required for privately owned and maintained pump stations.

O. Grounding

Install a 5/8" x 10' copper-clad ground rod for each electrical service. Connect to the ground rod a #6 bare copper wire to connect with the electrical panel grounding bar. Provide another, separate ground rod, tower clamp, and #6 bare copper wire to connect directly to the antenna tower, control cabinet/TCU cabinet, polyphaser, and ground. The ground rods and #6 bare copper wires shall be connected by a exothermic weld (cad weld).

P. Site Lighting

A minimum 6000 lumens LED shall be mounted on the system tower for illumination of the pump station area. The manually operated light shall be mounted on 3/4-inch aluminum rigid conduit connected to the RTU tower using 90 degree korns clamps.

3.01 GRINDER PUMP (LIFT) STATIONS

- A. Not applicable to this project

4.01 WATER SERVICE

- A. The lift station shall be equipped with a as shown on the Drawings. The water service shall be equipped with a 2-inch water meter and a reduced-pressure principle backflow prevention assembly (Wilkins 975XL2, Apollo RPLF4A, or Equal) and a 3/4-inch brass hose bib. The water meter and backflow prevention assembly shall be located within two feet of the pump station easement (or property) line. All water meters shall be obtained from the Manatee County Water Meter Department. Reclaimed water shall be used where available.

5.01 PERMITS

- A. The Contractor shall be responsible for obtaining and shall pay for any permits and/or inspections required.

6.01 SHOP DRAWINGS AND INSPECTIONS

- A. When calling for inspection, the Contractor shall have these approved shop drawings available on-site for review by the inspectors. The Contractor shall also deliver to the Lift Station Section inspector, the pump manufacturer's technical manual with the model number, serial number, and certified pump curve, for each pump prior to acceptance by the County for maintenance.

7.01 EASEMENTS

- A. An easement for ingress and egress to the lift station and an easement for the lift station must be granted and recorded before the lift station can be accepted by the County for operation and maintenance.

8.01 SITING

- A. The siting of all pump station facilities shall be subject to review and approval by Manatee County. All pump stations shall be located on a separate parcel of land or within a utility easement in common open space. The station shall be properly sited with due consideration of the neighborhood, surrounding site features, landscaping, aesthetics, safety and security. The station and associated landscaping shall not be sited on a right-of-way, private road, median, front yard of a residence, or within a visibility triangle. The pump station wet well, valve vault, control panel, and telemetry antenna shall not be sited within 20 feet of overhead power lines.
- B. Each pump station site shall have a vehicular access drive paved with a concrete surface course over a base course. The drive shall be designed to allow a service truck to park off of the right-of-way or roadway easement and to also allow the service truck to back up to the wet well such that the wet well is directly to the rear of the truck or adjacent to the side of the truck. The pump station control panel, telemetry antenna and hose bib shall not be located between the vehicular access driveway and the wet well, valve assembly, and/or valve vault.
- C. There shall be at least a 20-foot easement in all directions from the pump station site equipment. There shall be no obstructions within the easement such as buildings, walls, fences, etc., other than those that are part of the pump station and identified in these standards. A minimum setback of 5 ft shall be provided between pump station structures/equipment and the security fence. Pump station easement shall extend a minimum of 15 ft beyond all four sides of the security fence. If the pump station is adjacent to the street's right-of way, the pump station easement shall extend to the ROW line. The lift station site shall be made accessible with a minimum 30 ft wide corridor/easement.
- D. Surface stormwater flow shall be directed around the pump station site. The site shall be graded to provide sheet flow of site runoff away from the equipment and direct it to a suitable swale or drainage outfall. The construction drawings shall include a pump station site plan with a grading plan and landscaping plan.

9.01 FLOODING

- A. Wastewater pumping station structures and electrical and mechanical equipment shall be fully protected from physical damage from flood water intrusion by the 100-year flood. Wastewater pumping stations shall remain fully operational and accessible during the 25-year flood. Regulations of state and federal agencies regarding obstructions of the pumping station site by flood waters shall be observed during the design of the development.

10.01 ENTRANCE HATCH ELEVATIONS

- A. The wet well and valve vault top and entrance hatches shall be set at least 4 inches above the 100-year flood plain elevation, or 8 inches above the 25-year flood plain elevation, or 6 inches above the surrounding grade, or 12 inches above the adjacent roadway crown elevation, whichever is highest. Where this is not practical, deviation from the above must be approved by the County on a case-by-case basis.

11.01 ACCESSIBILITY AND SECURITY

- A. The pumping station shall be readily accessible by maintenance vehicles during all weather conditions. A fully functional paved travelway shall be provided to the lift station driveway. The facility shall be located off the traffic way of streets and alleys.
- B. All hatches, electrical panel and irrigation panel doors shall be provided with lockable hasps or staples.
- C. Security fences with lockable gates shall be provided for all lift stations that are owned and maintained by Manatee County. Lift stations shall have a 6-foot high vinyl coated chain link security fence with privacy decorative slatting (color matched). Chain link security fencing shall be #9 gauge core, galvanized with vinyl coating, with 1 5/8 inch top rails, 2 3/8 inch Schedule 40 line posts, 2 1/2 inch Schedule 40 corner posts and 3 1/2 inch Schedule 40 gate posts for swing gates. Gate posts and track line posts shall be 4 inch Schedule 40 for cantilever slide gates. Maximum line posts spacing shall be equally spaced, not to exceed 8 feet.
- D. For private lift stations, the Engineer of Record shall evaluate the location of the proposed lift station and determine whether a security fence is necessary.

12.01 FORCE MAIN FLOW METER

- A. Lift stations that re-pump sewage flows (directly or indirectly) from other lift stations shall be equipped with a submersible electromagnetic flow meter. The flow meter shall be mounted on an above-ground force main. The flow meter shall be a McCrometer Ultra Mag Model UM06 or an approved equal. The meters, gauges and all connections and wiring shall be rated fully submersible. The flow meter shall transmit 4-20 mA signals to the telemetry system via the Analog Monitor Module mounted inside the control panel. The signal cables shall be run through 1-inch PVC conduit from the meter to the control panel. The meter display unit shall be weather-proof and mounted on an aluminum stand adjacent to the meter.

13.01 LANDSCAPING & IRRIGATION

- A. Landscape trees and shrubs.

The pump station site shall have shrubs planted around the perimeter of the pump station security fence in a hedge-like placement. Shrubs shall have a minimum spacing of 3 feet between the centers of the shrub's base stem. For private pump stations that are located in nonresidential areas, shrubs are optional for the sides

that are not adjacent to thoroughfare roads, nonthoroughfare roads, and residential areas. For pump stations that are located adjacent to thoroughfare roads and non-thoroughfare roads, a minimum of two small understory trees or palm trees shall be planted between the pump station security fence and the right of way line. For pump stations within residential areas or located adjacent to residential areas, a minimum of two additional understory trees or palm trees; for a total of at least four understory trees or palm trees shall be planted around the pump station (these landscaping requirements are not applicable to pump stations that only serve one single family residence.) A minimum setback of 5 feet shall be provided between the shrub's base stem and the security fence to provide an access way for service personnel. A minimum setback of 10 feet shall be provided between the trunk of understory trees/palm trees and the security fence.

- B. Understory trees shall not have a mature height exceeding 30 feet. Small understory trees, palm trees and shrubs shall not have evasive roots. The minimum height of understory trees shall be six (6') feet at time of placement. The minimum height of palm trees shall be fifteen (15') feet at time of placement. The minimum height of shrubs shall be two (2') feet at time of placement. Shrubs shall have three gallon root balls. Shrub growth habits shall be upright, globose, or columnar. Shrub growth habits shall not be spreading or broad spreading. The understory trees and palm trees shall be planted to accent the shrub placement. Tops of root balls of plants shall be set at or slightly above existing grade. All plant material to be Florida Grade #1 or better, as defined in "Grades and Standards for Nursery Plants," State of Florida Dept. of Agriculture. Plants shall be sound, healthy, vigorous, and free from plant diseases, insects, pests, or their eggs and shall have healthy normal root systems. Plants shall be nursery grown stock, freshly dug. No heeled in, cold storage, or collected stock shall be accepted. Ground covers shall have sturdy fibrous root systems. Staking and bracing shall be done on all trees using Arbor tape and the Duckbill anchor system, in accordance with sound nursery practices.

- C. The shrubs, understory trees and palm trees shall be of the drought tolerant, low maintenance varieties. Plant selection shall be based on soil water retention as well as soil pH.

Examples of acceptable vegetation are as follows:

PLANT NAME	SOIL CONDITIONS WHERE PLANT WILL GROW		pH RANGE	
	Damp to poorly drained soils w/ low percolation	Well drained sands w/ high percolation	Plant tolerates acidic & alkaline soils	Plant tolerates acidic soils only
UNDERSTORY TREES (Mature height not exceeding 30 feet)				
Little Gem Magnolia (Magnolia grandiflora)	X			X
Southern Wax Myrtle (Myrica cerifera)	X	X	X	
Peregrina (Jatropha intergerrima)		X	X	

Bottle Brush Tree (Callistemon citrinus)		X		X
Crape Myrtle Tree (Lagerstroemia Indica)		X		X
Feijoa (Feijoa sellowiana)		X	X	
PALMS				
Cabbage Palms (Sabal palmetto)	X	X	X	
Pindo Palms (Butia capitata)		X	X	
Dwarf Royal (aka Christmas) Palm (Veitchia merrillii)		X	X	
SHRUBS & BUSHES				
Cocoplum (Chrysobalanus icaco)		X	X	
Pipestem (Agarista Populafollia)	X	X	X	
Sweet Viburnum (Viburnum odoratisimum)		X	X	
Yew podocarpus (Podocarpus macrophyllus)		X	X	

D. The following plant species shall not be planted at the lift station site:

Melaleuca quinquenervia (commonly known as Punk tree, Malaleuca); Schinus terebinthifolius (commonly known as Brazilian Pepper); Casuarina species (commonly known as Australian Pine); Rhodomyrtus tomentosa (commonly known as Downy Rose Myrtle); Mimosa pigra (commonly known as the Catclaw Mimosa); Dalbergia sissoo (commonly known as the Indian Rosewood); and Cupaniopsis anacardioides (commonly known as the Carrotwood).

E. Ground cover.

There shall be no vegetation within the lift station fencing. Site shall include a polypropylene weed barrier fabric that is covered with a minimum of 2-inches of washed shell, or rock within lift station fencing. Landscaping stones shall be inert and nonleaching. Crushed lime rock shall not be acceptable. Site shall include a polypropylene weed barrier fabric that is covered with 3 to 4-inches of shredded wood-type mulch that is located under the shrubs and up to the outside of the security fence. Polypropylene weed barrier fabric that is covered with 3 to 4-inches of shredded wood-type mulch shall be located under the trees for a minimum distance of 3 feet from the tree. Bahia, St. Augustine or Floritam sod or shredded wood-type mulch with a polypropylene weed barrier fabric shall be extended from the shrubs to the lift station easement line.

F. Irrigation.

An irrigation system shall be connected to a non-potable water source. A weather-tight time clock with built-in transformer, minimum of four zones (Rainbird ESP-4M, Toro CC-M-9, or equal) and a rain sensor (Mini-Clik, or equal) shall be furnished

and installed. The irrigation controller shall be in a lockable control panel and attached with stainless steel two piece pipe clamps or stainless steel U-bolts to two vertical 3 inch diameter stainless steel, schedule 40 pipes or equal pipe support. The pipe clamp or U-bolt ends shall be covered with plastic caps to prevent injury to personnel. The 3 inch vertical pipe shall have plastic end caps or stainless steel end caps at the top and shall be anchored in concrete. The irrigation system control panel recommended location is outside of the fence and behind the shrubs. The Contractor shall furnish the County a padlock with a set of two keys for the irrigation control panel. The number of zones shall be based on the proposed site, planting configuration, watering distribution, irrigation system demand, and type of vegetation to be irrigated. The irrigation system shall be installed to irrigate the trees, shrubs and grassed areas; and designed to provide three-fourths (3/4") to one (1") inch of water per week and be in conformance with irrigation restrictions established by the Southwest Florida Water Management District (not restricted if using reclaimed water). The irrigation system shall adhere to the requirements of the Manatee County Land Development Code and to the "Standards and Specifications for Turf and Landscape Irrigation Systems", latest edition, as published by the Florida Irrigation Society, Inc. A permanent sprinkler system with distribution lines underground with mist and/or bubbler nozzles, as appropriate, above the ground are acceptable. A micro-irrigation system located within the planting beds of shrubs and trees is acceptable for that type of installation. In each accent, isolated or separate tree planting bed, a tree bubbler (Toro 514-20 or equal), shall be installed at each tree. In addition, a four (4') foot section of flexible PVC shall be provided for the tree bubbler at each tree. Drip line hoses shall have built-in emitters (Toro DL2000 or equal).

G. Radio signal interference.

Landscape buffer plantings are to be field adjusted in coordination with the siting of the lift station's radio antenna to eliminate signal interference. The antenna for the existing or proposed radio telemetry unit at the lift station requires direct line-of-sight signaling capability to the Utilities Department office that will receive the signal. There shall be an unobstructed horizontal angle of fifteen (15°) degrees from the antenna mast (7 1/2 degrees on both sides of the direct line-of-sight azimuth). No tree shall be planted within the designated unobstructed angle for a twenty (20') foot horizontal distance measured from the mast.

14.01 BACK-UP DIESEL PUMPS OR EMERGENCY GENERATOR SET

- A. Emergency Generators: See Section 16231

END OF SECTION

SECTION 03600 GROUTING

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This Section includes grouting of equipment bases and such locations as shown on the Drawings and as specified.
- B. The types of grouting include the following:
 - 1. Portland Cement Grout
 - 2. Non-shrink, Non-expanding Grout

1.02 DELIVERY AND STORAGE

- A. Prevent damage to or contamination of grouting materials during delivery, handling and storage.
- B. Store all grouting materials in undamaged condition with seals and labels intact as packaged by the manufacturer.

1.03 SUBMITTALS

- A. All submittals shall be in accordance with Specification 01340 - Shop Drawings, Project Data and Samples.

PART 2 PRODUCTS

2.01 PREMIXED GROUTS

- A. Portland Cement Grout
- B. (For grouting CMU cells and similar items - $f'c=3000$ psi minimum)
 - 1. Portland Cement: ASTM C150, Type II
 - 2. Sand: ASTM C33, Fine Aggregate
 - 3. Water: Potable
 - 4. Pea Gravel: ASTM C33. Coarse aggregate graded so that at least 90% passes 3/8-inch sieve and 90% is retained by a number 4 sieve.
- C. (Grout Mortar for use as fillets and leveling)
 - 1. Portland Cement: ASTM C150, Type II
 - 2. Sand: ASTM C33, Fine Aggregate (Marson's sand)
 - 3. Water: Potable
 - 4. Mix 1-part Portland cement to 3-parts sand.
- D. Pre-Mixed non-shrink, Non-expanding Grout (Nonmetallic). Non-shrink grout as shown on the Drawings shall be a mixture of selected silica sands, Portland cement, water reducing agents, plasticizing and shrinkage compensating agents.

Grout shall be nonmetallic non-corrosive, non-staining and comply with CRD-C-588, Type D.

- E. The grout shall be non-shrink in accordance with ASTM C827, ASTM C191, and ASTM C109. The water-grout ratio shall be approximately 8 to 10 quarts of water per cubic foot of grout adjustable for varying job conditions.
- F. Grout shall not contain calcium chloride or other salt; aluminum or other metals; chemical additives, gypsum or expansive cements. Grout shall not expand after set.
- G. Grout shall be used and applied in accordance with the manufacturer's written instructions.
- H. Subject to compliance with requirements provide from the following:
 - 1. L&M Construction Chemicals, Inc. - Crystex
 - 2. Grout Corp. - Five Star Non-shrink Grout or equivalent

2.02 NONSHRINK GROUT

- A. Non-shrink grout shall conform to the following requirements:
 - 1. Manufactured under rigid quality control specifically for grout used in transferring heavy loads.
 - 2. Contain nonmetallic aggregates specially graded to minimize bleeding.
 - 3. Have an initial setting time of approximately one hour at 70°F.
 - 4. Produce no settlement or drying shrinkage at 3 days or later.
 - 5. Have higher strength at all ages than plain cement grout of the same flowability.
 - 6. Resist attack by oil and water and have lower absorption than plain cement grout of the same flowability.
 - 7. Minimum compressive strength, in accordance with ASTM C-109, shall be 2500 psi after 1 day and 7000 psi after 28 days.

2.03 MIXES

- A. For less than 2-inch clearance, or where size or shape of space makes grouting difficult, grout mix shall consist of Portland cement, fine aggregate and water.
- B. For greater than 2-inch clearances where coarse aggregate will not obstruct free passage of the grout, extend grout by adding 50 pounds of pea gravel per 100 pounds grout material.
- C. Use minimum amount of water necessary to produce a flowable grout without causing either segregation or bleeding.
- D. Portland cement mortar for raked-out edges of non-shrink grout: one part Portland cement, two parts sand and 0.50-part water by weight.

2.04 MIXING

- A. Mix grout in accordance with manufacturer's printed specifications.

- B. Mix grouting materials and water in a mechanical mixer for no less than 3-minutes.
- C. Mix grout as close to the work area as possible and transport the mixture quickly and in a manner that does not permit segregation of materials.
- D. After the grout has been mixed, do not add more water for any reason.

PART 3 EXECUTION

3.01 PROCEDURES

- A. Installation methods and procedures shall be approved by Engineer and shall be in accordance with manufacturer's printed specifications before work is begun.

3.02 SURFACE PREPARATION

- A. Surface preparation shall be in accordance with manufacturer's printed specifications.
- B. Remove defective concrete, laitance, dirt, oil, grease and other foreign material from concrete surfaces by bush-hammering, chipping, or other similar means, until a sound, clean concrete surface is achieved.
- C. Lightly roughen the concrete, but not enough to interfere with the proper placement of grout. Cover concrete areas with waterproof membrane until ready to grout. Immediately before grouting remove waterproof membranes and clean any contaminated surfaces.
- D. Remove foreign materials from metal surfaces in contact with grout. Align, level and maintain final positioning of all components to be grouted.
- E. Saturate concrete surfaces with clean water; remove excess water and leave none standing.

3.03 PLACING

- A. Placing shall be in accordance with manufacturer's printed specifications.
- B. Place non-shrink grouting material quickly and continuously by the most practical means permissible; pouring, pumping or under gravity pressure.
- C. Do not use either pneumatic-pressure or dry packing methods without written permission of the Engineer.
- D. Apply grout from one side only to avoid entrapping air.
- E. Final installation shall be thoroughly compacted and free from air pockets.
- F. Do not vibrate the placed grout mixture or allow it to be placed if the area is being vibrated by nearby equipment.

- G. Do not remove leveling shims for at least 48 hours after grout has been placed. After shims have been removed, fill voids with plain cement-sand grout.
- H. After non-shrink grout has reached initial set, rake out exposed edges approximately 1-inch into the grouted area and paint with Portland cement mortar.

3.04 CURING

- A. Cure grout for 3-days after placing by keeping wet and covering with curing paper or by another approved method.

END OF SECTION

DIVISION 4 MASONRY

SECTION 04220 MASONRY

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required to construct all masonry work as shown on the Drawings and specified herein.
- B. The work under this Section includes, but is not necessarily limited to the following:
 - 1. Concrete masonry units (CMU), including decorative masonry block.
 - 2. Reinforced CMU lintels.
 - 3. Masonry reinforcing, ties and anchors.
 - 4. Grouting required throughout the project.

1.02 SAMPLES

- A. Submit two samples each of concrete masonry units.
- B. Submit two samples of decorative, masonry block.
- C. Before commencing with the laying of any architectural masonry, construct on the site, where directed by the County, a sample 6 x 4 foot wall panel showing type and tooling of mortar and bond, for the County's approval. This sample wall shall remain in place for the duration of the masonry work. Remove sample panel at the completion of the work as directed by the County.

1.03 PROTECTION OF MATERIALS

- A. All perishable materials for the work of this Section shall be delivered, stored and handled so as to preclude damage of any nature. Manufactured materials, such as cement and lime, shall be delivered and stored in their original container, plainly marked with identification of material and maker. Materials in broken containers or in packages showing water marks or other evidence of damage, shall not be used and shall be removed from the site.

All masonry shall be shipped stacked with hap or straw protection or other suitable protective device, and shall be similarly stacked off the ground on the site. In addition, all masonry stored on the site shall be protected from the weather and staining with the use of tarpaulins or other covering approved by the County.

1.04 COLD WEATHER CONSTRUCTION

Masonry construction in cold weather shall conform to the applicable requirements of "Construction and Protection Recommendations for Cold Weather Masonry Construction" of the Technical Notes on Brick and Tile Construction by the Brick Institute of America.

PART 2 PRODUCTS

2.01 MATERIALS - MASONRY

A. Concrete Masonry Units:

1. Standard and light weight concrete masonry units (CMU) shall conform to ASTM C-90, Grade N, Type I, two cell hollow, load bearing units of 8" x 16" nominal face size and bed dimension as shown on the Drawings. Masonry prism strength f'_m shall be as shown on the drawings, but not less than 1250 psi.
2. CMU shall be free from substances that will cause staining for at least 18 hours and then air cured in covered storage for not less than 28 days before delivery. Units shall have a maximum linear drying shrinkage of 0.25 percent (ASTM C-426) and have a moisture content at time of delivery not exceeding 30 percent of total absorption.
3. CMU noted as fire-rated on the Drawings shall conform to Underwriters Laboratories, Inc., Standard for Concrete Masonry Units UL618, and shall have two (2) hour fire resistant rating.
4. All split rib CMU shall have 7-1/2 equally spaced 3/4-inch deep x 3/4-inch wide bevels. The projected face shall have a rough texture. Units shall be laid in horizontal stack bond.
5. Units shall be obtained from one manufacturer to insure even color and texture.
6. Provide special units required by the Drawings, including solid, corner, pilaster, lintels, and jamb units.
7. Decorative masonry block units shall be similar in quality to Number 1210, DeMaco Concrete Products, Sarasota, FL, or equal. Design pattern to be as shown on the Drawings.

- B. Acoustic concrete masonry units shall be Soundblox, Type R by the Proudfoot Company or equal. Units shall be fabricated on standard block machines using manufacturer's special molds; shall have a closed top and ends and slotted exposed face; shall have a noise reduction coefficient range (NRC) of 0.50 - 0.60 for Type R; and shall comply with ASTM-C90 for load bearing masonry units. Color of the Soundblox and mortar shall match interior color which will be submitted to the County. The Soundblox installation shall be laid in horizontal stackbond with flush joints.

2.02 REINFORCING, TIES, ANCHORS AND MISCELLANEOUS

- A. Reinforcing shall be welded wire units prefabricated in straight lengths of not less than 10 feet with matching corner and tee units fabricated from cold-drawn steel wire complying with ASTM-A82, with deformed continuous side rods and plain cross-rods, crimped for cavity wall construction, if required, and a unit width of 1-1/2 inches to 2 inches less than thickness of wall or partition. Reinforcement for decorative masonry block shall be 2 inches wide. Reinforcement shall be placed at every third course (24" o.c.).
- B. Single width reinforcement shall be truss type, fabricated with single pair of galvanized 9 gauge side rods and continuous 9 gauge cross-rods spaced not more than 16 inches on center.

- C. Galvanized dove-tailed anchor slots with anchors at 24 inches on center shall be furnished for anchorage to concrete framework or walls.
- D. Approved 16-gauge corrugated non-ferrous metal ties manufactured for use with the anchor slots provided shall be spaced at a maximum of 8 inches o.c. vertically and 30 inches o.c. horizontally.
- E. The Contractor shall provide and install miscellaneous anchors and attachment members, required both for the anchorage of his own work and that of other trades requiring attachment to masonry, which are not specifically provided under separate sections.
- F. Control joints shall be factory extruded preformed rubber gaskets conforming to ASTM D-2000 2AA-205 and shall be as manufactured by Dur-O-Wal, Hohmann and Bernard, Inc., AA Wire Products or equal. Control joints shall be installed as shown on the Drawings.
- G. Weep holes shall be 1/4-inch O.D. by 4 inches long, clear plastic tubing that will not stain brickwork, by Hohmann and Barnard, Inc. or equal.
- H. Cleaning compound shall be mild, non-caustic detergent solution such as 801 Super Real Clean by Superior Manufacturing Co., or 600 Sureclean by Process Solvent Co., Inc., or equal.

2.03 MORTAR MATERIALS

- A. Portland cement shall conform to ASTM C150 Type II. Masonry cements to be used when specifically approved for colored mortar.
- B. Lime for masonry mortar shall be hydrated, conforming to ASTM C207, Type S.
- C. Sand shall be clean, durable particles, free from injurious amounts of organic matter. The sand shall conform to the limits of ASTM C144. Sand for grout shall conform to ASTM C144 or C33 as required.
- D. Water shall be free from injurious amounts of oils, acids, alkalis or organic matter, and shall be clean and fresh.
- E. Mortar proportions shall conform to ASTM C270, Type M, or as otherwise approved by the County. Ingredients shall be accurately measured by volume in boxes especially constructed for the purpose by the Contractor. Measurement by shovel will not be allowed.
- F. Grout for setting bearing plates, machinery, or any other equipment shall be mixed as recommended by the manufacturer to give the necessary consistency for placing and to give a minimum compressive strength (ASTM C-109) of 5000 psi at 7 days.
- G. All other grout shall be 1 part Portland cement and 1 part sand with a maximum aggregate size of 3/8 inch pea rock and a minimum comprehensive strength of 3000 psi in 28 days.

- H. Non-shrink non-metallic grout shall be 5 star grout as manufactured by the U.S. Grout Corp., or equal and be used in strict accordance with the manufacturer's instructions for the use intended.

2.04 FACE BRICK

Non-load bearing burned clay or shale. Size, color and texture to match existing and as approved by the County.

PART 3 EXECUTION

3.01 MORTAR

- A. Mortar shall be machine mixed in an approved type of mixer in which the quantity of water can be accurately and uniformly controlled. The mixing time shall not be less than five minutes, approximately two minutes of which shall be for mixing the dry materials and not less than three minutes for continuing the mixing after the water has been added. Where hydrated lime is used for mortar requiring a lime content, the Contractor will have the options of using the dry-mix method or first converting the hydrated lime into a putty.
- B. All CMU shall be laid in a full bed or mortar, applied to shells only. Butter the vertical joint of unit already set in the wall and all contact faces of the unit to be set. Each unit shall be placed and shoved against the unit previously laid so as to produce a well-compacted vertical mortar joint for the full shell thickness. Units shall set with all cells in a vertical position. The moisture content of the units when laid shall not exceed 35 percent of the total absorption as determined by laboratory test. Decorative masonry units shall be laid in a full bed of mortar on all four sides.
- C. All masonry units shall be laid in stretcher (running) bond unless otherwise shown. Tool dense and neat.
- D. Sizes shall be specified and called for on the Drawings, and where "Soaps" and "Splits" are used, the space between these members and the backup material shall be slushed full of mortar.
- E. Joints of all masonry shall be tooled in accordance with the following:
 - 1. Wait until unit mortar is thumbprint hard before tooling joint. This may require as much as three hours in the shade and one hour in the sun in the summertime.
 - 2. The required personnel of the Contractor shall be kept on the job after hours, if necessary, to properly tool joints.
 - 3. Both vertical and horizontal joints shall be maintained uniform in spacing.
 - 4. Joints for CMU shall be 3/8 inch.
 - 5. Joints for structural block shall be 1/4 inch.
- F. Install all frames required to be set in masonry, set masonry tightly against frames, build in all frame anchors, and fill frames solid with mortar.
- G. Control joints shall be installed at the intersection of masonry walls with structural

concrete and elsewhere as detailed on the Drawings. Joints shall be raked out to a depth of 3/4 inch for the full height of the wall suitable for caulking. The maximum length, horizontally, between vertical control joints shall be 40 ft., but joints shall be located only as directed or shown. Joints shall be equal in width to the standard mortar joint.

- H. All masonry slots, chases, or openings required for the proper installations of the work of other Section shall be constructed as indicated on the Drawings or in accordance with information furnished before the work is started at the point affected. No chase shall cut into any wall constructed of hollow units after it is built, except as directed and approved by the County.
- I. Surfaces shall be brushed as work progresses and maintained as clean as it is practicable. Unfinished work shall be raked back where possible and toothed only where absolutely necessary. Before leaving fresh or unfinished work, walls shall be fully covered and protected against rain and wind and before continuing work previously laid shall be swept clean. To tops of walls or other unfinished work shall be protected against all damage by frost or the elements by means of waterproof paper, tarpaulins, boards or other means approved by the County.
- J. The Contractor shall build-in all miscellaneous items to be set in masonry for which placement is not specifically provided under separate Divisions, including reglets, lintels, ties, electrical panel boxes, sleeves, vents, grilles, anchors, grounds, and exterior electric conduits and fixtures, and shall cooperate with other trades whose work is to be coordinated with the work under this Section.
- K. All anchorage, attachment, and bonding devices shall be set so as to prevent slippage and shall be completely covered with mortar or grout.
- L. All ties and reinforcing for masonry shall be furnished and installed by the Contractor.
- M. Loose steel lintels shall be as shown on drawings and installed under this Section.
- N. Loose lintels shall be set in full bed or mortar and supported by solid or mortar filled hollow concrete blocks as detailed on the Drawings.
- O. Bed and grout all steel, for equipment and machinery, and items coming in contact with masonry where grouting is required, including door bucks and frames set in masonry. The Contractor shall install all anchor bolts, base plates, and seats in masonry walls, and build-in all items required for the completion of the building as they apply to masonry.

3.03 REINFORCED MASONRY

- A. Provide vertical reinforcing in filled cores of masonry units of size, spacing and locations as indicated on the Drawings and specified herein. Unless otherwise shown on the Drawings, vertical reinforcing at all exterior infill walls shall be No. 4 bars as specified in the Contract Documents and shall be placed 8'-0" on center, and vertical reinforcing at all exterior free-standing walls shall be No. 5 bars placed at each corner, each opening and not greater than 8'-0" centers along straight runs.

- B. All cores containing reinforcing shall be filled, full height, with 3/8" pump mix concrete $f'c = 2,500$ psi with a slump of not less than 6 inches nor more than 8 inches.

3.04 CLEANING

- A. All holes in exposed masonry shall be pointed, and defective joints shall be cut out and repointed with mortar of same color as that of the original and adjoining work.
- B. Exposed masonry shall be protected against staining by wall coverings, and excess mortar shall be wiped off the surface as the work progressed.
- C. All masonry shall be cleaned with approved detergent solution in accordance with manufacturer's printed directions. No acid or metal scrapers shall be used on masonry.
- D. Before applying any cleaning agent to the entire wall, it shall be applied to a sample wall area of approximately 20 square feet in a location approved by the County. No further cleaning work may proceed until the sample area has been approved by the County, after which time the same cleaning materials and method shall be used on the remaining wall area.

3.05 WALL FLASHING

- A. Fabric wall flashing shall be installed above and below all openings in exterior masonry, at intersection of floors with exterior walls, and elsewhere as shown or noted on the Drawings. It shall be furnished and installed as shown on the Drawings.

END OF SECTION

SECTION 05310

STEEL DECK

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes the following:
 - 1. Roof deck.
- B. Related Sections: The following Sections contain requirements that relate to this Section:
 - 1. Section 09900, "Painting" for touch-up and repair painting of deck.

1.03 SUBMITTALS

- A. General: Submit each item in this Article according to the Conditions of the Contract and Division 1 Specification Sections.
- B. Product data for each type of deck, accessory, and product specified.
- C. Shop drawings showing layout and types of deck panels, anchorage details, reinforcing channels, pans, deck openings, special jointing, accessories, and attachments to other construction.
- D. Product certificates signed by manufacturers of steel deck certifying that their products comply with specified requirements.
- E. Welder certificates signed by Contractor certifying that welders comply with requirements specified under the "Quality Assurance" Article.

1.04 QUALITY ASSURANCE

- A. Installer Qualifications: Engage an experienced Installer who has completed steel deck similar in material, design, and extent to that indicated for this Project and with a record of successful in-service performance.
- B. Testing Agency Qualifications: To qualify for acceptance, an independent testing agency must demonstrate to Architect's satisfaction, based on evaluation of agency-submitted criteria conforming to ASTM E 329, that it has the experience and capability to satisfactorily conduct the testing indicated without delaying the Work.
- C. Welding Standards: Comply with applicable provisions of AWS D1.1 "Structural Welding Code--Steel" and AWS D1.3 "Structural Welding Code--Sheet Steel."

1. Certify that each welder has satisfactorily passed AWS qualification tests for welding processes involved and, if required, has undergone recertification.
- D. AISI Specifications: Comply with calculated structural characteristics of steel deck according to AISI's "North American Specification for the Design of Cold-Formed Steel Structural Members."
- E. Florida Building Code 2020 edition, Chapter 17 criteria.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Protect steel deck from corrosion, deformation, and other damage during delivery, storage, and handling.
- B. Stack steel deck on platforms or pallets and slope to provide drainage. Protect with a waterproof covering and ventilate to avoid condensation.

1.06 COORDINATION

- A. Coordinate installation of inserts and fittings in metal roof deck with related units of Work specified in other Sections.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products that may be incorporated in the Work include, but are not limited to, the following:
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 1. Nucor Corp.; Vulcraft Div.
 2. United Steel Deck, Inc.

2.02 ROOF DECK

- A. Steel Roof Deck: Fabricate panels without top-flange stiffening grooves conforming to SDI Publication No. 31 "Specifications and Commentary for Steel Roof Deck" and the following:
 1. Galvanized Steel Sheet: ASTM A 653, Structural Steel (SS), Grade 33 minimum.
 - a) Color: Manufacturer's Standard
 2. Deck Profile: As indicated on the construction drawings.
 3. Profile Depth: As indicated on the construction drawings.
 4. Design Uncoated-Steel Thickness: As indicated on the construction drawings.

5. Span Condition: As indicated on the construction drawings.
6. Side Joints: Overlapped or interlocking seam at Contractor's option. Provide side lap fasteners as indicated on the construction drawings.

2.03 ACCESSORIES

- A. General: Provide accessory materials for steel decks that comply with requirements indicated and recommendations of the steel deck manufacturer.
- B. Mechanical Fasteners: Manufacturer's standard, corrosion-resistant, low-velocity, powder-actuated or pneumatically driven carbon steel fasteners; or self-drilling, self-threading screws.
- C. Side Lap Fasteners: Manufacturer's standard, corrosion-resistant, hexagonal washer head; self-drilling, carbon steel screws, No. 10 minimum diameter as indicated on the construction drawings.
- D. Flexible Closure Strips: Manufacturer's standard vulcanized, closed-cell, synthetic rubber.
- E. Miscellaneous Sheet Metal Deck Accessories: Steel sheet, minimum yield strength 33,000 psi and not less than 0.0359-inch-thick minimum ridge and valley plates, finish strips, and reinforcing channels of same material as roof deck.
- F. Weld Washers: Manufacturer's standard un-coated-steel sheet weld washers, shaped to fit deck rib, 0.0598 inch thick with 3/8-inch minimum diameter pre-punched hole.
- G. Steel Sheet Accessories: ASTM A 446, G 60 coating class, galvanized according to ASTM A 525.
- H. Galvanizing Repair Paint: SSPC-Paint 20 or DOD-P-21035, with dry film containing a minimum of 94 percent zinc dust by weight.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting framing and field conditions for compliance with requirements for installation tolerances and other conditions affecting performance of steel deck.

3.02 PREPARATION

- A. Locate decking bundles to prevent overloading of supporting members.

3.03 INSTALLATION, GENERAL

- A. Install deck panels and accessories according to applicable specifications and commentary of SDI Publication No. 31, manufacturer's recommendations, and requirements of this Section.
- B. Install temporary shoring before placing deck panels when required to meet deflection limitations.

- C. Place deck panels on supporting framing and adjust to final position with ends accurately aligned and bearing on supporting framing before being permanently fastened. Do not stretch or contract side lap interlocks.
- D. Place deck panels flat and square and fasten to supporting framing without warp or deflection.
- E. Cut and neatly fit deck panels and accessories around openings and other work projecting through or adjacent to the decking.
- F. Provide additional reinforcement and closure pieces at openings as required for strength, continuity of decking, and support of other work.
- G. Comply with AWS requirements and procedures for manual shielded metal arc welding, appearance and quality of welds, and methods used in correcting welding work.

3.04 ROOF DECK INSTALLATION

- A. Fasten roof-deck panels to steel supporting members with mechanical fasteners as indicated on drawings or by arc spot (puddle) welds of the surface diameter indicated or arc seam welds with an equal perimeter that is not less than 1-1/2 inches long, and as follows:
 - 1. Weld Diameter: 5/8 inch or 3/4 inch as indicated on the construction drawings.
 - 2. Weld Spacing: Space welds in pattern indicated on the construction drawings.
 - 3. Weld Washers: Install weld washers at each weld location.
- B. Side-Lap and Perimeter Edge Fastening: Fasten side laps and perimeter edges of panels between supports, at intervals not exceeding the lesser of 1/2 of the span or 18 inches and as follows:
 - 1. Mechanically fasten with self-drilling, No. 10 diameter or larger, carbon-steel screws as indicated on the construction drawings.
- C. End Bearing: Install deck ends over supporting framing with a minimum end bearing of 1-1/2 inches, with end joints as follows:
 - 1. End Joints: Lapped 2 inches minimum.
- D. Miscellaneous Roof Deck Accessories: Install ridge and valley plates, finish strips, cover plates, end closures, and reinforcing channels according to deck manufacturer's written instructions. Weld to substrate to provide a complete deck installation.
 - 1. Weld cover plates at changes in direction of roof-deck panels, unless otherwise indicated.

- E. Flexible Closure Strips: Install flexible closure strips over partitions, walls, and where indicated. Install with adhesive according to manufacturer's instructions to ensure complete closure.

3.05 FIELD QUALITY CONTROL

- A. Testing Agency: A qualified independent testing agency employed and paid by Owner will perform field quality control testing.
- B. Field welds will be subject to inspection.
- C. Testing agency will report test results promptly and in writing to Contractor and Architect.
- D. Remove and replace work that does not comply with specified requirements.
- E. Additional testing will be performed at the Contractor's expense to determine compliance of corrected work with specified requirements at no cost to the Owner.

3.06 REPAIRS AND PROTECTION

- A. Galvanizing Repairs: Prepare and repair damaged galvanized coatings on both surfaces with galvanized repair paint according to ASTM A 780 and the manufacturer's written instructions.
- B. Repair Painting: Wire brush and clean rust spots, welds, and abraded areas on both surfaces of prime-painted deck immediately after installation, and apply repair paint.
 - 1. Apply repair paint, of same color as adjacent shop-primed deck, to bottom surfaces of deck exposed to view.
 - 2. Wire brushing, cleaning, and repair painting of bottom deck surfaces are included in Division 09 Painting Sections.
- C. Provide final protection and maintain conditions to ensure steel decking is without damage or deterioration at time of Substantial Completion.

END OF SECTION

DIVISION 5 METALS

SECTION 05500 MISCELLANEOUS METAL

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, equipment and incidentals required and install covers, grates, frames and other miscellaneous metals as shown on the Drawings and specified herein. The miscellaneous metal items include but are not limited to the following:
1. All metal frames, ladders, stairs, stair rails, floor opening frames including gratings and supports.
 2. Prefabricated access hatches and frames.
 3. Anchors and anchor bolts except those specified to be furnished with all equipment.
 4. Railings, posts and supports both interior and exterior.
 5. Cast iron frames, covers, grates, drain leaders and drains.
 6. Bridge crane track supports.
 7. Stair nosings, steel plates, overhead steel door frames, angle frames, plates and channels.
 8. Exterior H.V.A.C. hoods.
 9. Pump guide rail system.

1.02 COORDINATION

- A. The work in this Section shall be completely coordinated with the work of other Sections. Verify at the site both the dimensions and work of other trades adjoining items of work in this Section before fabrication and installation of items herein specified.
- B. Furnish to the pertinent trades all items included under this Section that are to be built into the work of other Sections.

1.03 SHOP DRAWINGS AND SAMPLES

- A. Detail drawings, as provided for in the Contract Documents, showing sizes of members, method of assembly, anchorage, and connection to other members shall be submitted to the County for approval before fabrication.
- B. Samples shall be submitted at the request of the County for concurrent review with Shop Drawings.

1.04 FIELD MEASUREMENTS

- A. Field measurements shall be taken at the site to verify or supplement indicated dimensions and to insure proper fitting of all items.

1.05 REFERENCED SPECIFICATIONS

A. Unless otherwise specified, materials shall conform to the following:

Structural Steel	ASTM A36
Welded & Seamless Steel Pipe	ASTM A53
Gray Iron Castings	ASTM A48, Class 30
Galvanizing, general	ASTM A123
Galvanizing, hardware	ASTM A153
Galvanizing, assemblies	ASTM A386
Aluminum (Extruded Shapes)	6061-T6 (Alum. alloy)
Aluminum (Extruded Pipe)	6061-T6 (Alum. alloy)
Aluminum Bar Structural	6061-T6 (Alum. alloy)
Bolts and Nuts	ASTM, A307
Stainless Steel Bolts, Fasteners	AISI, Type 316
Stainless Steel Plate and Sheet, Wire	AISI, Type 316
Welding Rods for Steel	AWS Spec. for Arc Welding

PART 2 PRODUCTS

2.01 ANCHORS, BOLTS AND FASTENING DEVICES

- A. Anchors, bolts, etc., shall be furnished as necessary for installation of the work of this Section.
- B. Compound masonry anchors shall be of the type shown or required and shall be equal to Star Slug in compounded masonry anchors manufactured by Star Expansion Industries, equal by Phillips Drill Co., Rawlplug, or equal. Anchors shall be minimum "two unit" type.
- C. The bolts used to attach the various members to the anchors shall be the sizes shown or required. Stainless steel shall be attached to concrete or masonry by means of stainless steel machine bolts and iron or steel shall be attached with steel machine bolts unless otherwise specifically noted.
- D. For structural purposes, post installed anchors shall be Red Head C6, Hilti HIT HY200 or an accepted equivalent adhesive anchor. Mechanical wedge type anchors are not allowed. When length of bolt is not called for on the Drawings, the length of bolt shall be sufficient to provide the manufacturers minimum required embedment with sufficient clearance from the bottom of anchor to bottom of concrete. Material shall be as noted on the Drawings. If not listed, all materials shall be stainless steel.

2.02 ALUMINUM ITEMS

- A. Aluminum gratings shall be of serrated I-Bar Aluminum Alloy 6061-T6, fabricated to the depths and thicknesses shown on the Drawings and shall be Reliance Steel Products Company, I-Lok Type 7/8 R4 Aluminum Grating; IKG Industries, "Galok" Aluminum I-Bar Grating Type S194-I, or equal. All openings 2 inches and greater in diameter shall be banded with a bar of the same depth and thickness as the main bearing bars of the grating, or furnished with continuous cross bridges. Each cut bar shall be welded to the band if banding is utilized. The ends of all grating

sections shall be likewise banded. Clamps and bolts used for attaching grating to supporting members shall be stainless steel. All grating shall be clamped unless noted otherwise. Clamps shall be as recommended by the manufacturer.

- B. Stair treads shall be as specified above for grating and shall have abrasive nonslip nosing.
- C. Aluminum nosing at concrete stairs shall be an extrusion of 4-inch minimum width with abrasive filled and shall be Wooster Products, Inc., Alumogrit Treads, Type 116; equal by Barry Pattern and Foundry Co.; Andco; or equal. Embedded anchors shall be furnished with a minimum of three anchors per tread.
- D. Aluminum ladders shall be fabricated to the dimensions and details and installed as shown on the Drawings. Treads to be of cast aluminum by Dixie Metals, Inc. of Fort Lauderdale, Florida or equal.
- E. Aluminum Handrails, Mechanically Fastened Type:
 - 1. All aluminum mechanically fastened type pipe handrails and guardrails shall be clear anodized aluminum finish and installed as specified herein and indicated on the Drawings. Handrails shall be made of nominal 1-1/2 inches inside diameter pipe (Schedule 40) fabricated or seamless 6063-T6 alloy. The supplier of the handrail system shall supply all necessary fittings, rackets, transition, corner and connector pieces, toeboards, protective gaskets, etc., for a complete job at the locations, indicated on the Drawings. All mounting hardware including bolts, studs, nuts, etc., shall be stainless steel Type 316. Bends shall be smooth and accurate to the details shown. Railings shall be the "Rigid Rail System" as manufactured by Reynolds Aluminum of Reynolds Metal Company as Reynolds II pipe railing system or the "Connectorail System" as manufactured by Julius Blum & Co., Inc., Carlstadt, New Jersey. The handrail systems shall comply with all OSHA and D Section 1208.2 of the Standard Building Code.
 - 2. Spacing of posts where posts are required shall be as noted on shop drawings, but in all cases, shall be uniform and shall not exceed the requirements of OSHA and Section 1208.2 of the Standard Building Code. Shorter spacing may be used where required to maintain the maximum spacing. The fabricator of the aluminum handrail and guardrail system shall be responsible for the design and preparation of shop drawings and design calculations (signed and sealed by Florida Registered Engineer) to meet OSHA requirements and Section 1208.2 of Standard Building Code.
 - 3. All railings shall be erected in line and plumb. Field splicing and expansion compensation shall be accomplished using internal splice sleeves. Make provisions for removable railing sections as detailed and where shown on the Drawings.
 - 4. Where handrail or guardrail posts are set in concrete as per the manufacturer's requirements the posts shall be set into aluminum sheeves cast in the concrete and firmly cemented with 1651 epoxy resin by E-Bond Epoxies, Oakland Park, Florida, Moulded Reinforced Plastics, Inc., Fort Lauderdale, Florida or equal. Collars shall be placed on the posts and fastened in place, as shown and as detailed on approved shop drawings.
 - 5. Where handrail is supported from structural members, it shall be done by the use of approved sockets, flanges, brackets, or other approved means

- which will provide neat and substantial support for the pipe railing.
6. All railing shall be properly protected by paper, or by an approved coating or by both against scratching, splashes or mortar, paint, or other defacements during transportation and erection and until adjacent work by other trades has been completed.
- F. Toeboards: Contractor shall furnish and install aluminum toeboards conforming to latest OSHA requirements on all railings and other locations where indicated on the Drawings.
1. Toeboards shall consist of an extruded 6063-T6 aluminum shape bolted by means of a pipe clamp to the railing posts without requiring any drilling or welding of the toeboard to the railing posts as manufactured by Reynolds Aluminum, Julies Blum & Company, Thompson Fabricating Company or equal. Toeboards shall have pitched top and tear drop bottom to prevent accumulation of dirt, or other material.
 2. All fastening hardware shall be Type 316 stainless steel.
- G. Kickplates, if required, shall be fabricated and installed as shown on the Drawings.
- H. Aluminum safety gate shall be fabricated of extruded aluminum.
- I. Prefabricated checkerplate aluminum floor hatches shall be Type "JD", or "KD" as manufactured by Bilco Co., Babcock-Davis Associates, Inc.; Type "AM" Inland-Ryerson Construction Products Co., Milcor Division; or equal, sized as shown. Hatches with either dimension over 3 feet-6 inches shall be double leaf type. Hatches shall be designed for a live load of 300 pounds per square foot. Hatches shall be watertight.
- J. Ship ladders shall be of all aluminum construction as detailed. Treads shall have abrasive nosing as manufactured by Reliance Steel Products Co., IKG Industries, or equal.
- K. Checkplate aluminum cover plates shall be fabricated to the details shown and installed at the locations shown.
- L. Structural aluminum angle and channel door frames shall be provided as shown on the Drawings and shall be anodized. Frames shall be fabricated with not less than three anchors on each jamb.
- M. Miscellaneous aluminum shapes and plates shall be fabricated as shown. Angle frames for hatches, beams, grates, etc., shall be furnished complete with welded strap anchors attached. Furnish all miscellaneous aluminum shown, but not otherwise detailed. Structural shapes and extruded items shall conform to the detail dimensions on the Plans within the tolerances published by the American Aluminum Association.

2.03 STEEL ITEMS

- A. Sleeves shall be steel or cast iron pipe in walls and floors with end joints as shown on the Drawings. All pipe sleeves shall have center anchor around circumference as shown.

- B. Miscellaneous steel pipe for sleeves and lifting attachments and other uses as required shall be Schedule 40 pipe fabricated according to the details as shown on the Drawings.
- C. Miscellaneous steel shall be fabricated and installed in accordance with the Drawings and shall include: beams, angles, support brackets, closure angles in roof at edge of T-beams; base plates to support ends of T-beams; door frames; splice plates, anchor bolts; lintels and any other miscellaneous steel called for on the Drawings and not otherwise specified.

2.04 CAST IRON ITEMS

- A. Outside pipe clean-out frames and covers shall be heavy duty, R-6013-R-6099 series as manufactured by Neenah Foundry Co., or equal. All outside pipe clean-outs shall be 6-inch diameter.
- B. Frames and covers for valve vaults and manholes shall be of a good quality, strong, tough even grained cast iron except as otherwise specified below. Castings shall be as manufactured by the U. S. Foundry, Neenah Foundry, Mechanics Iron Foundry, or equal. Covers to have letters "WATER", "SEWER" or "DRAIN", as applicable, embossed on top.

PART 3 EXECUTION

3.01 FABRICATION

- A. All miscellaneous metal work shall be formed true to detail, with clean, straight, sharply defined profiles and smooth surfaces of uniform color and texture and free from defects impairing strength or durability.
- B. Connections and accessories shall be of sufficient strength to safely withstand stresses and strains to which they will be subjected. Steel accessories and connection to steel or cast iron shall be steel, unless otherwise specified. Threaded connections shall be made so that the threads are concealed by fitting.
- C. Welded joints shall be rigid and continuously welded or spot welded as specified or shown. The face of welds shall be dressed flush and smooth. Exposed joints shall be close fitting and jointed where least conspicuous.
- D. Welding of parts shall be in accordance with the Standard Code of Arc and Gas Welding in Building Construction of the AWS and shall only be done where shown, specified, or permitted by the County. All welding shall be done only by welders certified as to their ability to perform welding in accordance with the requirements of the AWS Code. Component parts of built-up members to be welded shall be adequately supported and clamped or held by other adequate means to hold the parts in proper relation for welding.
- E. Welding of aluminum work shall be on the unexposed side as much as possible in order to prevent pitting or discoloration.
- F. All aluminum finish exposed surfaces, except as specified below, shall have

manufacturer's standard mill finish. Aluminum handrails shall be given an anodic oxide treatment in accordance with the Aluminum Association Specification AA-C22-A41. A coating of methacrylate lacquer shall be applied to all aluminum shipment from the factory.

- G. Castings shall be of good quality, strong, tough, even-grained, smooth, free from scale, lumps, blisters, sand holes, and defects of any kind which render them unfit for the service for which they are intended. Castings shall be thoroughly cleaned and will be subjected to a hammer inspection in the field by the County. All finished surfaces shown on the Drawings and/or specified shall be machined to a true plane surface and shall be true and seat at all points without rocking. Allowances shall be made in the patterns so that the thickness specified or shown shall not be reduced in obtaining finished surfaces. Castings will not be acceptable if the actual weight is less than 95 percent of the theoretical weight computed from the dimensions shown. The Contractor shall provide facilities for weighing castings in the presence of the County showing true weights, certified by the supplier.
- H. All steel finish work shall be thoroughly cleaned, in accordance with the Contract Documents, of all loose mill scale, rust, and foreign matter before shipment and shall be given one shop coat of primer compatible with finish coats specified in Painting Section after fabrication but before shipping. Paint shall be applied to dry surfaces and shall be thoroughly and evenly spread and well worked into joints and other open spaces. Abrasions in the field shall be touched up with primer immediately after erection. Final painting is specified in the Contract Documents.
- I. Galvanizing, where required, shall be the hot-dip zinc process after fabrication. Following all manufacturing operations, all items to be galvanized shall be thoroughly cleaned, pickled, fluxed, and completely immersed in a bath of molten zinc. The resulting coating shall be adherent and shall be the normal coating to be obtained by immersing the items in a bath of molten zinc and allowing them to remain in the bath until their temperature becomes the same as the bath. Coating shall be not less than 2 oz. per sq. ft. of surface.

3.02 INSTALLATION

- A. Install all furnished items imbedded in concrete or other masonry. Items to be attached to concrete or masonry after such work is completed shall be installed in accordance with the details shown. Fastening to wood plugs in masonry will not be permitted. All dimensions shall be verified at the site before fabrication is started.
- B. All steel surfaces to come in contact with exposed concrete or masonry shall receive a protective coating of an approved heavy bitumastic troweling mastic applied in accordance with the manufacturer's instructions prior to installation or provide a 1/32-inch neophrene gasket between the steel surface and the concrete or masonry.
- C. Where aluminum is embedded in concrete, apply a heavy coat of approved bitumastic troweling mastic in accordance with the manufacturer's instructions prior to installation.
- D. Where aluminum contacts masonry or concrete, provide a 1/32-inch neophrene

- gasket between the aluminum and the concrete or masonry.
- E. Where aluminum contacts a dissimilar metal, apply a heavy brush coat of zinc-chromate primer and provide a 1/32-inch neoprene gasket between the aluminum and the dissimilar metal.

Where aluminum contacts wood, apply two coats of aluminum metal and masonry paint to the wood.

END OF SECTION

DIVISION 7 THERMAL AND MOISTURE PROTECTION

SECTION 07100 WATERPROOFING, DAMPPROOFING AND CAULKING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all materials, labor, equipment, and incidentals required to perform all through wall flashing work, waterproofing, dampproofing, caulking, and related work necessary for the proper completion of the project as required by the Drawings and as specified herein.
- B. Dampproof the exterior surfaces of all exterior poured- in-place concrete walls or concrete masonry foundation walls from the top of the footings up to 6 inches below finished grade.

1.02 APPLICABLE SCHEDULE

- A. Deliver all materials in original manufacturer's packages with labels and seals intact. Handle and store in accordance with manufacturer's instructions.
- B. Inspect job conditions for defects which would prevent proper installation of caulking. Do not proceed until defects have been corrected.
- C. Caulk all exterior wall joints between metal wall panels and adjacent materials, between frames in openings and adjacent materials, between masonry and cast-in-place concrete, brick paver expansion and control joints and all other joints shown on the Drawings or required for the completion of the Work.
- D. Caulk all interior joints between frames and masonry, at tops of masonry walls, between masonry and structural concrete, expansion and control joints in ceramic tile and brick pavers, exterior window and door frames, louvers, and all other joints shown on the drawings or required for the completion of the Work.
- E. Joints noted as "caulk", "caulking", or "sealant" shall be caulked with the sealant specified herein.
- F. Furnish and place through wall flashing in exterior masonry walls as shown on the Drawings.
- G. Furnish and place vapor barrier under all building structure slabs contacting soil as specified herein.

1.03 SUBMITTALS

Submit two representative samples of any or all other proposed materials and installation method required for the work of this Section as requested by the County.

PART 2 PRODUCTS

2.01 DAMPPROOFING

- A. Dampproofing shall be Bitumastic Black Solution by the Koppers Company, Inc., Dehydrating 4 by W.R. Grace and Co., or equal.

2.02 CAULKING

- A. Caulking Compound: One component, synthetic rubber base sealant, soft curing, non-staining, conforming to F.S. TT-S-00230 and Thiocol's Building Trade Performance Specifications for Type 1 Class B sealants. Colors shall match material receiving caulking, as directed by the County.
- B. Interior Silicone Sealant: F.S. TT-001543 for perimeter of plumbing fixtures against walls and floors and joints between laminated plastic counters and walls shall be transparent.
- C. Primer: As recommended by caulking compound manufacturer.
- D. Back-up Material: Closed cell foam polyethylene, or similar non-bituminous material as recommended by manufacturer of caulking compound and completely compatible with selected compound.

2.03 HYDRAULIC CEMENT

- A. Material for quick-set hydraulic cement shall be Waterplug as manufactured by Thoro System Products, or equal.

2.04 VAPOR BARRIER

- A. Vapor barrier shall be 10 mil thick polyethylene sheet with a vapor transmission rating of 0.20 perms. Laps between adjacent sheets shall be 10 inches minimum. Vapor barrier shall be carefully inspected by the County prior to concrete placement. Additional polyethylene sheet required for repair or replacement of damaged vapor barrier shall be furnished and installed by the Contractor as directed by the County at no additional cost to the County.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Installation of Dampproofing
 1. Surface to be treated shall be free from oil and dirt and shall be in the proper condition as indicated by the manufacturer prior to the application of the dampproofing material. The concrete shall have been completely cured and the surface shall be dry and free from frost at the time of application.
 2. Surfaces to be dampproofed shall receive two (2) heavy coats 10 mils thick, the first coat being carefully applied so that "holidays" or untreated air-bubble depressions in the surface shall be completely filled and the second coat will guarantee a 100% coating of the surface.

3. Particular care shall be given to the application of dampproofing at all construction joints which are encountered.
4. The number of coats specified is in addition to primer coats as recommended by the manufacturer.

B. Installation of Caulking

1. Surface Preparation: Clean metal surfaces free of grease, oil, wax, lacquer, and other foreign residue by wiping with a clean cloth moistened with a suitable solvent. Scrape or brush masonry surfaces clean. Apply appropriate primer to contact surfaces.
2. Joint Preparation: Joints to be caulked having a depth in excess of 3/8-inch shall be packed with back-up material. Round back-up material shall be sized to require 20 percent to 5 percent compression upon insertion. In joints not of sufficient depth to allow packing, install polyethylene bond-breaking tape at back of joint. Avoid lengthwise stretching of back-up material. Cut all corners, avoid wrapping around corners.
3. Application: Apply compound with pressure flow gun with nozzle of proper size and shape to suit width of joint, promptly after mixing and with sufficient pressure to fill joint. Apply as a continuous operation horizontally in one direction and vertically from bottom to top, except joints having excessive widths where compound might sag, the joints shall be built up with excessive beads. Finish joints smooth and slightly covered.
4. Cleaning: Immediately clean adjacent material which may be soiled by caulking operation.

C. Installation of Quick-Set Hydraulic Cement

1. The surface shall be cleaned and free of dirt, loose mortar particles, paints, films, protective coatings, efflorescence, laitance, form treatments, curing compounds, and other materials.
2. Cut out crack at least 3/4 inches wide and deep, cutting back into wall slightly. Flush away all cuttings and dirt. Force water-plug into prepared crack with a round tool and smooth out. Form cove at junction.
3. To be applied under manufacturer's recommendations.

END OF SECTION

SECTION 07411

METAL ROOF PANEL, STANDING SEAM

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Standing seam metal roof panel system.
- B. Insulated Nail Base Substrate.

1.02 RELATED REQUIREMENTS

- A. Division 05 Section "Steel Decking" for steel roof deck supporting metal roof panel.
- B. Division 07 Section "Joint Sealants" for field-applied joint sealants.

1.03 SYSTEM DESCRIPTION

- A. Standing Seam Metal Roof Panel System: Metal roof panels with concealed attachment, and accessories necessary for a complete watertight installation.

1.04 REFERENCES

- A. American Engineerural Manufacturer's Association (AAMA):
 - 1. AAMA 620 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Engineerural Aluminum Substrates.
 - 2. AAMA 621 - Voluntary Specifications for High Performance Organic Coatings on Coil Coated Engineerural Hot Dipped Galvanized (HDG) & Zinc-Aluminum Coated Steel Substrates.
- B. American Society of Civil Engineers (ASCE):
 - 1. ASCE 7 - Minimum Design Loads for Buildings and Other Structures.
- C. ASTM International (ASTM):
 - 1. ASTM A 653 - Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process.
 - 2. ASTM A 755 - Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products.
 - 3. ASTM A 792 - Specification for Steel Sheet, 55 percent Aluminum-Zinc Alloy Coated by the Hot Dip Process.
 - 4. ASTM C 920 - Specification for Elastomeric Joint Sealants.
 - 5. ASTM D 2244 - Test Method for Calculation of Color Differences from Instrumentally Measured Color Coordinates.

6. ASTM D 4214 - Test Methods for Evaluating Degree of Chalking of Exterior Paint Films.
 7. ASTM E 119 - Test Methods for Fire Tests of Building Construction and Materials.
 8. ASTM E 1514 - Specification for Structural Standing Seam Steel Roof Panel.
 9. ASTM E 1592 - Standard Test Method for Structural Performance of Sheet Metal Roof and Siding Systems by Uniform Static Air Pressure Difference.
 10. ASTM E 1646 - Standard Test Method for Water Penetration of Exterior Metal Roof Panel Systems by Uniform Static Air Pressure Difference.
 11. ASTM E 1680 - Standard Test Method for Rate of Air Leakage Through Exterior Metal Roof Panel Systems.
 12. ASTM E 1980 - Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces.
- D. Sheet Metal and Air Conditioning Contractors National Association, Inc. (SMACNA):
1. Engineerural Sheet Metal Manual.
- E. Underwriters Laboratories, Inc. (UL):
1. UL 580 - Tests for Uplift Resistance of Roof Assemblies.
 2. UL Roofing Materials Directory.
 3. UL Fire Resistance Directory.

1.05 PERFORMANCE REQUIREMENTS

- A. General: Provide metal roof panel system meeting performance requirements as determined by application of specified tests by a qualified testing agency on manufacturer's standard assemblies.
- B. Air Infiltration: Maximum 0.03 cfm/sq. ft. (0.3 L/s per sq. m) per ASTM E 1680 at a static-air-pressure difference of 4 lbf/sq. ft. (191.5 Pa).
- C. Water Penetration Static Pressure: No uncontrolled water penetration at a static pressure of 6.4 lbf/sq. ft.(306.4 Pa) when tested per ASTM E 1646.
- D. Structural Performance: Provide metal roof panel system capable of withstanding the effects of indicated loads and stresses within limits and under conditions indicated, per ASTM based on testing according to ASTM E 1592:
 1. Wind Loads: Determine loads based on uniform pressure, importance factor, exposure category, and basic wind speed indicated on drawings.
 2. Snow Loads: As indicated on Drawings

3. Deflection Limits: Metal roof panel system shall withstand wind and snow loads with vertical deflections no greater than 1/180 of the span
 4. Concentrated Load Performance: Provide metal roof panel system that withstand a concentrated load of 250 lbs (113 kg) applied to a 4 sq. in. (2580 sq. mm) at midspan and center of the panel halfway between supports without causing deformation, buckling or side lap separation.
- E. Wind Uplift Resistance: UL 580 wind uplift rating UL 90.
- F. Thermal Movements: Allow for thermal movements from variations in both ambient and internal temperatures. Accommodate movement of support structure caused by thermal expansion and contraction.
1. Thermal Cycle test: Provide metal roof panel system that shows no wear when subject to 100,000 cycles of 1 inch (25 mm) movement in the plane of the panel face relative to the clip anchor.

1.06 QUALITY ASSURANCE

- A. Manufacturer/Source: Provide metal roof panel system from a single manufacturer.
1. Provide products by same manufacturer as manufacturer of products specified in Division 07 Section "07421 - Insulated Core Metal Wall Panels."
- B. Manufacturer Qualifications: Approved manufacturer listed in this Section with minimum 5 years experience in manufacture of similar products in successful use in similar applications.
1. Approval of Comparable Products: Submit the following in accordance with project substitution requirements, within time allowed for substitution review:
 - a. Product data, including certified independent test data indicating compliance with requirements.
 - b. Samples of each component.
 - c. Sample submittal from similar project.
 - d. Project references: Minimum of 5 installations not less than 5 years old, with Owner and Engineer contact information.
 - e. Sample warranty.
 2. Substitutions following award of contract are not allowed except as stipulated in Division 01 "General Requirements."
 3. Approved manufacturers must meet separate requirements of Submittals Article.
- C. Installer Qualifications: Experienced Installer with minimum of 5 years experience with successfully completed projects of a similar nature and scope.

1. Provide work installed by same Installer as Installer of products specified in Division 07 Section "07421 - Insulated Core Metal Wall Panels."
- D. Fire Performance Characteristics: Provide metal roof panel system with the following fire-test characteristics.
1. Surface-Burning Characteristics: Provide metal roof panel system with the following characteristics when tested per ASTM E 84.
 - a. Flame spread index: 25 or less.
 - b. Smoke developed index: 450 or less.

1.07 ADMINISTRATIVE REQUIREMENTS

- A. Pre-installation Meeting: Prior to erection of metal roof panel system , conduct pre-installation meeting at site attended by Owner, Engineer, manufacturer's technical representative, inspection agency and related trade contractors.
1. Coordinate building framing in relation to metal roof panel system.
 2. Coordinate openings and penetrations of metal roof panel system.
 3. Coordinate work for roof openings and penetrations and manufacturer's accessories with installation of metal roof panels.

1.08 ACTION SUBMITTALS

- A. Product Data: Manufacturer's data sheets for specified products and accessories.
- B. Florida Product Approval and Approved Installation Instructions.
- C. Shop Drawings: Show layouts of metal roof panels and nail base. Include details of each condition of installation, panel profiles, and attachment to building. Provide details at a minimum scale 1-1/2-inch per foot of edge conditions, joints, fastener and sealant placement, flashings, penetrations, and special details. Make distinctions between factory and field assembled work.
1. Include data indicating compliance with performance requirements.
 2. Indicate points of supporting structure that must coordinate with metal roof panel system installation.
 3. Include structural data indicating compliance with performance requirements and requirements of local authorities having jurisdiction.
- D. Samples for Initial Selection: For each product specified including sealants and gaskets. Provide representative color charts of manufacturer's full range of colors.
- E. Samples for Verification: Provide 12-inch- (305 mm-) long section of metal roof panel showing finishes, vertical joint return, and anchoring details. Provide 12-inch- (305 mm-) long pieces of trim.

1.09 INFORMATIONAL SUBMITTALS

- A. Product Test Reports: Indicating compliance of products with requirements, from a qualified independent testing agency, when requested by Engineer.
- B. Buy American Act Certification: Submit documentation certifying that products comply with provisions of the Buy American Act 41 U.S.C 10a - 10d.
- C. Qualification Information: For Installer firm and Installer's field supervisor.
- D. Manufacturer's warranty: Submit sample warranty.

1.10 CLOSEOUT SUBMITTALS

- A. Maintenance data.

1.11 DELIVERY, STORAGE, AND HANDLING

- A. Protect products of metal roof panel system during shipping, handling, and storage to prevent staining, denting, deterioration of components or other damage. Protect panels and trim bundles during shipping with water resistant paper. Protect painted surfaces with a strippable protective covering before shipping.
 - 1. Deliver, unload, store, and erect metal roof panel system and accessory items without misshaping panels or exposing panels to surface damage from weather or construction operations.
 - 2. Store in accordance with Manufacturer's written instruction. Provide wood collars for stacking and handling in the field.

1.12 WARRANTY

- A. Special Manufacturer's Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace components of metal roof panel system that fail in materials and workmanship within two years from date of Substantial Completion.
- B. Metal Panel Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal panels that rupture or perforate due to corrosion within 20 years from date of Substantial Completion.
- C. Special Weathertight Performance Warranty: On Manufacturer's standard form, in which Manufacturer and Installer agree to pay the cost of repair or replacement of components of metal roof panel system that fail to remain weathertight for a period of 10 years from date of Substantial Completion, up to the cost of the initial material purchase order and initial installation labor cost.
- D. Special Panel Finish Warranty: On Manufacturer's standard form, in which Manufacturer agrees to repair or replace metal roof panels that evidence deterioration of factory-applied finish within 20 years from date of Substantial Completion, including:
 - 1. Color fading in excess of 5 Hunter units per ASTM D 2244.

2. Chalking in excess of No. 8 rating per ASTM D 4214.
3. Failure of adhesion, peeling, checking, or cracking.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Basis of Design: CENTRIA, SRS2 Structural Standing Seam Metal Roof Panel System. Provide basis of design product, or comparable product approved by Engineer prior to bid.

1. CENTRIA Engineerural Systems; Moon Township, PA 15108-2944.
Tel: (800) 759-7474. Tel: (412) 299-8000. Fax: (412) 299-8317.
Email: info@CENTRIA.com. Web: www.CENTRIA.com.

2.02 MATERIALS

- A. Metallic-Coated Steel Face Sheet: Coil-coated, ASTM A 755/A 755M.

1. Zinc Metallic Coated (Galvanized) Steel Sheet: ASTM A 653/A 653M, SS Grade 37, G90 (Z275), structural quality.
2. Face Sheet: Minimum 0.036 inch/20 gage (0.91 mm) nominal uncoated thickness.
3. Surface: Smooth.

2.03 STANDING SEAM METAL ROOF PANELS

- A. Structural Standing Seam Metal Roof Panels: Formed with 2 inch (51 mm) high vertical ribs at panel edges and evenly spaced raised longitudinal stiffening beads or planks, manufactured for sequential installation by attaching panels to supports using concealed clips and engaging edges of adjacent panels and mechanically seaming panel ribs together, sealed with factory-applied sealant.

1. Panel Coverage: 12 inch (305 mm).
2. Anchor Clips:
 - a. Galvanized steel G90, 1-piece, 14 ga., movement allowance 2 inch (51 mm).

2.04 FINISHES

- A. Exposed Coil-Coated Finish System:

1. Urethane Two-Coat Corrosion and Abrasion Resistant System: 3.0 mil barrier coat primer with 1.5 mil urethane color coat.
 - a. Basis of Design: CENTRIA Versacor Ultra TF.
 - b. Interior Finish: Manufacturer's standard.

- B. Color:
 - 1. Exterior Surface: As selected by Owner from manufacturer's standard colors.
 - 2. Interior Surface: Manufacturer's standard primer color.

2.05 METAL ROOF PANEL ACCESSORIES

- A. Provide complete metal roof panel assembly incorporating trim, copings, fasciae, soffits, downspouts, insulation spacers and miscellaneous flashings. Provide required fasteners, gaskets, closure strips, and sealants. Fabricate and install accessories in accordance with SMACNA Manual.
 - 1. Steel Roof Panel Systems: Comply with ASTM E 1514.
 - 2. Flashing and Trim: Match material, thickness, and finish of metal roof panels.
- B. Panel Fasteners: Self-tapping screws, bolts, nuts, and other acceptable fasteners recommended by roof panel manufacturer. Where exposed fasteners cannot be avoided, supply corrosion-resistant fasteners with heads matching color of metal panels by means of factory-applied coating.
 - 1. Exposed Screws: Manufacturer's recommended stainless steel screws with bonded neoprene and stainless steel washers, coated to match panel color.
 - 2. Concealed Screws: Manufacturer's recommended corrosion resistant carbon steel with corrosion resistant coating.
- C. Panel Sealants:
 - 1. Side Lap Sealant: One part, non-skinning, non-drying, synthetic butyl elastomer sealant.
 - 2. Field Applied Unexposed Sealant: Side Laps, end laps, and flashing details: Gun grade, non-skinning, butyl elastomer or polymeric non-skinning butyl tape.
 - 3. Exposed Sealant: ASTM C 920; elastomeric polyurethane, polysulfide, or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal roof panels and remain weathertight; as recommended by metal roof panel manufacturer colored to match panel color.
- D. Metal Roof Substrate: 2" flat polyiso bonded to 7/16" OSB nail base conforming to H-Shield-NB with SIP/SD panel fasteners as manufactured by Hunter Panels or Approved equal.
- E. Slip - Sheeting: Red Rosin Paper at areas where roof system contacts weather treated wood blocking.
- F. Felt underlayment (solid substrate) 30 lb (13.6 kg), asphalt saturated fiberglass felt, non-perforated.

- G. Pipe Flashings: Molded EPDM, with metal collar.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine metal roof panel system substrate with Installer present. Inspect for erection tolerances and other conditions that would adversely affect installation of metal roof panel installation. Do not install roof panels until panel substrate meets roof panel manufacturer's requirements.
 - 1. Inspect framing that will support metal roof panel system to determine if support components are installed as indicated on approved shop drawings. Confirm presence of acceptable framing members at recommended spacing to match installation requirements of metal roof panels.
 - 2. Panel Support Tolerances: Install metal roof panels on substrate within tolerances acceptable to metal roof panel manufacturer:
 - a. Maximum out of plane deviation 1/4 inch in 20 feet.
 - b. Maximum deviation 1/2 inch (12.7 mm) over entire roof.

3.02 INSTALLATION

- A. General: Install metal roof panel system in accordance with approved shop drawings and manufacturer's recommendations. Install metal roof panels in orientation, sizes, and locations indicated. Install metal roof panels in one piece lengths from the ridge to eave unless otherwise indicated on approved shop drawings. Anchor panels and other components securely in place. Provide for thermal and structural movement.
- B. Attach panels to metal framing using recommended clips, screws, fasteners, sealants, and adhesives indicated on approved shop drawings.
 - 1. Fasten metal roof panels to supports with concealed clips at each joint at location, spacing, and with fasteners recommended by manufacturer. Install clips to supports with self-tapping fasteners approved by manufacturer.
 - 2. Provide weatherproof escutcheons for pipe and conduit penetrating roof.
 - 3. Dissimilar Materials: Where elements of metal wall panel system will come into contact with dissimilar materials, treat faces and edges in contact with dissimilar materials as recommended by manufacturer.
- C. Joint Sealers: Install joint sealers where indicated and where required for weatherproof performance of metal roof panel assemblies.
 - 1. Prepare joints and apply sealants per requirements of Division 07 Section "Joint Sealants."

3.03 ACCESSORY INSTALLATION

- A. General: Install metal roof panel accessories with positive anchorage to building and weather tight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
 - 1. Install related flashings and sheet metal trim.
 - 2. Install components required for a complete metal roof panel assembly, including trim, copings, flashings, sealants, gaskets, fillers, closure strips, and similar items.
 - 3. Comply with performance requirements, requirements of authorities having jurisdiction, and manufacturer's written installation instructions.
 - 4. Provide concealed fasteners except where noted on approved shop drawings.
 - 5. Set units true to line and level as indicated. Install work with laps, joints, and seams that will be permanently watertight and weather resistant.
- B. Metal roof substrate.
 - 1. Solid 2-inch-minimum thickness insulated nail base substrate.
 - a. Provide one layer of felt with 6" horizontal overlaps and 18" end laps staggered between layers.
 - b. Lay parallel to ridgeline with 2 1/2 inch (64 mm) horizontal laps and 6 inch (152 mm) vertical laps.
 - c. Start application at low point; work up roof laying plies in shingle fashion.
 - 2. Verify nail base substrate solidly supported and fastened per manufacturer's requirements.

3.04 FIELD QUALITY CONTROL

- A. Manufacturer's Field Service: Engage a service representative authorized by metal wall panel manufacturer to inspect completed installation. Submit written report. Correct deficiencies noted in report.

3.05 CLEANING AND PROTECTION

- A. Remove temporary protective films when directed by Engineer. Clean finished surfaces as recommended by metal roof panel manufacturer.
- B. Replace damaged panels and accessories that cannot be repaired to the satisfaction of the Engineer.

END OF SECTION

SECTION 08120
ALUMINUM DOORS AND FRAMES

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Flush aluminum doors.
- B. Aluminum panels.
- C. Aluminum door frames.

1.02 RELATED SECTIONS

- A. Section 07920 - Sealants and Caulking.
- B. Section 08710 - Finish Hardware.
- C. Section 08800 - Glazing.

1.03 REFERENCES

- A. Aluminum Association, Inc. (AA).
 - 1. AA 5005-H14 - Sheet Architectural.
 - 2. AA 6061-T6 - Heavy Duty Structures.
 - 3. AA 6063-T5 - Extrusions, Pipe, Architectural.
 - 4. AA DAF-45 - Designation System for Aluminum Finishes.
- B. American Architectural Manufacturers Association (AAMA).
 - 1. AAMA 2603 - Pigmented Organic Coatings (Polycron).
 - 2. AAMA 2605 - Superior Performing Organic Coatings (Kynar).
 - 3. AAMA 609 - Anodized Architectural Finishes Cleaning and Maintenance.
 - 4. AAMA 610 - Painted Architectural Products Cleaning and Maintenance.
 - 5. AAMA 611 - Anodized Architectural Standards.
 - 6. AAMA 701 - Pile Weatherstrip.
- C. American Society for Testing Materials (ASTM).
 - 1. A 123 - Zinc (Hot-Dip Galvanized) Coatings.
 - 2. C 591 - Unfaced Preformed Rigid Cellular Polyisocyanurate.
 - 3. C 728 - Insulation Board, Mineral Aggregate.
 - 4. E 330 - Structural Performance of Exterior Doors.

1.04 TESTING AND PERFORMANCE REQUIREMENTS

- A. Structural Test Unit: Minimum size of 3-feet (91.44 cm) by 7-feet (213.36 cm) with 24-inch (60.96 cm) by 34-inch (86.36 cm) vision light shall be evaluated compliant with ASTM E 330 testing method.
- B. Test Procedures and Performances:
 - 1. With door closed and locked, test unit in accordance with ASTM E 330 at static air pressure difference of 80.0 pounds per square foot (3.83 kPa) positive pressure and 80.0 pounds per square foot negative pressure with 155 miles (249.5 km) per hour wind load.
 - 2. At conclusion of test there shall be no glass breakage, permanent damage to fasteners, hardware parts, support arms or actuating mechanism, nor any other damage that would cause the door to be inoperable.

1.05 SUBMITTALS

- A. Submit under provisions of Section 01340.
- B. Florida Product Approval and Installation Certificates indicating compliance with required wind loading.
- C. Product Data: Manufacturer's descriptive literature for each type door and frame. Include the following information:
 - 1. Fabrication methods.
 - 2. Finishing.
 - 3. Hardware preparation.
 - 4. Accessories.
- D. Shop Drawings: Indicate the following:
 - 1. Elevations and details of each door and frame type.
 - 2. Schedule of doors and frames.
 - 3. Conditions at openings with various wall thicknesses and materials.
 - 4. Location and installation requirements for hardware.
 - 5. Thicknesses of materials, joints.
 - 6. Connections and trim.
- E. Samples: Two sets of color chips representing specified colors and finishes.
- F. Verification Samples:
 - 1. Submit samples of each type, consisting of aluminum door corner construction, minimum 6-inch by 6-inch (150 mm) legs.

2. Where color or texture variations are anticipated, such as anodized finishes, include two or more units in each set of samples indicating extreme limits of variations.

- G. Hardware Templates: Provide finish hardware mounting details.
- H. Manufacturer's Installation Instructions: Printed installation instructions for each product, including product storage requirements.
- I. Operations and Maintenance Data: Printed instructions for each product.

1.06 QUALITY ASSURANCE

- A. Manufacturer Qualifications: Company specializing in manufacturing aluminum door and frame systems of the type required for this project, with minimum ten continuous years documented experience.
- B. Product Qualifications: Wind-load test certification conforming to ASTM E 330 on samples of previous products shall be provided for the type of door to be used.
- C. Installer's Qualifications: Workers skilled in handling aluminum door and frame systems of the type required for this project.
- D. Instruction: The manufacturer or his representative will be available for consultation to all parties engaged in the project, including instruction to installation personnel.

1.07 DELIVERY, STORAGE AND HANDLING

- A. Deliver doors and frames palleted, or individually crated. Doors shall be side protected with surrounding grooved 2-inch (50.8 mm) by 4-inch (101.6 mm) wood frame and covered with 275-pound (124.74 kg) test corrugated cardboard.
- B. Inspect delivered doors and frames for damage; unload and store with minimum handling. Repair minor damage if refinished items are equal in all respects to new work; otherwise, remove damaged items and replace with new.
- C. Store products of this section under cover in manufacturer's unopened packaging until installation.
 1. Place units on minimum 4-inch (101.6 mm) wood blocking.
 2. Avoid non-vented plastic or canvas covers.
 3. Remove packaging immediately if packaging becomes wet.
 4. Provide 0.25-inch (6.35 mm) air spaces between stacked doors.

1.08 PROJECT CONDITIONS

- A. Field Measurements: Take field measurements of areas to receive aluminum frames; note discrepancies on submitted shop drawings.

1.09 SCHEDULING

- A. Ensure that all approvals and/or shop drawings are supplied or returned to the manufacturer in time for fabrication without affecting construction progress schedule.
- B. Ensure that actual hardware requested by manufacturer is available in time for fabrication without affecting construction progress schedule.

1.10 WARRANTY

- A. Manufacturer: Ten-year warranty against defects in workmanship and materials, including warping, rotting, decaying or bowing.
- B. Installer: Warrant installation procedures and performance for five years against defects due to workmanship and materials handling.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Acceptable Manufacturer: Model: Series 100BE Cline Aluminum Doors, Inc., 112 32nd Avenue West, Bradenton, FL 34205-8907; Phone: (941) 746-4104, Fax: (941) 746-5153 Toll-free: (800) 648-6736; www.ClineDoors.com, Email: inquire@clinedoors.com
- B. Requests for substitution will be considered in accordance with provisions of Section 01600.

2.02 COMPONENTS

- A. Aluminum Members: Alloy and temper recommended by manufacturer for strength, corrosion resistance, and application of required finish.
- B. Flush Aluminum Door Composite Components: Minimum 5-ply composite laminated construction to include:
 - 1. Facing: One-piece 0.040-inch (1.02 mm) smooth 5005-H14 stretcher-leveled aluminum alloy.
 - 2. Substrate: One-piece 0.085-inch (2.16 mm) oil-tempered hardboard; neither pegboard nor non-tempered hardboard shall be accepted.
 - 3. Core: Pre-stabilized, five pound minimum, EPS foam. No injected foams or poured-in-place foams acceptable to avoid air pockets and destabilization.
 - 4. Hardware Backup: Provide continuous, nonspecific hardware reinforcement with full internal perimeter aluminum tube, 4.25-inches (108 mm) in width, 0.125-inch (3.18 mm) minimum wall thickness.
 - 5. Bonding Agent: Shall be a commercial bonding adhesive with a strength buildup of 350 pounds per square inch (24.6 kg/cm²).

6. Extrusion Wall: Thickness of 0.125-inch (3.18 mm) minimum, except beads and trim.
7. Beads and Trim: Wall Thickness of 0.050-inch (1.25 mm) minimum. Replaceable lock stile door edge of 6063-T5 extruded aluminum alloy with special beveled edge cap design shall be provided with integral weatherstripping. Hinge lock style to a clip mortise square edge design to accommodate standard weight and heavy weight butt hinges. Use of integral door edging not acceptable.
8. Weatherstripping: Replaceable wool pile with nylon fabric, polypropylene backing meeting AAMA 701 standards.
9. Materials: Only nonferrous, non-rusting members shall be acceptable, including tie rods, screws and reinforcement plates.
10. Regulations: All components and agents to meet EPA standards.

C. Glazing:

1. Glass shall be 1-inch (25 mm) insulating, with 0.5625-inch (14.29 mm) laminated glass as scheduled. Refer to Section 08800.
2. Stops shall be snap-in, non-removable type, 6063-T5 extruded aluminum alloy and 0.050-inch (1.25 mm) thickness.
3. Seals shall be vinyl inserts.
4. No fasteners shall be exposed.

D. Door Louvers:

1. Blades and Frames: 6063-T5 extruded aluminum alloy, 0.062-inch (1.57 mm) minimum thickness. Louver blades shall be inverted "Y" type.
2. Insect Screens: 14-18 mesh, 0.011-inch (0.28 mm) diameter Alclad aluminum, set in 6063-T5 extruded aluminum alloy frame, 0.050-inch (1.25 mm) minimum thickness.
3. Louver shall have a minimum of 50-percent free airflow.

E. Aluminum Frames:

1. Frame Components: Extruded channel (tubular) 6063-T5 aluminum alloy, minimum wall thickness 0.125-inch (3.18 mm); cut corners square and joinery shall be mechanical with no exposed fasteners.
2. Profile: Open Back with Applied Stop (OBS), 1.75-inches by 5-inches (44 x 127 mm).
3. Hinge and Strike Mounting Plates: Extruded aluminum alloy bar stock, 0.1875-inch (4.75 mm) thick mounted in a concealed integral channel with no exposed fasteners.

4. Replaceable Weatherstripping: AAMA 701, wool pile with nylon fabric, polypropylene backing, at head and jambs.
5. Door Stop: No screw-on stops acceptable.
6. Frame Finish: Shall match door finish.

2.03 FINISH

- A. Finish: High Performance Organic Coating: Kynar/Polyvinylidene Fluoride (PVDF) (AAMA 605.2).
 1. Color: Selected by Owner from manufacturer's standard colors and to match existing.

2.04 FABRICATION

- A. General: Receive hardware if required by manufacturer.
- B. Aluminum Flush Door Construction: Of type, size and design indicated:
 1. Minimum Thickness: 1.75-inches (44 mm), 5-ply composite laminate system. No 3-ply doors accepted for commercial application.
 2. Door Size: Sizes shown are nominal; provide standard clearances as follows:
 - a. Hinge and Lock Stiles: 0.125-inch (3.18 mm).
 - b. Between Meeting Stiles: 0.25-inch (6.35 mm).
 - c. At Top Rails: 0.125-inch (3.18 mm).
 - d. Between Door Bottom and Threshold: 0.125-inch (3.18 mm).
 3. Face Panels: Exterior and interior aluminum panels shall be one-piece stretcher-leveled aluminum alloy, each laminated edge-to-edge to one-piece oil-tempered hardboard substrate.
 4. Substrate: Oil-tempered hardboard substrates shall have 100-percent bilateral lamination to a pre-stabilized, five pound minimum, EPS foam core and internal hardware backup tube.
 5. Reinforcement: Internal tube shall reinforce the full internal door perimeter to allow for all specified and non-specified hardware.
 6. Core: Pre-stabilized, five pound minimum, EPS foam core shall have 100-percent bilateral lamination to facing substrate and to internal reinforcement system.
 7. Door Edge: Door perimeter shall be trimmed with a field replaceable 6063-T5 extruded aluminum alloy, with a beveled edge on the lock stile and a clip mortise squares edged on the hinge stile, to protect door edges.

8. Weatherstripping: Lock stile of door shall have wool pile weatherstripping applied.
- C. Aluminum Frames: Of shapes and contours indicated.
 1. Corners shall be cut square.
 2. Reinforce and secure mechanically.

2.05 ACCESSORIES

- A. Fasteners: Aluminum, non-magnetic stainless steel, or other material warranted by manufacturer as non-corrosive and compatible with aluminum components.
 1. Do not use exposed fasteners.
- B. Brackets and Reinforcements: Manufacturer's high-strength aluminum units where feasible, otherwise, nonferrous stainless steel.
- C. Bituminous Coating: Cold-applied asphaltic mastic, compounded for 30-mil (0.76 mm) thickness per coat.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Verify that wall surfaces and openings are ready to receive frames and are within tolerances specified in manufacturer's instructions.
- B. Verify that frames installed by other trades for installation of doors of this section are in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.

3.02 PREPARATION

- A. Perform cutting, fitting, forming, drilling, and grinding of frames as required for project conditions; do not damage sight-exposed finishes.
- B. Separate dissimilar metals to prevent electrolytic action between metals.

3.03 INSTALLATION

- A. Install doors and frames in accordance with manufacturer's instructions and approved shop drawings; set frames plumb, square, level, and aligned to receive doors.
- B. Anchor frames to adjacent construction in strict accordance with recommendations and approved shop drawings and within tolerances specified in manufacturer's instructions.
 1. Seal metal-to-metal joints between framing members using good quality elastomeric sealant.
- C. Where aluminum surfaces contact with metals other than stainless steel, zinc or small areas of white bronze, protect from direct contact by one or more of the following methods.

1. Paint dissimilar metal with one coat of heavy-bodied bituminous paint.
 2. Apply good quality elastomeric sealant between aluminum and dissimilar metal.
 3. Paint dissimilar metal with one coat of primer and one coat of paint recommended for aluminum surface applications.
 4. Use non-absorptive tape or gasket in permanently dry locations.
- D. Hang doors with required clearances as follows:
1. Hinge and Lock Stiles: 0.125-inch (3.18 mm).
 2. Between Meeting Stiles: 0.250-inch (6.35 mm).
 3. At Top Rails: 0.125-inch (3.18 mm).
 4. Between Door Bottom and Threshold: 0.125-inch (3.18 mm).
- E. Adjust doors and hardware to operate properly.
- F. Install glazing in glazing frames.
- G. Install hardware for doors of this section.
- H. Installation of door hardware is specified in Section 08710.
- I. Installation of glass is specified in Section 08800.

3.04 CLEANING

- A. Upon completion of installation, thoroughly clean door and frame surfaces in accordance with AAMA 609.
- B. Do not use abrasive, caustic or acid cleaning agents.

3.05 PROTECTION

- A. Protect products of this section from damage caused by subsequent construction until substantial completion.
- B. Repair damaged or defective products to original specified condition in accordance with manufacturer's recommendations.
- C. Replace damaged or defective products that cannot be repaired to Owner's acceptance.

END OF SECTION

SECTION 08710
FINISH HARDWARE

PART 1 GENERAL

1.01 QUALITY ASSURANCE

- A. Acceptable Designs: Specified products and their manufacturers establish acceptable design, material, type, grade, size, function and finish of hardware items required. Do not substitute other products, except with Engineer's acceptance.
- B. Manufacturer: Obtain each kind of hardware latch and locksets, hinges, closers from only one (1) manufacturer, although several may be indicated as offering products complying with the manufacturer's requirements.
- C. Supplier: The hardware supplier shall be a full member of the Society of Architectural Hardware Consultants and shall be available during normal working hours during the course of the project for hardware consultation to the Owner, Engineer, and Contractor.

1.02 SUBMITTALS

- A. Product Data: Submit in accordance with the requirements of Section 01340. Include installation and maintenance instructions for operating parts and finish. Transmit copy of applicable data to Installer.
- B. Certificates: Any hardware that is furnished other than that called out on the drawings shall have manufacturer's certificates certifying that the hardware meets this specification submitting the hardware shop drawings.
- C. Hardware Submittal: Submit final hardware submittal in the manner and format indicated below. Hardware submittals are intended for coordination of work.
 - 1. Organize hardware submittal into "hardware sets" indicating complete designations of every item required for each door or opening, including:
 - a) Type, style, function, size and finish of each hardware item.
 - b) Name and manufacturer of each item.
 - c) Fastenings and other pertinent information.
 - d) Location of hard set cross-referenced to indications on Drawings both on floor plans and in door and frame submittal.
 - e) Explanation of all abbreviations, symbols, code, etc. contained in submittal.
 - f) Mounting locations for hardware.
 - g) Door and frame sizes and materials.

2. Submit submittal at earliest possible date particularly where acceptance of hardware submittal must precede fabrication of other work, e.g. hollow metal frames, which is critical in the project construction schedule.
 3. Include product data, samples, shop drawings of other work affected by builder's hardware, and other information essential to the coordinated review of hardware submittal.
 4. Templates: Furnish for the installation of all hardware and to the manufacturer of related equipment for his preparation of that equipment for all hardware that must be attached thereto. Templates shall also be furnished to the manufacturer of wood doors for use on all wood doors that are factory fitting and factory machined for hardware.
- D. Keying Submittal: Submit separate detail submittal indicating clearly how the Owner's final instruction on keying of locks has been fulfilled. Prior to submittal blank key schedule to be completed by maintenance personnel.
- E. Samples: Prior to submittal of the final hardware, and prior to final ordering of builders hardware, submit one (1) sample of each type of exposed hardware unit, finished as required, and tagged with full.

1.03 JOB CONDITIONS

- A. Coordinate hardware with other work. Tag each item or package separately with identification related to the final hardware submittal. Furnish hardware items of proper design for use on doors and frames of the thickness, profile, swing, security and similar requirements indicated as necessary for proper installation and function. Deliver individually packaged hardware items at the proper times to the proper location shop or project site for installation.
- B. Packing and Marking: Package each item of hardware separately in individual containers, complete with necessary screws, keys, instructions and installation templates for spotting mortising tools. Mark each container with item's number corresponding to number shown on hardware supplier's submittal and properly tag each cylinder's key.
- C. Provide secure lock-up for hardware delivered to the project but not the installed. Control the handling and installation of hardware items that are not immediately replaceable, so that the completion of the work will not be delayed by hardware losses, both before and after installation.
- D. Templates: Furnish hardware templates to each fabricator of doors, frames and other work to be factory-prepared for the installation of hardware. Upon request, check the shop drawings of such other work to confirm that adequate provisions are made for the proper installation of hardware.
- E. Inspection of Hardware and Installation: The hardware supplier shall visit the project when the hardware is delivered and check it before it is installed. He shall visit the project again after all the hardware has been installed and shall notify the Engineer if there is any hardware that has not been installed correctly. Contractor and supplier shall furnish Engineer with written certification to this effect. After the

hardware is installed, the hardware supplier shall meet with the Owner or his representative and explain the functions, uses, and maintenance of all types of hardware installed. The Contractor shall turn over to the Owner, after completion of the work, all tools, wrenches and templates that come packaged with the hardware for the Owner's use in servicing the hardware. The hardware supplier shall adjust the door closers for proper operation with particular attention being given to final operation of the air conditioning, heating and ventilating system.

PART 2 PRODUCTS

2.01 PRODUCTS

A. Acceptable Manufacturers:

1. Hinges: Hager, McKinney, Stanley
2. Continuous Gear Hinges: McKinney, Zero, Select
3. Cylinders: Best, Corbin Russwin, Sargent
4. Door Closers: RYOBI, LCN, Sargent
5. Locks, Latches: Best, Corbin Russwin, Sargent
6. Silencers, Stops & Flush Bolts: Baldwin, Ives, Rockwood
7. Kick Plates, & Misc.: Baldwin, Ives, Rockwood
8. Exit Devices: Precision, Sargent, Von Duprin
9. Thresholds: National Guard, Pemko, Zero
10. Overhead Stops/ HOLDERS: ABH, Glynn-Johnson, Rixson

2.02 MATERIALS, FABRICATION AND FINISHES

A. General:

1. Manufacturer's Name Plate: Do not use products which have manufacturer's name or trade name displayed in a visible location except in conjunction with required UL labels.
2. Unless otherwise noted, exposed hardware items shall receive satin stainless steel finish.
3. Furnish screws of type as required for substrates indicated with each hardware item. Finish exposed screws to match the hardware finish or, if exposed in surfaces of other work, to match the finishes of such other work as closely as possible.
4. Unless otherwise noted, provide concealed fasteners for hardware units that are exposed when door is closed. Where fasteners must remain exposed when door is closed, provide vandal resistant fasteners.

5. Finish shall be: Dull Chrome [US26D], Dull Stainless Steel [US32D] Aluminum Lacquer [AL], Extruded Aluminum [Alum] and Prime Coat [USP] as listed on the Hardware Notes on the Structural Drawings.
6. Tools for maintenance: Furnish a complete set of specialized tools as needed for Owner's continued adjustment, maintenance and removal and replacement of builder's hardware.
7. Hardware Operation: Force required to activate door hardware shall be not greater than 5 lbf.
8. Door Opening Force: Maximum force for pushing or pulling open a door shall comply with this paragraph. For hinged doors, the force shall be applied perpendicular to the door at the door opener or 30 inches from the hinged side whichever is farther from the hinge.
 - a) Exterior hinged doors shall not exceed 8.5 lbf. Slight increases in opening force shall be allowed where 8.5 lbf. is insufficient to compensate for air pressure differentials.
 - b) Interior hinged doors shall not exceed 5.0 lbf.

B. Hinges:

1. Provide template-produced hinges complying with ANSI A156.1.
2. Provide stainless steel pins, non-removable type for exterior doors and non-rising types for interior doors. Pins shall have flat button ends finished to match hinge leaves.
3. Hinges shall be full-mortised, 4½" x 4½" unless otherwise noted; five knuckle ball bearing type, heavy duty rated.

C. Lock Cylinders and Keying:

1. Metals: Construct lock cylinder parts from brass/bronze, stainless steel or nickel silver.
2. Equip locks with manufacturer's construction master key feature that permits voiding of construction keys without cylinder removal.
3. Comply with the Owner's instructions for master keying and, except as otherwise indicated, provide individual change key for each lock that is not designated to be keyed alike with a group of related locks.
4. Key Material: Provide keys of nickel silver only.
5. Permanently inscribe each key with number or lock that identifies cylinder manufacturer's key symbol.
6. Keying: Establish a new Masterkey System as directed by the Owner. Furnish four (4) Masterkeys, three (3) keys per lock.

D. Locks and Latches:

1. Strikes: Except as otherwise indicated or specified, provide manufacturer's standard wrought box strike for each latch or lock bolt with curved lip extended to protect frame, finished to match hardware set.
 2. Handles and knobs: Provide manufacturer's lever handle set complete with stem, roses and trim unless otherwise noted.
 3. Lock throw: Provide 1/2" minimum throw on doors.
- E. Exit Devices: Exit devices shall be as called out with no substitutes accepted. Exit devices shall comply with ANSI Standard 156.3 Grade 1 modified as follows:
1. The devices shall be "touchpad" type with touchpad that shall extend a minimum of ½ of the door width.
 2. Devices should have a ¼" gap between the face of the door and the touchbar unit, eliminating the need for shims or cutting away the glass moulding.
 3. Lock stile chassis shall be cast bronze. Stamped steel units will not be accepted. All device latchbolts shall be extruded bronze and, where used in vertical rod devices, shall be deadlocking type.
 4. Device strikes shall be investment cast stainless steel.
 5. Device end cap shall be all metal and secured with a bracket that completely inserts into device housing.
 6. All outside device trim shall be cast or forged brass full escutcheon. Lever trim shall be "vandal resistant" with substantial resistance to rotation when locked.
 7. All vertical rod devices shall be concealed and have "latch retraction" hold back.
 8. Devices must be convertible from one function to another simply by exchanging back plate assembly in lock stile case and selecting proper outside trim.
 9. Device shall be secured to the door with sex bolts and through bolting at both ends.
 10. All devices shall be UL approved for all types and functions indicated in the Hardware notes.
 11. Devices shall have published three (3) year warranty.
 12. All exit devices shall be by the same manufacturer.
 13. Mullions shall be "keyed removable" type with only a key required for take down. No key or tools shall be required to reinstall. Mullions shall be by the same manufacturer as the exit devices.
- F. Closers: Shall be:

1. Closer shall be non-handed and adjustable.
 2. Closer shall have R14 high silicone aluminum alloy cylinder body with 1/2" steel piston.
 3. Closer shall have ten (10) year warranty.
 4. Closer shall have all season fluid to eliminate seasonal adjustment.
 5. All closers mounted parallel arm shall have EDA arm.
- G. Overhead Stops/Holders: Shall be - No Sub.
1. Units shall have metal/plated end plugs.
 2. Units mounting screws shall be designed so that they go through housing and end plug.
 3. Units shall have metal slide.
 4. All stops shall be by same manufacturer.
- H. Silencers, Stops & Flush Bolts: Shall be:
1. Silencers: Provide plug-type silencers in all metal door. Provide three (3) silencer units in door frames.
 2. All Stops, wall and floor shall be by the same manufacturer.
 3. Flush bolts shall have 3/4" throw with 2" vertical adjustment. Shall have override feature and stainless steel cams and rub plates. All flush bolts shall be by the same manufacturer.
- I. Thresholds: Extruded aluminum, smooth commercial mill finish, grooved tread, 4" minimum tread by full door width. Thickness of threshold shall be 0.5" at primary tread surfaces, 0.1875" for secondary tread surfaces, and 0.125" for concealed flanges and legs.
- J. Kick Plates, Mop Plates and Armor Plates: .050 material sized as follows:
1. Kick Plates: 8 x 2 LDW
 2. Mop Plates: 4 x 2 LDW
 3. Armor Plates: 16 x 2 LDW

2.03 SCHEDULE OF HARDWARE

- A. See Notes in Structural Drawings

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Properly tag, index and file all keys until turned over to the Owner. Apply hardware in accordance with templates and manufacturer's instructions; mortise and fit accurately; apply securely and adjust carefully.

1. Mount hardware units at heights recommended in "Recommended Locations for Builders Hardware" by DHI, except where shown otherwise on drawings.
2. Install each hardware item in compliance with the manufacturer's instructions and recommendations. Do not install surface mounted items until finishes have been completed on the substrate.
3. Set units level, plumb and true to line and location. Adjust and reinforce the attachment substrate as necessary for proper installation and operation.
4. Exercise care not to injure work when applying hardware. Review shop drawings and Contract Drawings for proper location. Cover door hardware with a heavy cloth until painting is completed. At completion of the work, examine doors and hardware, adjust as required and leave hardware in proper working order, free from defects.
5. At all times be responsible for the distribution of keys for hardware installed during construction, and cause all keys to be returned prior to final completion of the building

B. Preparation:

1. Do not install finish hardware until the wet trades have been fully completed.
2. Supplier shall mark each item of hardware for location. Protect markings until each item is installed. If any item of hardware is delivered to the Project not properly marked, return it to the supplier for marking before attempting to install it.
3. Install and make necessary adjustments for proper working order. Hardware damaged by improper adjustments or abuse will be rejected.
4. Provide clean, properly sized, and accurately placed mortises and drilled holes for all mortise and surface mounted finish hardware. Use appropriate jigs, templates and power mortising equipment for the installation of all mortised hardware items.
5. Metal frames to receive hardware items shall be drilled and tapped accurately.
6. Removal for Painting:
 - a) Before painters finish is applied, remove all finish hardware except prime-coated items.
 - b) After final paint and finish coats are dry, permanently replace and adjust finish hardware for proper operation.

C. Thresholds:

1. Cut and fit threshold to profile door frames, with mitered corners and hairline joints. Screw thresholds to substrate with No. 10 or larger bronze or stainless steel screws.
 2. Set thresholds in a bed of either butyl/rubber sealant or polyisobutylene mastic sealant to completely fill concealed voids and exclude moisture from every source. Do not plug drainage holes or block weeps. Remove excess sealant.
- D. Mounting Heights: Shall be as follows, measured from finished floor except for top hinge which is measured from door top:
1. Bottom hinge: 10-3/8" hinge center.
 2. Top hinge: 9-3/4" hinge center.
 3. Intermediate hinges: Equally spaced between top and bottom hinges.
 4. Locks and latches: 38" operating spindle.

3.02 ADJUST AND CLEAN

- A. Adjust and check each operating item of hardware and each door to ensure proper operation or function of every unit. Lubricate moving parts with type lubricant recommended by manufacturer and graphite-type if no other recommended]. Replace units that cannot be adjusted and lubricated to operate freely and smoothly as intended for the application made.
- B. Upon completion of the work and before final acceptance, demonstrate that all hardware is in satisfactory working order, that all keys fit in their respective locks and upon acceptance of the work, tag and deliver all keys to the Owner.
- C. Final Adjustment: Wherever hardware installation is made more than one (1) month prior to acceptance or occupancy of a space or area, return to the work during the week prior to acceptance or occupancy to make a final check and adjustment of all hardware items in such space or area. Clean and re-lubricate operating items as necessary to restore proper function and finish of hardware and doors. Adjust door control devices to compensate for final operation of heating and ventilating equipment.
- D. Instruct Owner's personnel in proper adjustment and maintenance of hardware and hardware finish during the final adjustment of hardware.

END OF SECTION

SECTION 08800

GLAZING

PART 1 GENERAL

1.01 RELATED DOCUMENTS

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

1.02 SUMMARY

- A. This Section includes glazing for the following products and applications, including those specified in other Sections where glazing requirements are specified by reference to this Section:

- 1. Doors.

1.03 DEFINITIONS

- A. Manufacturer: A firm that produces primary glass or fabricated glass as defined in referenced glazing publications.
- B. Interspace: Space between lites of an insulating-glass unit that contains dehydrated air or a specified gas.
- C. Deterioration of Laminated Glass: Defects developed from normal use that are attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning laminated glass contrary to manufacturer's written instructions. Defects include edge separation, delamination materially obstructing vision through glass, and blemishes exceeding those allowed by referenced laminated-glass standard.
- D. Deterioration of Insulating Glass: Failure of the hermetic seal under normal use that is attributed to the manufacturing process and not to causes other than glass breakage and practices for maintaining and cleaning insulating glass contrary to manufacturer's written instructions. Evidence of failure is the obstruction of vision by dust, moisture, or film on interior surfaces of glass.

1.04 PERFORMANCE REQUIREMENTS

- A. General: Provide glazing systems capable of withstanding normal thermal movement and wind and impact loads (where applicable) without failure, including loss or glass breakage attributable to the following: defective manufacture, fabrication, and installation; failure of sealants or gaskets to remain watertight and airtight; deterioration of glazing materials; or other defects in construction.
- B. Glass Design: Glass thicknesses indicated are minimums and are for detailing only. Confirm glass thicknesses by analyzing Project loads and in-service conditions. Provide glass lites for various size openings in nominal thicknesses

indicated, but not less than thicknesses and in strengths (annealed or heat treated) required to meet or exceed the following criteria:

1. Glass Thicknesses: Select minimum glass thicknesses to comply with ASTM E 1300, according to the following requirements:
 - a. Specified Design Wind Loads and impact resistance: As required by the Florida Building Code for all glazing not protected by exterior window shutters. For glazing protected by exterior window shutters, as indicated on the drawings, comply with the Florida Building Code requirements for wind loading (not impact resistance).
 - b. Probability of Breakage for Vertical Glazing: 8 lites per 1000 for lites set vertically or not more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 60 seconds or less.
 - c. Probability of Breakage for Sloped Glazing: 1 lite per 1000 for lites set more than 15 degrees off vertical and under wind action.
 - 1) Load Duration: 30 days.
 - d. Maximum Lateral Deflection: For the following types of glass supported on all four edges, provide thickness required that limits center deflection at design wind pressure to 1/50 times the short side length or 1 inch (25 mm), whichever is less.
 - 1) For monolithic-glass lites heat-treated to resist wind loads.
 - 2) For insulating glass.
 - 3) For laminated-glass lites.
 - e. Minimum Glass Thickness for Exterior Lites: Not less than 6 mm.
 - f. Thickness of Tinted and Heat-Absorbing Glass: Provide the same thickness for each tint color indicated throughout Project.
- C. Thermal Movements: Provide glazing that allows for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures acting on glass framing members and glazing components. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.
 1. Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.
- D. Thermal and Optical Performance Properties: Provide glass with performance properties specified based on manufacturer's published test data, as determined according to procedures indicated below:

1. For monolithic-glass lites, properties are based on units with lites 6 mm thick.
2. For laminated-glass lites, properties are based on products of construction indicated.
3. For insulating-glass units, properties are based on units with lites 6 mm thick and a nominal 1/2-inch- (13-mm-) wide interspace.
4. Center-of-Glass U-Values: NFRC 100 methodology using LBL-35298 WINDOW 4.1 computer program, expressed as Btu/ sq. ft. x h x deg F (W/sq. m x K).
5. Center-of-Glass Solar Heat Gain Coefficient: NFRC 200 methodology using LBL-35298 WINDOW 4.1 computer program.
6. Solar Optical Properties: NFRC 300.

1.05 SUBMITTALS

- A. Product Data: For each glass product and glazing material indicated.
- B. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass and of 12-inch- (300-mm-) long Samples for sealants. Install sealant Samples between two strips of material representative in color of the adjoining framing system.
- C. Samples: For the following products, in the form of 12-inch- (300-mm-) square Samples for glass.
 1. Each color of tinted float glass.
 2. Insulating glass for each designation indicated.
 3. For each color (except black) of exposed glazing sealant indicated.
- D. Glazing Schedule: Use same designations indicated on Drawings for glazed openings in preparing a schedule listing glass types and thicknesses for each size opening and location.
- E. Product Certificates: Signed by manufacturers of glass and glazing products certifying that products furnished comply with requirements.
- F. Qualification Data: For firms and persons specified in "Quality Assurance" Article to demonstrate their capabilities and experience. Include lists of completed projects with project names and addresses, names and addresses of architects and owners, and other information specified.
- G. Preconstruction Adhesion and Compatibility Test Report: From glazing sealant manufacturer indicating glazing sealants were tested for adhesion to glass and glazing channel substrates and for compatibility with glass and other glazing materials.

- H. Product Test Reports: From a qualified testing agency indicating the following products comply with requirements, based on comprehensive testing of current products:
 - 1. Tinted float glass.
 - 2. Insulating glass.
 - 3. Glazing sealants.
 - 4. Glazing gaskets.
- I. SWRI Validation Certificate: For each elastomeric glazing sealant specified to be validated by SWRI's Sealant Validation Program.
- J. Warranties: Special warranties specified in this Section.

1.06 QUALITY ASSURANCE

- A. Installer Qualifications: An experienced installer who has completed glazing similar in material, design, and extent to that indicated for Project and whose work has resulted in construction with a record of successful in-service performance.
- B. Source Limitations for Clear Glass: Obtain clear float glass from one primary-glass manufacturer.
- C. Source Limitations for Tinted Glass: Obtain tinted, heat absorbing, and light-reducing float glass from one primary-glass manufacturer for each tint color indicated.
- D. Source Limitations for Insulating Glass: Obtain insulating-glass units from one manufacturer using the same type of glass and other components for each type of unit indicated.
- E. Source Limitations for Glazing Accessories: Obtain glazing accessories from one source for each product and installation method indicated.
- F. Glass Product Testing: Obtain glass test results for product test reports in "Submittals" Article from a qualified testing agency based on testing glass products.
 - 1. Glass Testing Agency Qualifications: An independent testing agency with the experience and capability to conduct the testing indicated, as documented according to ASTM E 548.
- G. Elastomeric Glazing Sealant Product Testing: Obtain sealant test results for product test reports in "Submittals" Article from a qualified testing agency based on testing current sealant formulations within a 36-month period.
 - 1. Sealant Testing Agency Qualifications: An independent testing agency qualified according to ASTM C 1021 to conduct the testing indicated, as documented according to ASTM E 548.

2. Test elastomeric glazing sealants for compliance with requirements specified by reference to ASTM C 920, and where applicable, to other standard test methods.
- H. Preconstruction Adhesion and Compatibility Testing: Submit to elastomeric glazing sealant manufacturers, for testing indicated below, samples of each glass type, tape sealant, gasket, glazing accessory, and glass-framing member that will contact or affect elastomeric glazing sealants.
1. Use manufacturer's standard test methods to determine whether priming and other specific preparation techniques are required to obtain rapid, optimum adhesion of glazing sealants to glass, tape sealants, gaskets, and glazing channel substrates.
 - a. Perform tests under normal environmental conditions replicating those that will exist during installation.
 2. Submit not fewer than nine pieces of each type and finish of glass-framing members and each type, class, kind, condition, and form of glass (monolithic, laminated, and insulating units) as well as one sample of each glazing accessory (gaskets, tape sealants, setting blocks, and spacers).
 3. Schedule sufficient time for testing and analyzing results to prevent delaying the Work.
 4. For materials failing tests, obtain sealant manufacturer's written instructions for corrective measures, including the use of specially formulated primers.
 5. Testing will not be required if elastomeric glazing sealant manufacturers submit data based on previous testing of current sealant products for adhesion to, and compatibility with, glazing materials matching those submitted.
- I. Fire-Rated Window Assemblies: Assemblies complying with NFPA 80 that are listed and labeled by a testing and inspecting agency acceptable to authorities having jurisdiction, for fire ratings indicated, based on testing according to NFPA 257.
- J. Safety Glass: Category II materials complying with testing requirements in 16 CFR 1201 and ANSI Z97.1.
1. Subject to compliance with requirements, permanently mark safety glass with certification label of Safety Glazing Certification Council or another certification agency acceptable to authorities having jurisdiction.
 2. Comply with Florida Statutes-Chapter 553, Part III, Safety Performance Specifications and Methods of Test for Safety Glazing Used in Buildings.
- K. Glazing Publications: Comply with published recommendations of glass product manufacturers and organizations below, unless more stringent requirements are

indicated. Refer to these publications for glazing terms not otherwise defined in this Section or in referenced standards.

1. GANA Publications: GANA'S "Glazing Manual" and "Laminated Glass Design Guide."
 2. AAMA Publications: AAMA GDSG-1, "Glass Design for Sloped Glazing," and AAMA TIR-A7, "Sloped Glazing Guidelines."
 3. SIGMA Publications: SIGMA TM-3000, "Vertical Glazing Guidelines," and SIGMA TB-3001, "Sloped Glazing Guidelines."
- L. Insulating-Glass Certification Program: Permanently marked either on spacers or on at least one component lite of units with appropriate certification label of the following inspecting and testing agency:
1. Insulating Glass Certification Council.
 2. Associated Laboratories, Inc.
 3. National Accreditation and Management Institute.
- M. Mockups: Before glazing, build mockups for each glass product indicated below to verify selections made under sample Submittals and to demonstrate aesthetic effects and qualities of materials and execution. Build mockups to comply with the following requirements, using materials indicated for the completed Work:
1. Build mockups with the following kinds of glass to match glazing systems required for Project, including typical lite size, framing systems, and glazing methods:
 - a. Heat-strengthened glass.
 - b. Fully tempered glass.
 - c. Laminated glass.
 - d. Insulating glass.
 2. Notify Architect seven days in advance of dates and times when mockups will be constructed.
 3. Obtain Architect's approval of mockups before starting fabrication.
 4. Maintain mockups during construction in an undisturbed condition as a standard for judging the completed Work.
 5. Demolish and remove mockups when directed.
 6. Approved mockups may become part of the completed Work if undisturbed at time of Substantial Completion.
- N. Pre-installation Conference: Conduct conference at Project site to comply with requirements in Division 1.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Protect glazing materials according to manufacturer's written instructions and as needed to prevent damage to glass and glazing materials from condensation, temperature changes, direct exposure to sun, or other causes.
- B. For insulating-glass units that will be exposed to substantial altitude changes, comply with insulating-glass manufacturers written recommendations for venting and sealing to avoid hermetic seal ruptures.

1.08 PROJECT CONDITIONS

- A. Environmental Limitations: Do not proceed with glazing when ambient and substrate temperature conditions are outside limits permitted by glazing material manufacturers and when glazing channel substrates are wet from rain, frost, condensation, or other causes.
 - 1. Do not install liquid glazing sealants when ambient and substrate temperature conditions are outside limits permitted by glazing sealant manufacturer or below 40 deg F (4.4 deg C).

1.09 WARRANTY

- A. General Warranty: Special warranties specified in this Article shall not deprive Owner of other rights Owner may have under other provisions of the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under requirements of the Contract Documents.
- B. Manufacturer's Special Warranty on Laminated Glass: Written warranty, made out to Owner and signed by laminated-glass manufacturer agreeing to furnish replacements for laminated-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: Five years from date of Substantial Completion.
- C. Manufacturer's Special Warranty on Insulating Glass: Written warranty, made out to Owner and signed by insulating-glass manufacturer agreeing to furnish replacements for insulating-glass units that deteriorate as defined in "Definitions" Article, f.o.b. the nearest shipping point to Project site, within specified warranty period indicated below.
 - 1. Warranty Period: 10 years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 PRODUCTS AND MANUFACTURERS

- A. Available Products: Subject to compliance with requirements, products that may be incorporated into the Work include, but are not limited to, the products indicated in schedules at the end of Part 3.

2.02 PRIMARY FLOAT GLASS

- A. Float Glass: ASTM C 1036, Type I (transparent glass, flat), Quality q3 (glazing select); class as indicated in schedules at the end of Part 3.

2.03 HEAT-TREATED FLOAT GLASS

- A. Fabrication Process: By horizontal (roller-hearth) process with roll-wave distortion parallel to bottom edge of glass as installed, unless otherwise indicated.
- B. Heat-Treated Float Glass: ASTM C 1048; Type I (transparent glass, flat); Quality q3 (glazing select); class, kind, and condition as indicated in schedules at the end of Part 3.

2.04 WIRED GLASS

- A. Wired Glass: ASTM C 1036, Type II (patterned and wired glass, flat), Class 1 (clear), Quality q8 (glazing); 6.4 mm thick; of form and mesh pattern indicated below:
 - 1. Polished Wired Glass: Form 1 (wired, polished both sides), and as follows:
 - a. Mesh m1 (diamond).
- B. Manufacturers: Subject to compliance with requirements, provide products by one of the following:
 - 1. Polished Wired Glass:
 - a. Ashai Glass Co./Ama Glass Corp.
 - b. Central Glass Co., Ltd.
 - c. Nippon Sheet Glass Co., Ltd.
 - d. Pilkington Glass Ltd.

2.05 LAMINATED GLASS

- A. Laminated Glass: Comply with ASTM C 1172 for kinds of laminated glass indicated and other requirements specified, including those in the Laminated-Glass Schedule at the end of Part 3.
- B. Interlayer: Interlayer material as indicated below, clear, and of thickness indicated with a proven record of no tendency to bubble, discolor, or lose physical and mechanical properties after laminating glass lites and installation.
 - 1. Interlayer Material: Polyvinyl butyral sheets.
- C. Laminating Process: Fabricate laminated glass to produce glass free of foreign substances and air or glass pockets as follows:
 - 1. Laminate lites with polyvinyl butyral interlayer in autoclave with heat plus pressure.

2.06 INSULATING GLASS

- A. Insulating-Glass Units: Preassembled units consisting of sealed lites of glass separated by a dehydrated interspace, and complying with ASTM E 774 for Class

CBA units and with requirements specified in this Article and in the Insulating-Glass Schedule at the end of Part 3.

- B. Overall Unit Thickness and Thickness of Each Lite: Dimensions indicated in the Insulating-Glass Schedule at the end of Part 3 are nominal and the overall thicknesses of units are measured perpendicularly from outer surfaces of glass lites at unit's edge.
- C. Sealing System: Dual seal, with primary and secondary sealants as follows:
 - 1. Manufacturer's standard sealants.
- D. Spacer Specifications: Manufacturer's standard spacer material and construction.

2.07 ELASTOMERIC GLAZING SEALANTS

- A. General: Provide products, complying with the following requirements:
 - 1. Compatibility: Select glazing sealants that are compatible with one another and with other materials they will contact, including glass products, seals of insulating-glass units, and glazing channel substrates, under conditions of service and application, as demonstrated by sealant manufacturer based on testing and field experience.
 - 2. Suitability: Comply with sealant and glass manufacturers' written instructions for selecting glazing sealants suitable for applications indicated and for conditions existing at time of installation.
 - 3. Colors of Exposed Glazing Sealants: As selected by Architect from manufacturer's full range for this characteristic.
- B. Elastomeric Glazing Sealant Standard: Comply with ASTM C 920 and other requirements indicated for each liquid-applied, chemically curing sealant.
 - 1. Additional Movement Capability: Where additional movement capability is necessary, provide products with the capability, when tested for adhesion and cohesion under maximum cyclic movement per ASTM C 719, to withstand the specified percentage change in the joint width existing at time of installation and remain in compliance with other requirements in ASTM C 920 for uses indicated.
- C. Glazing Sealant for Fire-Resistive Glazing Products: Identical to product used in test assembly to obtain fire-protection rating.

2.08 GLAZING TAPES

- A. Back-Bedding Mastic Glazing Tape: Preformed, butyl-based elastomeric tape with a solids content of 100 percent; nonstaining and nonmigrating in contact with nonporous surfaces; with or without spacer rod as recommended in writing by tape and glass manufacturers for application indicated; packaged on rolls with a release paper backing; and complying with ASTM C 1281 and AAMA 800 for products indicated below:

1. AAMA 804.3 tape.
 2. AAMA 806.3 tape, for glazing applications in which tape is subject to continuous pressure.
 3. AAMA 807.3 tape, for glazing applications in which tape is not subject to continuous pressure.
- B. Expanded Cellular Glazing Tape: Closed-cell, PVC foam tape; factory coated with adhesive on both surfaces; packaged on rolls with release liner protecting adhesive; and complying with AAMA 800 for the following types:
1. Type 1, for glazing applications in which tape acts as the primary sealant.
 2. Type 2, for glazing applications in which tape is used in combination with a full bead of liquid sealant.

2.09 GLAZING GASKETS

- A. Lock-Strip Gaskets: Neoprene extrusions in size and shape indicated, fabricated into frames with molded corner units and zipper lock strips, complying with ASTM C 542, black.
- B. Dense Compression Gaskets: Molded or extruded gaskets of material indicated below, complying with standards referenced with name of elastomer indicated below, and of profile and hardness required to maintain watertight seal:
1. Neoprene, ASTM C 864.
 2. EPDM, ASTM C 864.
 3. Silicone, ASTM C 1115.
 4. Thermoplastic polyolefin rubber, ASTM C 1115.
 5. Any material indicated above.
- C. Soft Compression Gaskets: Extruded or molded, closed-cell, integral-skinned gaskets of material indicated below; complying with ASTM C 509, Type II, black; and of profile and hardness required to maintain watertight seal:
1. Neoprene.
 2. EPDM.
 3. Silicone.
 4. Thermoplastic polyolefin rubber.
 5. Any material indicated above.

2.10 MISCELLANEOUS GLAZING MATERIALS

- A. General: Provide products of material, size, and shape complying with referenced glazing standard, requirements of manufacturers of glass and other

glazing materials for application indicated, and with a proven record of compatibility with surfaces contacted in installation.

- B. Cleaners, Primers, and Sealers: Types recommended by sealant or gasket manufacturer.
- C. Setting Blocks: Elastomeric material with a Shore A durometer hardness of 85, plus or minus 5.
- D. Spacers: Elastomeric blocks or continuous extrusions with a Shore A durometer hardness required by glass manufacturer to maintain glass lites in place for installation indicated.
- E. Edge Blocks: Elastomeric material of hardness needed to limit glass lateral movement (side walking).
- F. Cylindrical Glazing Sealant Backing: ASTM C 1330, Type O (open-cell material), of size and density to control glazing sealant depth and otherwise produce optimum glazing sealant performance.
- G. Perimeter Insulation for Fire-Resistive Glazing: Identical to product used in test assembly to obtain fire-resistance rating.

2.11 FABRICATION OF GLASS AND OTHER GLAZING PRODUCTS

- A. Fabricate glass and other glazing products in sizes required to glaze openings indicated for Project, with edge and face clearances, edge and surface conditions, and bite complying with written instructions of product manufacturer and referenced glazing standard, to comply with system performance requirements.
- B. Clean-cut or flat-grind vertical edges of butt-glazed monolithic lites in a manner that produces square edges with slight kerfs at junctions with indoor and outdoor faces.
- C. Grind smooth and polish exposed glass edges.

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine framing glazing, with Installer present, for compliance with the following:
 - 1. Manufacturing and installation tolerances, including those for size, squareness, and offsets at corners.
 - 2. Presence and functioning of weep system.
 - 3. Minimum required face or edge clearances.
 - 4. Effective sealing between joints of glass-framing members.
- B. Proceed with installation only after unsatisfactory conditions have been corrected.

3.02 PREPARATION

- A. Clean glazing channels and other framing members receiving glass immediately before glazing. Remove coatings not firmly bonded to substrates.

3.03 GLAZING, GENERAL

- A. Comply with combined written instructions of manufacturers of glass, sealants, gaskets, and other glazing materials, unless more stringent requirements are indicated, including those in referenced glazing publications.
- B. Glazing channel dimensions, provide necessary bite on glass, minimum edge and face clearances, and adequate sealant thicknesses, with reasonable tolerances. Adjust as required by Project conditions during installation.
- C. Protect glass edges from damage during handling and installation. Remove damaged glass from Project site and legally dispose of off Project site. Damaged glass is glass with edge damage or other imperfections that, when installed, could weaken glass and impair performance and appearance.
- D. Apply primers to joint surfaces where required for adhesion of sealants, as determined by preconstruction sealant-substrate testing.
- E. Install setting blocks in sill rabbets, sized and located to comply with referenced glazing publications, unless otherwise required by glass manufacturer. Set blocks in thin course of compatible sealant suitable for heel bead.
- F. Do not exceed edge pressures stipulated by glass manufacturers for installing glass lites.
- G. Provide spacers for glass lites where the length plus width is larger than 50 inches (1270 mm) as follows:
 - 1. Locate spacers directly opposite each other on both inside and outside faces of glass. Install correct size and spacing to preserve required face clearances, unless gaskets and glazing tapes are used that have demonstrated ability to maintain required face clearances and to comply with system performance requirements.
 - 2. Provide 1/8-inch (3-mm) minimum bite of spacers on glass and use thickness equal to sealant width. With glazing tape, use thickness slightly less than final compressed thickness of tape.
- H. Provide edge blocking where indicated or needed to prevent glass lites from moving sideways in glazing channel, as recommended in writing by glass manufacturer and according to requirements in referenced glazing publications.
- I. Set glass lites in each series with uniform pattern, draw, bow, and similar characteristics.
- J. Where wedge-shaped gaskets are driven into one side of channel to pressurize sealant or gasket on opposite side, provide adequate anchorage so gasket cannot walk out when installation is subjected to movement.

- K. Square cut wedge-shaped gaskets at corners and install gaskets in a manner recommended by gasket manufacturer to prevent corners from pulling away; seal corner joints and butt joints with sealant recommended by gasket manufacturer.

3.04 TAPE GLAZING

- A. Position tapes on fixed stops so that, when compressed by glass, their exposed edges are flush with or protrude slightly above sightline of stops.
- B. Install tapes continuously, but not necessarily in one continuous length. Do not stretch tapes to make them fit opening.
- C. Where framing joints are vertical, cover these joints by applying tapes to heads and sills first and then to jambs. Where framing joints are horizontal, cover these joints by applying tapes to jambs and then to heads and sills.
- D. Place joints in tapes at corners of opening with adjoining lengths butted together, not lapped. Seal joints in tapes with compatible sealant approved by tape manufacturer.
- E. Do not remove release paper from tape until just before each glazing unit is installed.
- F. Apply heel bead of elastomeric sealant.
- G. Center glass lites in openings on setting blocks and press firmly against tape by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings.
- H. Apply cap bead of elastomeric sealant over exposed edge of tape.

3.05 GASKET GLAZING (DRY)

- A. Fabricate compression gaskets in lengths recommended by gasket manufacturer to fit openings exactly, with stretch allowance during installation.
- B. Insert soft compression gasket between glass and frame or fixed stop so it is securely in place with joints miter cut and bonded together at corners.
- C. Center glass lites in openings on setting blocks and press firmly against soft compression gasket by inserting dense compression gaskets formed and installed to lock in place against faces of removable stops. Start gasket applications at corners and work toward centers of openings. Compress gaskets to produce a weathertight seal without developing bending stresses in glass. Seal gasket joints with sealant recommended by gasket manufacturer.
- D. Install gaskets so they protrude past face of glazing stops.

3.06 SEALANT GLAZING (WET)

- A. Install continuous spacers, or spacers combined with cylindrical sealant backing, between glass lites and glazing stops to maintain glass face clearances and to

prevent sealant from extruding into glass channel and blocking weep systems until sealants cure. Secure spacers or spacers and backings in place and in position to control depth of installed sealant relative to edge clearance for optimum sealant performance.

- B. Force sealants into glazing channels to eliminate voids and to ensure complete wetting or bond of sealant to glass and channel surfaces.
- C. Tool exposed surfaces of sealants to provide a substantial wash away from glass.

3.07 LOCK-STRIP GASKET GLAZING

- A. Comply with ASTM C 716 and gasket manufacturer's written instructions. Provide supplementary wet seal and weep system, unless otherwise indicated.

3.08 PROTECTION AND CLEANING

- A. Protect exterior glass from damage immediately after installation by attaching crossed streamers to framing held away from glass. Do not apply markers to glass surface. Remove nonpermanent labels, and clean surfaces.
- B. Protect glass from contact with contaminating substances resulting from construction operations, including weld splatter. If, despite such protection, contaminating substances do come into contact with glass, remove them immediately as recommended by glass manufacturer.
- C. Examine glass surfaces adjacent to or below exterior concrete and other masonry surfaces at frequent intervals during construction, but not less than once a month, for build-up of dirt, scum, alkaline deposits, or stains; remove as recommended by glass manufacturer.
- D. Remove and replace glass that is broken, chipped, cracked, abraded, or damaged in any way, including natural causes, accidents, and vandalism, during construction period.
- E. Wash glass on both exposed surfaces in each area of Project not more than four days before date scheduled for inspections that establish date of Substantial Completion. Wash glass as recommended by glass manufacturer.

3.09 MONOLITHIC FLOAT-GLASS SCHEDULE

- A. Uncoated Clear Float Glass: Where glass as designated below is indicated, provide Type I (transparent glass, flat), Class 1 (clear) glass lites complying with the following:
 - 1. Uncoated Clear Heat-Strengthened Float Glass FG-2: Kind HS (heat strengthened).
 - 2. Uncoated Clear Fully Tempered Float Glass FG-1: Kind FT (fully tempered).
 - 3. Visible Light Transmittance: 88%

4. Winter Nighttime U-Value: 1.09
5. Solar Heat Gain Coefficient: .94
6. Outdoor Visible reflectance: 9%

3.10 LAMINATED-GLASS SCHEDULE

A. Laminated Glass LG-1: Where glass of this designation is indicated, provide glass lites complying with the following:

1. Inner Lite: Type I (transparent glass, flat) float glass.
 - a. Kind HS Heat-Strengthened
 - b. Class 1 (clear).
 - c. Thickness: 6 mm.
2. Outer Lite: Type I (transparent glass, flat) float glass.
 - a. Kind HS Heat-Strengthened
 - b. Class 2 (tinted, heat absorbing, and light reducing).
 - 1) Tint Color: Bronze.
 - c. Thickness: 6 mm.
3. Plastic Interlayer: 0.060 inch (1.52 mm) thick or as required.
 - a. Interlayer Color: Clear. If a color is selected, insert light-transmittance value below.
 - b. Visible Light Transmittance of Interlayer: 80 to 90%
4. Visible Light Transmittance: 46%
5. Winter Nighttime U-Value: .48
6. Solar Heat Gain Coefficient: .56
7. Outdoor Visible Reflectance: 9%

3.11 INSULATING-GLASS SCHEDULE

A. Insulating Glass IG-1: Where glass of this designation is indicated, provide uncoated insulating-glass units complying with the following:

1. Overall Unit Thickness and Thickness of Each Lite: 25 and 6 mm.
2. Interspace Content: Air.
3. Outdoor Lite: Type I (transparent glass, flat), Class 1 (clear) float glass.
 - a. Kind FT (fully tempered), Condition A (uncoated surfaces).
4. Indoor Lite: LG-1.

- B. Insulating Glass IG-2: Where glass of this designation is indicated, provide uncoated insulating-glass units complying with the following:
1. Overall Unit Thickness and Thickness of each Lite: 25 and 6 mm.
 2. Interspace Content: Air.
 3. Indoor Lite: Type I (transparent glass, flat) Class I (clear) float glass.
 - a. Kind FT (fully tempered)
 4. Outdoor Lite: Type I (transparent glass, flat) Class I (clear) float glass.
 - a. Kind FT (fully tempered)

END OF SECTION

DIVISION 9 PAINTING

SECTION 09865 SURFACE PREPARATION AND SHOP PRIME PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals required for the surface preparation and application of shop primers on ferrous metals, excluding stainless steels, as specified herein.

1.02 SUBMITTALS

- A. Submit to the County for approval, as provided in the Contract Drawings for shop drawings, manufacturer's specifications and data on the proposed primers and detailed surface preparation, application procedures and dry mil thickness.
- B. Submit representative physical samples of the proposed primers, if required by the County.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Submerged Services: Shop primer for ferrous metals which will be subject to splash action or which are specified to be considered submerged service shall be sprayed with one coat of Koppers 654 epoxy Primer or Koppers Inertol Primer 621-FDA, dry film thickness 3.5 to 4.5 mils by Koppers Co., Inc., or equal.
- B. Non-submerged Services: Shop primer for ferrous metals other than those covered by paragraph 2.01 A shall be sprayed with one coat of Koppers Pug Primer, dry film thickness 3.0 to 4.0 mils by Koppers Co., Inc. or equal.
- C. Non-primed Surfaces: Gears, bearing surfaces, and other similar surfaces obviously not to be painted shall be given a heavy shop coat of grease or other suitable rust-resistant coating. This coating shall be maintained as necessary to prevent corrosion during all periods of storage and erection and shall be satisfactory to the County up to the time of the final acceptance.
- D. Compatibility of Coating Systems: Shop priming shall be done with primers that are guaranteed by the manufacturer to be compatible with their corresponding primers and finish coats specified in the Contract Documents for use in the field and which are recommended for use together.

PART 3 EXECUTION

3.01 APPLICATION

- A. Surface Preparation and Priming:

1. Non submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-6, Commercial Grade, immediately prior to priming. Submerged components scheduled for priming, as defined above, shall be sandblasted clean in accordance with SSPC-SP-10. Near White, immediately prior to priming.
2. Surfaces shall be dry and free of dust, oil, grease, dirt, rust, loose mill scale and other foreign material before priming.
3. Shop prime in accordance with approved paint manufacturer's recommendations.
4. Priming shall follow sandblasting before any evidence of corrosion has occurred and within 24 hours.

END OF SECTION

SECTION 09900 PAINTING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, tools, materials, equipment, scaffolding or other structures and incidentals necessary to complete this Contract in its entirety.
- B. The work includes painting and finishing of all new interior and exterior exposed items above and below grade and surfaces, such as structural steel, miscellaneous metals, ceilings, walls, floors, doors, frames, transoms, roof fans, construction signs, guardrails, posts, fittings, valves, tanks, equipment and all other work obviously required to be painted unless otherwise specified herein or on the Drawings. The omission of minor items in the Schedule of Work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specification as stated herein.
- C. The following items shall not be painted:
1. Any code-requiring labels, such as Underwriter's Laboratories and Factory Mutual, or any equipment identification, performance rating, name or nomenclature plates.
 2. Any moving parts of operating units, mechanical and electrical parts, such as valve and damper operators, linkages, sinkages, sensing devices, motor and fan shafts, unless otherwise indicated.
 3. Aluminum handrails (except where in contact with concrete) walkways, windows, louvers and grating unless otherwise specified herein.
 4. Signs and nameplates.
 5. Finish hardware.
 6. Chain link fence.
 7. Piping buried in the ground or embedded in concrete.
 8. Concealed surfaces of pipe or crawl space.
 9. Nonferrous metals, unless specifically noted otherwise.
 10. Electrical switchgear and motor control centers.
 11. Stainless steel angles, tubes, pipe, etc.
 12. Products with polished chrome, aluminum, nickel or stainless steel finish.
 13. Plastic switch plates and receptacle plates.
 14. Flexible couplings, lubricated bearing surfaces, insulation and metal and plastic pipe interior.
 15. Sprinkler heads.
 16. Lifting chain on cranes and hoists
 17. Electrical cable, festooned conductor system, cables, collector pole brackets, etc.
- D. All work shall be done in strict accordance with this Specification, the Design Drawings and the painting package, including manufacturer's printed instructions.
- E. The Contractor will obtain, at its own expense, all permits, licenses and inspections and shall comply with all laws, codes, ordinances, rules and regulations promulgated by authorities having jurisdiction which may bear on the Work. This

compliance will include Federal Public Law 91-596 more commonly known as the "Occupational Safety and Health Act of 1970".

1.02 DEFINITIONS

- A. Field Painting is the painting of new or rebuilt items at the job site. Field painting shall be the responsibility of the Contractor.
- B. Shop Painting is the painting of new or rebuilt items in the shop prior to delivery to the jobsite.
- C. Abbreviations The abbreviations and definitions listed below, when used in this specification, shall have the following meanings:
 - 1. SSPC - Steel Structures Painting Council
 - 2. Exterior - Outside, exposed to weather
 - 3. Interior Dry - Inside, concealed or protected from weather
 - 4. Interior Wet - Inside, subject to immersion services
 - 5. ASTM - American Society of Test Materials
 - 6. NACE - National Association of Corrosion Engineers
 - 7. NSF - National Sanitation Foundation
 - 8. AWWA - American Water Works Association
- D. Dry Film Thickness shall be in Mils.

1.03 RESOLUTION OF CONFLICTS

- A. It shall be the responsibility of the Contractor to arrange a meeting prior to the start of painting, or flooring installation between the Contractor, the Paint Manufacturer, whose products are to be used, and the County. All aspects of surface preparation, application and coating systems as covered by this Specification will be reviewed at this meeting.
- B. Clarification shall be requested promptly from the County when instructions are lacking, conflicts occur in the Specifications, or the procedure seems improper or inappropriate for any reason.
- C. Copies of all manufacturer's instructions and recommendations shall be furnished to the County by the Painting Contractor.
- D. It shall be the responsibility of the Coating Manufacturer to have their factory representative meet in person with the Contractor and County a minimum of three times during the job as a consultant on surface preparation, mil thickness of coating and proper application of coating unless meeting is determined to be unnecessary by the County.

1.04 SUBMITTALS

- A. Contractor shall submit catalog data and cut sheets for the painting system being used if not the TNEMEC materials specified.
- B. Samples as detailed in 3.01 B shall be submitted regardless of system being used,

showing each color to be used.

- C. Hazardous Material Disposal documentation shall be submitted if applicable.

PART 2 PRODUCTS

2.01 EQUIPMENT

- A. Effective oil and water separators shall be used in all compressed air lines serving spray painting and sandblasting operations to remove oil or moisture from the air before it is used. Separators shall be placed as far as practicable from the compressor.
- B. All equipment for application of the paint and the completion of the work shall be furnished by the Contractor in first-class condition and shall comply with recommendations of the paint manufacturer.
- C. Contractor will provide free of charge to the County a "Nordson-Mikrotest" or "Positest" dry film thickness gauge for ferrous metal and an OG232 "Tooke" gauge or equal for non-ferrous and cementitious surface, to be used to inspect coatings by the County and Contractor. The gauges may be used by the Contractor and returned each day to the County. County will return gauges to Contractor at completion of job.

2.02 MATERIALS

- A. All materials specified herein are manufactured by the TNEMEC Company, Inc., North Kansas City, Missouri. These products are specified to establish standards of quality and are approved for use on this Project.
- B. Equivalent materials of other manufacturers may be substituted on approval of the County. Requests for substitution shall include manufacturer's literature for each product giving the name, generic type, descriptive information and evidence of satisfactory past performance and an independent laboratory certification that their product meets the performance criteria of the specified materials.
- C. Abrasion - Fed. Test Method Std. No. 141, Method 6192, CS-17 Wheel, 1,000 grams load.
- D. Adhesion - Elcometer Adhesion Tester.
- E. Exterior Exposure - Exposed at 45 degrees facing the ocean (South Florida Marine Exposure)
- F. Hardness - ASTM D3363-74
- G. Humidity - ASTM D2247-68
- H. Salt Spray (Fog) - ASTM B117-73
- I. Standard practice for Operating the Severe Wastewater Analysis Testing Apparatus ASTM G210-13

- I. Substitutions which decrease the total film thickness, change the generic type of coating, or fail to meet the performance criteria of the specified materials shall not be approved. Prime and finish coats of all surfaces shall be furnished by the same manufacturer.
- J. All coatings to be shop applied must meet the requirements for volatile organic compounds (VOC) of not more than 3.5 lbs/gallon after thinning.
- K. Colors, where not specified, shall be as selected by the County or their Representative.
- L. All coatings in contact with potable water need to be NSF Certified in accordance with ANSI/NSF Standard 61.
- M. All above ground potable water mains and appurtenances shall be painted safety blue.

PART 3 EXECUTION

3.01 INSPECTION OF SURFACES

- A. Before application of the prime coat and each succeeding coat, all surfaces to be coated shall be subject to inspection by the County. Any defects or deficiencies shall be corrected by the Contractor before application of any subsequent coating.
- B. Samples of surface preparation and of painting systems shall be furnished by the Contractor to be used as a standard throughout the job, unless omitted by the County.
- C. When any appreciable time has elapsed between coatings, previously coated areas shall be carefully inspected by the County, and where, in his opinion, surfaces are damaged or contaminated, they shall be cleaned and recoated at the Contractor's expense. Recoating times of manufacturer's printed instructions shall be adhered to.
- D. Coating thickness shall be determined by the use of a properly calibrated "Nordson-Mikrotest" "Positest" Coating Thickness Gauge (or equal) for ferrous metal or an OG232 "Tooke" Paint Inspection gauge (or equal) for non-ferrous and cementitious surfaces. Please note that use of the "Tooke" gauge is classified as a destructive test.

3.02 SURFACE PREPARATION

- A. The surface shall be cleaned as specified for the paint system being used. All cleaning shall be as outlined in the Society for Protective Coatings (SSPC) Surface Preparation Specification, And the International Concrete Repair Institute (ICRI) unless otherwise noted. If surfaces are subject to contamination, other than mill scale or normal atmospheric rusting, the surfaces shall be pressure washed, and acid or caustic pH residues neutralized, in addition to the specified surface preparation.

3.03

STANDARDS FOR SURFACE PREPARATION

- A. Chemical and/or Solvent Cleaning: Remove all grease, oil, salt, acid, alkali, dirt, dust, wax, fat, foreign matter and contaminants, etc. by one of the following methods: steam cleaning, alkaline cleaning, or volatile solvent cleaning.
- B. Hand Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by hand chipping, scraping, sanding and wire brushing.
- C. Power Tool Cleaning: Removal of loose rust, loose mill scale and loose paint to a clean sound substrate by power tool chipping, descaling, sanding, wire brushing and grinding.
- D. Flame Cleaning: Dehydrating and removal of rust, loose mill scale and some light mill scale by use of flame, followed by wire brushing.
- E. White Metal Blast Cleaning: Complete removal of all mill scale, rust, rust scale, previous coating, etc., leaving the surface a uniform gray-white color.
- F. Commercial Grade Blast Cleaning: Complete removal of all dirt, rust scale, mill scale, foreign matter and previous coating, etc., leaving only shadows and/or streaks caused by rust stain and mill scale oxides. At least 66% of each square inch of surface area is to be free of all visible residues, except slight discoloration.
- G. Brush-Off Blast Cleaning: Removal of rust scale, loose mill scale, loose rust and loose coatings, leaving tightly-bonded mill scale, rust and previous coatings. On concrete surfaces, brush-off blast cleaning shall remove all laitance, form oils and solid contaminants. Blasting should be performed sufficiently close to the surface so as to open up surface voids, bugholes, air pockets and other subsurface irregularities, but so as not to expose underlying aggregate.
- H. Pickling: Complete removal of rust and mill scale by acid pickling, duplex pickling or electrolytic pickling (may reduce the resistance of the surface to corrosion, if not to be primed immediately).
- I. Near-White Blast Cleaning: Removal of all rust scale, mill scale, previous coating, etc., leaving only light stains from rust, mill scale and small specks of previous coating. At least 95% of each square inch of surface area is to be free of all visible residues and the remainder shall be limited to slight discoloration.
- J. Power Tool Cleaning to Bare Metal: Complete removal of rust, rust scale, mill scale, foreign matter and previous coatings, etc., to a standard as specified on a Commercial Grade Blast Cleaning (SSPC-SP-6, NACE-3) by means of power tools that will provide the proper degree of cleaning and surface profile.
- K. Surface Preparation of Concrete (SSPC-SP13)
- L. Visual standards "Pictorial Surface Preparation Standards for Painting Steel Surfaces", and the National Association of Corrosion Engineer, "Blasting Cleaning Visual Standards" TM-01-70 and TM-01-75 shall be considered as standards for proper surface preparation.

- M. Oil, grease, soil, dust, etc., deposited on the surface preparation that has been completed shall be removed prior to painting according to Solvent Cleaning under this Specification.
- N. Weld flux, weld spatter and excessive rust scale shall be removed by Power Tool Cleaning as per these Specifications.
- O. All weld seams, sharp protrusions and edges shall be ground smooth prior to surface preparation or application of any coatings.
- P. All areas requiring field welding shall be masked off prior to shop coating, unless waived by the County.
- Q. All areas which require field touch-up after erection, such as welds, burnbacks, and mechanically damaged areas, shall be cleaned by thorough Power Tool as specified in these Specifications.
- R. Touch-up systems will be same as original specification except that approved manufacturer's organic zinc-rich shall be used in lieu of inorganic zinc where this system was originally used. Also, strict adherence to manufacturer's complete touch-up recommendations shall be followed. Any questions relative to compatibility of products shall be brought to the County's attention; otherwise, Contractor assumes full responsibility.

3.03 PRETREATMENTS

- A. When specified, the surface shall be pretreated in accordance with the specified pretreatment prior to application of the prime coat of paint.

3.04 STORAGE

- A. Materials shall be delivered to the job site in the original packages with seals unbroken and with legible un mutilated labels attached. Packages shall not be opened until they are inspected by the County and required for use. All painting materials shall be stored in a clean, dry, well-ventilated place, protected from sparks, flame, direct rays of the sun or from excessive heat. Paint susceptible to damage from low temperatures shall be kept in a heated storage space when necessary. The Contractor shall be solely responsible for the protection of the materials stored by himself at the job site. Empty coating cans shall be required to be neatly stacked in an area designated by the County and removed from the job site on a schedule determined by the County. County may request a notarized statement from Contractor detailing all materials used on the Project.

3.05 PREPARATION OF MATERIALS

- A. Mechanical mixers, capable of thoroughly mixing the pigment and vehicle together, shall mix the paint prior to use where required by manufacturer's instructions; thorough hand mixing will be allowed for small amounts up to one gallon. Pressure pots shall be equipped with mechanical mixers to keep the pigment in suspension, when required by manufacturer's instructions. Otherwise, intermittent hand mixing shall be done to assure that no separation occurs. All mixing shall be done in accordance with SSPC Vol. 1, Chapter 4, "Practical Aspects, Use and Application

of Paints" and/or with manufacturer's recommendations.

- B. Catalysts or thinners shall be as recommended by the manufacturer and shall be added or discarded strictly in accordance with the manufacturer's instruction.

3.06 APPLICATION

- A. Paint shall be applied only on thoroughly dry surfaces and during periods of favorable weather, unless otherwise allowed by the paint manufacturer. Except as provided below, painting shall not be permitted when the atmospheric temperature is below 50 deg F, or when freshly painted surfaces may be damaged by rain, fog, dust, or condensation, and/or when it can be anticipated that these conditions will prevail during the drying period.
- B. No coatings shall be applied unless surface temperature is a minimum of 5 Degrees above dew point; temperature must be maintained during curing.
- C. See coating schedule for actual coating systems to be used on this project.

3.07 DEW POINT CALCULATION CHART

DEW POINT CALCULATION CHART

Ambient Air Temperature - Fahrenheit

Relative Humidity	20	30	40	50	60	70	80	90	100	110	120
90%	18	28	37	47	57	67	77	87	97	107	117
85%	17	26	36	45	55	65	76	84	95	104	113
80%	16	25	34	44	54	63	73	82	93	102	110
75%	15	24	33	42	52	62	71	80	91	100	108
70%	13	22	31	40	50	60	68	78	88	96	105
65%	12	20	29	38	47	57	66	76	85	93	103
60%	11	20	27	36	45	55	64	73	83	92	101
55%	9	17	25	34	43	53	61	70	80	89	98
50%	6	15	23	31	40	50	59	67	77	86	94
45%	4	13	21	29	37	47	56	64	73	82	91
40%	1	11	18	26	35	43	52	61	69	78	87
35%	-2	8	16	23	31	40	48	57	65	74	83

SURFACE TEMPERATURE AT WHICH CONDENSATION OCCURS

Dew Point

Temperature at which moisture will condense on surface. No coatings should be applied unless surface temperature is a minimum of 5deg above this point. Temperature must be maintained during curing.

Example

If air temperature is 70 deg F and relative humidity is 65%, the dew point is 57 deg F. No coating should be applied unless surface temperature is 62 deg F minimum.

- A. No coating shall be applied unless the relative humidity is below 85%.
- B. Suitable enclosures to permit painting during inclement weather may be used if provisions are made to control atmospheric conditions artificially inside the enclosure, within limits suitable for painting throughout the painting operations.
- C. Field painting in the immediate vicinity of, or on, energized electrical and rotating equipment, and equipment and/or pipes in service shall not be performed without the approval of the County.
- D. Extreme care shall be exercised in the painting of all operable equipment, such as valves, electric motors, etc., so that the proper functioning of the equipment will not be affected.
- E. The Contractor's scaffolding shall be erected, maintained and dismantled without damage to structures, machinery, equipment or pipe. Drop cloths shall be used where required to protect buildings and equipment. All surfaces required to be clear for visual observation shall be cleaned immediately after paint application.
- F. Painting shall not be performed on insulated pipe within three (3) feet of insulation operations or on insulation whose covering, and surface coat have not had time to set and dry. Painting shall not be performed on uninsulated pipe within one (1) foot of any type of connection until the connection has been made, except as directed by the County.
- G. The prime coat shall be applied immediately following surface preparation and in no case later than the same working day. All paint shall be applied by brushing, paint mitt and roller, conventional spraying, or airless spraying, using equipment approved by the paint manufacturer.
- H. Each coat of paint shall be recoated as per manufacturer's instructions. Paint shall be considered recoatable when an additional coat can be applied without any detrimental film irregularities such as lifting or loss of adhesion.
- I. Surfaces that will be inaccessible after assembly shall receive either the full specified paint system or three shop coats of the specified primer before assembly.
- J. Finish colors shall be in accordance with the COLOR SCHEDULE and shall be factory mixed (i.e., there shall be no tinting by the Contractor, unless authorized by the County).
- K. All edges and weld seams in immersion service shall receive a "stripe coat" (applied by brush) of the 2nd coat prior to application of the full 2nd coat.
- L. All open seams in the roof area of tanks shall be filled after application of the topcoat with a flexible caulking such as Sika Flex 1A.

3.08 WORKMANSHIP

- A. The Contractor must show proof that all employees associated with this Project shall have been employed by the Contractor for a period not less than six (6) months.
- B. Painting shall be performed by experienced painters in accordance with the recommendations of the paint manufacturer. All paint shall be uniformly applied without sags, runs, spots, or other blemishes. Work which shows carelessness, lack of skill, or is defective in the opinion of the County, shall be corrected at the expense of the Contractor.
- C. The Contractor shall provide the names of at least three other projects of similar size and scope that they have successfully completed under their current company name.

3.09 APPLICATION OF PAINT

- A. By Brush and/or Rollers
 - 1. Top quality, properly styled brushes and rollers shall be used. Rollers with a baked phenol core shall be utilized.
 - 2. The brushing or rolling shall be done so that a smooth coat as nearly uniform in thickness as possible is obtained. Brush or roller strokes shall be made to smooth the film without leaving deep or detrimental marks.
 - 3. Surfaces not accessible to brushes or rollers may be painted by spray, by dauber or sheepskins, and paint mitt.
 - 4. It may require two coats to achieve the specified dry film thickness if application is by brush and roller.
- B. Air, Airless or Hot Spray
 - 1. The equipment used shall be suitable for the intended purpose, shall be capable of properly atomizing the paint to be applied and shall be equipped with suitable pressure regulators and gauges.
 - 2. Paint shall be applied in a uniform layer, with a 50% overlap pattern. All runs and sags should be brushed out immediately or the paint shall be removed and the surface resprayed.
 - 3. High build coatings should be applied by a cross-hatch method of spray application to ensure proper film thickness of the coating.
 - 4. Areas inaccessible to spray shall be brushed; if also inaccessible to brush, daubs or sheepskins shall be used, as authorized by the manufacturer.
 - 5. Special care shall be taken with thinners and paint temperatures so that paint of the correct formula reaches the receiving surface.
 - 6. Nozzles, tips, etc., shall be of sizes and designs as recommended by the manufacturer of the paint being sprayed.
 - 7. The first coat on concrete surfaces in immersion service should be sprayed and back rolled.

3.10 PROTECTION AND CLEANUP

- A. It shall be the responsibility of the Contractor to protect at all times, in areas where

painting is being done, floors, materials of other crafts, equipment, vehicles, fixtures, and finished surfaces adjacent to paint work. Cover all electric plates, surface hardware, nameplates, gauge glasses, etc., before start of painting work.

- B. At the option of the County during the course of this project, the Contractor will contain all spent abrasives, old paint chips, paint overspray and debris by means suitable to the County, including, but not limited to, full shrouding of the area.
- C. If shrouding is required, the Contractor must provide a complete design of the intended shroud or cover. Care must be taken not to modify or damage the structure during the use of the shroud. If damage should occur, the Contractor is held responsible for all repairs.
- D. At completion of the work, remove all paint where spilled, splashed, spattered, sprayed or smeared on all surfaces, including glass, light fixtures, hardware, equipment, painted and unpainted surfaces.
- E. After completion of all painting, the Contractor shall remove from job site all painting equipment, surplus materials and debris resulting from this work.
- F. The Contractor is responsible for the removal and proper disposal of all hazardous materials from the job site in accordance with Local, State and Federal requirements as outlined by the Environmental Protection Agency.
- G. A notarized statement shall be presented to the County that all hazardous materials have been disposed of properly including, but not limited to: name of disposal company, disposal site, listing of hazardous materials, weights of all materials, cost per pound and EPA registration number.

3.11 TOUCH-UP MATERIALS

- A. The Contractor shall provide at the end of the Project at least one (1) gallon of each generic topcoat in each color as specified by the County for future touch-up. Two gallons may be required for (2) component materials.

3.12 ON-SITE INSPECTION

- A. During the course of this Project, the County will reserve the option of incorporating the services of a NACE Level III inspection service. The inspection service will be responsible for assuring the proper execution of this Specification by the successful Contractor.

3.13 STEEL - STRUCTURAL, TANKS, PIPES AND EQUIPMENT

- A. EXTERIOR EXPOSURE (NON-IMMERSION)

- 1. System No. 1095-1: Epoxy/High Build Urethane

- This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. Second coat to be close to finish color but not the same color. This system should be used for above ground exterior steel

surfaces that are neither submerged, nor buried.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 66HS-1211 Epoxoline Primer	3.0 - 4.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 1095-Endura-Shield III	<u>2.0 - 3.0</u>
Dry Film Thickness	7.0 - 10.0
Minimum	8.0 Mils

2. System No. 1095-2: High Build Urethane for Marginally Cleaned Surfaces or Topcoating Existing System

This system can be used over factory finish paint or cover non-sandblasted steel and offer the high performance of a urethane coating. Specify Series 1074U Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning or SSPC-SP3 Power Tool Cleaning

Shop Coat: Manufacturer Standard Primer (or existing coating)	3.0-5.0
2nd Coat: 135 Chembuild	3.0 - 5.0
3rd Coat: 1095-Color Endura-Shield	<u>2.0 - 3.0</u>
Dry Film Thickness	8.0 - 13.0
Minimum	9.5 Mils

4. System 90-97: Zinc/Epoxy/Urethane

This system offers the added corrosion protection of a zinc rich primer. Series 90-97 Tneme-Zinc is an organic zinc-rich primer that can be used for field touch up of a zinc primer or for touch up of galvanized surfaces that are damaged.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 90-97 Tneme-Zinc	2.5 - 3.5
2nd Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 1095 Endurashield	<u>2.0 - 3.0</u>
Dry Film Thickness	6.5 - 9.5
Minimum	8.0 Mils

B. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No.66HS-1: High Build Epoxy

This system will provide chemical and corrosion resistance against abrasion, moisture, corrosion fumes, chemical contact and immersion in non-potable water. Primer coat must be touched-up before second coat is applied. Substitute Series 161HS for low temperature cure or quick recoats. Use this system for interior exposed, non submerged metals.

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Shop Coat: 66HS-1211 Epoxoline Primer	3.0 - 5.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	<u>4.0 - 6.0</u>
Dry Film Thickness	7.0 - 11.0
Minimum	9.0 Mils

2. System No. 66HS-2: High Build Epoxy (Over OEM Finishes)

This system is to be used over standard manufacturer's primer to offer a high performance epoxy finish. Excellent for areas of rust not able to be completely cleaned.

Surface Preparation: Spot SSPC-SP6 Commercial Blast Cleaning or SSPC- SP11 Power Tool Cleaning to Bare Metal

Shop Coat: Manufacturer's Standard (or existing coating)	1.0 - 2.0
2nd Coat: 27WB	2.5 - 4.0
3rd Coat: 66HS-Color Hi-Build Epoxoline	<u>2.0 - 4.0</u>
Dry Film Thickness	5.5 - 10.0
Minimum	7.0 Mils

C. IMMERSION

1. System No. 104-1: High Solids Epoxy (Non-Potable Water)

This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion in *mild to moderate* Wastewater, such as clarifiers, chlorine contact basins, aeration basins, settling basins and other open top (aerobic) structures. Primer coat must be touched-up before second coat is applied. Scarify the surface before topcoating if the Series 66HS has been exterior-exposed for 60 days or longer. Substitute Series 161HS for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat: 66HS-1211 Epoxoline Primer	3.0 - 5.0
2nd Coat: 104-Color Hi-Build Epoxoline	6.0-8.0
3rd Coat: 104-Color Hi-Build Epoxoline	<u>6.0-8.0</u>
Dry Film Thickness	15.0 - 21.0
Minimum	11.0 Mils

2. System No. 20HS-1: Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside Paint System Number 1. Series 20HS meets the new requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61. Substitute Series FC20HS for low temperature cure or quick recoats.

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning

Shop Coat:20HS-WH02 Pota-Pox (Tank White)	3.0 - 5.0
2nd Coat: 20HS-1255 Pota-Pox (Beige)	4.0 - 6.0
3rd Coat: 20HS-WH02 Pota-Pox (Tank White)	<u>4.0 - 6.0</u>
Dry Film Thickness	11.0 - 17.0
Minimum	12.0 Mils

3.14 OVERHEAD METAL DECKING, JOIST

A. INTERIOR EXPOSURE

System No. 115-1: Uni-Bond

This system should be used on ceiling areas where a one-coat system is desired. Can be applied over steel, galvanized and aluminum decking, joist, shop primed beams, conduits and concrete.

Surface Preparation: Surfaces must be dry, clean and free of oil, grease and other contaminates. Allow concrete to cure 28 days.

Coating:	115-Color Uni-Bond
Dry Film Thickness	2.5 - 4.0

B. EXTERIOR EXPOSURE

System No. 1029-1: Enduratone

This system can be applied over a wide variety of coatings and factory finishes. It can also be applied direct to galvanized aluminum decking, joists, & conduits

Surface Preparation: Pressure clean to remove all dirt, oil, grease, chemicals and foreign contaminates. Remove loose paint and all rust by hand and power tool cleaning (SSPC-SP 2 & 3)

1st Coat:	1029-Color Endura-tone	2.0-3.0
2 nd Coat:	1029-Color Enduratone	<u>2.0-3.0</u>
	Dry Film Thickness	4.0-6.0

3.16 GALVANIZED STEEL - PIPE AND MISCELLANEOUS FABRICATIONS

A. EXTERIOR / (NON-IMMERSION)

System No. 1095-3: Epoxy/High Build Urethane

Series 66HS has excellent adhesion to galvanized steel. This system is highly resistant to abrasion, wet conditions, corrosive fumes and chemical contact. Provides 3-4 times the color and gloss retention of conventional paints. First coat to be same color as or close to the finish color. Specify Series 1074U Endura-Shield for gloss finish.

Surface Preparation: SSPC-SP1 Solvent Cleaning, followed by Sweep Abrasive

Blasting (SSPC-SP7)

1st Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 1095-Color Endura-Shield	<u>2.0 - 4.0</u>
Dry Film Thickness	4.0 - 8.0
Minimum	5.0 Mils

B. INTERIOR EXPOSURE (NON IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE

System No. 66HS-3: Polyamide Epoxy

Surface Preparation: SSPC-SP1 Solvent Cleaning

1st Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 4.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	<u>2.0 - 4.0</u>
Dry Film Thickness	4.0 - 8.0
Minimum	5.0 Mils

3.18 CONCRETE

A. EXTERIOR - ABOVE GRADE

1. System No. 1026-1: Acrylic Emulsion Low Sheen

If semi-gloss finish is desired, use Series 1029 Tneme-Cryl SG as the second coat.

Surface Preparation: Allow new concrete to cure for 28 days. Surface must be clean and dry.

1st Coat: 1026-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 1026-Color Tneme-Cryl	<u>2.0 - 3.0</u>
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

2. System No. 156-1: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX (medium texture) For application over previously applied coatings, use TNEMEC Series 151 Elasto-Grip at 1.0 - 2.5 mils DFT prior to the application of Series 156 Enviro-Crete.

Surface Preparation: Surface must be clean and dry.

1st Coat: 156-Color Enviro-Crete	4.0 - 8.0
2nd Coat: 156-Color Enviro-Crete	<u>4.0 - 8.0</u>
Dry Film Thickness	8.0 - 16.0
Minimum	10.0 Mils

B. EXTERIOR - BELOW GRADE

1. System No. 46-31: Coal Tar-Epoxy

Surface Preparation: Surface shall be clean and dry.

One Coat:	46H-413 Hi-Build Tneme-Tar
Dry Film Thickness	14.0 - 20.0

C. EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 1026-2: Acrylic Emulsion, Low Sheen (Interior/Exterior)

This system will provide a decorative coating with good exterior durability, color retention, and a high vapor transmission rate. ***For Semi-Gloss finish, use 1029-Color Tneme-Cryl S/G.***

Surface Preparation: Surface shall be clean and dry. Allow concrete to cure for 28 days.

Block Filler (CMU only): 1254 Epoxoblock	125 SF/GL
1st Coat: 1026-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 1026-Color Tneme-Cryl	<u>2.0 - 3.0</u>
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

*Does not include Block Filler

2. System No. 66HS-4: Epoxy-Polyamide (Interior)

Series 66HS provides excellent protection from abrasion, moisture, corrosive fumes and chemical contact..

Surface Preparation: Surfaces shall be clean and dry. Allow concrete to cure for 28 days. All surfaces must be clean and dry.

Block Filler (CMU only): 1254 Epoxoblock	125 SF/GL
1st Coat: 66HS-Color Hi-Build Epoxoline	3.0 - 5.0
2nd Coat: 66HS-Color Hi-Build Epoxoline	<u>4.0 - 6.0</u>
Dry Film Thickness	7.0 -11.0*
Minimum	9.0 Mils

*(Does not include Block Filler)

D. IMMERSION - POTABLE & NON-POTABLE WATER

1. System No. 104-2: High Solids Epoxy (Non-Potable Water). This system will provide chemical and corrosion resistance for protection against abrasion, moisture, corrosive fumes, chemical contact and immersion in ***mild to moderate*** Wastewater, such as clarifiers, chlorine contact basins, aeration basins, settling basins and other open top (aerobic) structures.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: 104-1255 H.S. Epoxy Primer	6.0 - 8.0
2nd Coat: 104 Color H.S. Epoxy	<u>6.0 - 8.0</u>
3rd Coat: 104 Color H.S. Epoxy	6.0 - 8.0
Dry Film Thickness	18.0 - 240.0
Minimum	20.0 Mils

2. System No. 20HS-2 Epoxy-Polyamide (Potable Water)

This system meets American Water Works Association AWWA D 102 Inside System No. 1. Series 20HS meets the requirements of approval for potable water use as established by the National Sanitation Foundation Standard 61.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

1st Coat: 20HS-15BL Pota-Pox	4.0 - 6.0
2nd Coat: 20HS-1255 Pota-Pox Finish	<u>4.0 - 6.0</u>
3rd Coat: 20HS -15BL	4.0 - 6.0
Dry Film Thickness	12.0 - 17.0
Minimum	13.0 Mils

E. INTERIOR EXPOSURE (NON-IMMERSION)

1. System No. 66HS-5: High Solids Epoxy

This system will produce a slick, tile-like finish that has excellent chemical and water resistance. Surface will be easy to clean.

Surface Preparation: Allow new concrete to cure for at least 28 days. Surface to be clean and dry.

1st Coat: 66HS-Color H.S. Epoxy	6.0 - 8.0
2nd Coat: 66HS-Color H.S. Epoxy	<u>6.0 - 8.0</u>
Dry Film Thickness	12.0 - 16.0
Minimum	14.0 Mils

2. System No. 113-1: Acrylic-Epoxy Semi-Gloss

This system will provide high performance and can be applied directly over existing coatings without lifting. Can be used when low odor is required during application. Specify Series 114 Tneme-Tufcoat for Gloss Finish.

Surface Preparation: Allow new concrete to cure for at least 28 days. Surface must be clean and dry.

One or Two Coats:	113-Color Tneme-Tufcoat
Dry Film Thickness	4.0 - 6.0

3.19 CONCRETE FLOORS

A. EPOXY FLOOR COATINGS

1. System No. 290-1: Epoxy- Chemical Resistant Urethane

This system will provide a durable, long-wearing coating that bonds tightly to concrete and stands up under heavy foot traffic, frequent cleaning, spillage of water, oil, grease, or chemical, and UV Exposure.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade or Sweep Abrasive Blast Cleaning

Moisture vapor transmission should not exceed three lbs per 1,000 sq ft in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.")

Note: For moisture content up to 10 lbs per 1,000 sq ft or relative humidity up to 90%, Series 208 may be substituted for Series 201 as the primer.

1st Coat: 201- Epoxoprime	5.0-7.0
2nd Coat: 237-Color Tneme-Glaze	8.0-10.0
3 rd Coat: 290 CRU	2.0 - 3.0
Dry Film Thickness	15.0 - 20.0
Minimum	17.0 Mills

For a non-skid finish, broadcast 30-50 mesh clean, dry silica sand into the 2nd coat at a rate of 5 lbs per 150 square feet.

2. System No. 241/222: Decorative Quartz Flooring (Non-Slip)

This system provides a decorative, chemical, abrasion, impact resistant, non-slip, seamless flooring system with a moisture mitigating base coat that resists up to 20 lbs of moisture vapor pressure.

Surface Preparation: Allow new concrete to cure for 28 days. Mechanically abrade or Sweep abrasive Blast to provide a minimum surface profile equal to ICRI CSP3

1st Coat: 241 Ultra-Tread MVT	70 square feet per small kit
2nd Coat: 222 Deco-Tread	(1 ct. @ 1/16" ea.)
3rd Coat: 284 Tneme-Glaze (clear)	<u>8.0 - 12.0</u>
Minimum Dry Film Thickness	1/8"+

3.20 POROUS MASONRY

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 156-2: Modified Epoxy - Sand Texture

Modified Waterborne Acrylate. This system offers long term protection against wind-driven rain, mold/mildew growth, chalking & fading, and bridges hairline cracks.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 157-Color Envirocrete	6.0 - 9.0
2nd Coat: 157 Envirocrete	6.0 - 9.0
Dry Film Thickness	12.0 -18.0
Minimum DFT:	14.0 mils

2. System No. 104-3: High Solids Epoxy (Interior Only)

This system will produce a film thickness of 16 mils. The surface will be tile-like for easy cleaning and will provide protection against chemical attack, corrosive fumes, high humidity and wash down. Backroll first coat to fill porosity.

Surface Preparation: Surface to be clean and dry.

1st Coat: 104-Color H.S. Epoxy	8.0 - 10.0
2nd Coat: 104-Color H.S. Epoxy	<u>8.0 - 10.0</u>
Dry Film Thickness	16.0 - 20.0
Minimum	18.0 Mils

3. System No. 113-2: Acrylic-Epoxy Semi-Gloss (Interior Only)

Series 113 Tneme-Tufcoat has very low odor and can be used when painting in occupied areas.

Specify Series 114 Tneme-Tufcoat for a gloss finish.

Surface Preparation: Surface must be clean and dry.

1st Coat: 1254 Epoxoblock WB	125 SF/Gal
2nd Coat: 113-Color Tneme-Tufcoat*	<u>4.0 - 6.0</u>
	**4.0 - 6.0

- * *Two coats may be required if applied by roller*
- ** *Total Dry Film Thickness of Topcoats Only*

4. System No. 156-3: Modified Acrylic Elastomer

If texture is needed, use 157 Enviro-Crete TX For application over previously applied coatings, use TNEMEC 151 Elasto-Grip at 1.0 - 2.5 mils DFT in lieu of Series 1254.

Surface Preparation: Surfaces must be clean and dry.

1st Coat: 1254 Epoxoblock WB	125 SF/Gal
2nd Coat: 156-Color Enviro-Crete	4.0 - 8.0
3rd Coat: 156-Color Enviro-Crete	<u>4.0 - 8.0</u>
Dry Film Thickness	8.0 - 16.0
Minimum	10.0 Mils

3.21 GYPSUM WALLBOARD

A. INTERIOR EXPOSURE

1. System No. 113-3: Acrylic-Epoxy

Surface Preparation: Surface must be clean and dry.

1st Coat: 51PVA Sealer	1.0 - 2.0
2nd Coat: 113 H.B. Tneme-Tufcoat*	<u>4.0 - 5.0</u>
Dry Film Thickness	5.0 - 7.0
Minimum	6.0 Mils

*Two coats may be required if application is by brush and roller.

2. System No. 66HS-5: Hi-Build Epoxoline

Surface Preparation: Surface must be clean and dry.

1st Coat: 51PVA Sealer	1.0 - 2.0
2nd Coat: 66HS-Color Hi-Build Epoxoline*	<u>4.0 - 6.0</u>
Dry Film Thickness	5.0 - 8.0
Minimum	5.0 Mils

*Two coats may be required if applied by roller

3. System No. 1026--3: Acrylic Emulsion, Low Sheen (Interior/Exterior Exposure)

This system is designed for mild use areas like office walls, laboratory ceilings, stairwells, etc. For Semi-Gloss finish, use 1029-color Tneme-Cryl S/G.

Surface Preparation: Surface must be dry and clean.

1st Coat: 1026-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 1026-Color Tneme-Cryl	<u>2.0 - 3.0</u>
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.22 WOOD

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 1029-2: Acrylic Emulsion Semi-Gloss

Specify Series 1028 Hi-Build Tneme-Gloss for High Gloss finish.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 10-99W Undercoater	2.0 - 3.0
2nd Coat: 1029 Enduratone	1.5 - 3.5
3rd Coat: 1029 Enduratone	<u>1.5 - 3.5</u>
Dry Film Thickness	5.0 - 10.5
Minimum	6.0 Mils

3.23 PVC PIPE

A. EXTERIOR OR INTERIOR

System No. 1095-4: Acrylic Polyurethane

Surface Preparation: SSPC-SP1 followed by hand or power sanding to scarify / degloss surface.

Two Coats: 1095 Endurashield
 Dry Film Thickness 2.0-3.0 mils per coat.

3.24 INSULATED PIPE

A. INTERIOR EXPOSURE

System No. 1026-4: Acrylic Emulsion, Low Sheen

For semi-gloss finish, use 1029-Color Tneme-Cryl S/G.

Surface Preparation: Surface shall be clean and dry.

1st Coat: 1026-Color Tneme-Cryl	2.0 - 3.0
2nd Coat: 1026-Color Tneme-Cryl	<u>2.0 - 3.0</u>
Dry Film Thickness	4.0 - 6.0
Minimum	5.0 Mils

3.25 HIGH HEAT COATING

A. EXTERIOR/INTERIOR EXPOSURE

1. System No. 1528-1: Inert Multipolymeric Matrix (1200 deg F Maximum)

Surface Preparation: SSPC-SP10 Near-White Blast Cleaning - 1.5 Mil Surface Profile

1st Coat: 1528-Color Endura-Heat DTM	2.0 - 4.0
2nd Coat: 1528-Color Endura-Head DTM	<u>2.0 - 4.0</u>
Dry Film Thickness	4.0-6.0

B. CEMENTITIOUS SURFACES

2. System No. 434-1: Polyamine Epoxy Mortar system

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Apply Tnemec Series 218 to all surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

1st Coat: 434 Perma-Shield	125 mils
2nd Coat: 435 Perma-Glaze	<u>18.0 - 20.0</u>
Dry Film Thickness	143 -145
Minimum	144.0

B. FERROUS METAL SURFACES

System No. 142-1: Flake /Aluminum Oxide Filled Polyamine Epoxy

Surface Preparation: SSPC-SP-10
Near White Metal Blast Cleaning (1.5 Mil Profile)

1st Coat: Series 1 Omnithane	2.5 - 3.5
2nd Coat: 142 Epoxoline	<u>14 - 18.0</u>
Dry Film Thickness	16.0 - 23.5.0
Minimum	20.0 Mils

3.27 EXTERIOR OF PRESTRESSED CONCRETE TANKS

A. System No. 156-4: New Tanks

Surface Preparation: Allow new concrete to cure for at least (3) days. Surface to be clean and dry.

1st Coat: 156-Color Envirocrete	4.0 - 6.0
2nd Coat: 156-Color Envirocrete	<u>4.0 - 6.0</u>
Dry Film Thickness	8.0 - 12.0
Minimum	10.0 Mills

B. System No. 156-5: Existing Tanks (Previously Painted)

Surface Preparation: Remove all dirt, oil, grease, chalk, and loose paint per high pressure water blast (min. 3500 psi).

1st Coat: 151 Elasto-Grip	1.0 - 2.5
Stripe Coat: Stripe all hairline cracks with a brushed coat of Series 156 Envirocrete	3.0 - 5.0
Topcoat: 156-Envirocrete	<u>4.0 - 6.0</u>
Dry Film Thickness (Cracks)	8.0 - 13.5
Dry Film Thickness (Other)	5.0 - 8.5

3.28 **SECONDARY CONTAINMENT AREAS**

A. **System No. 239SC-1: Modified Novolac Epoxy**

This system offers superior chemical resistance to a wide range of aggressive chemicals, including Sulfuric Acid, Hydrofluosilicic Acid, Sodium Hydroxide, Sodium Hypochlorite, Polymer Emulsion, and hydrocarbons.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Moisture vapor transmission should not exceed three lbs per 1,000 sq ft in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.") Note: For moisture content up to 10 lbs per 1,000 sq ft or relative humidity up to 90%, Series 241 may be substituted for the primer. Refer to the Series 241 product data sheet for more information.

Apply Tnemec Series 218 to all vertical surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, and to create a monolithic, paintable surface.

Apply Tnemec Series 215 or 218 as needed to fill voids in horizontal surfaces.

Primer: Tnemec Series 239SC RCK	6.0-8.0
Basecoat: Tnemec Series 239SC MCK	60.0-80.0
Fiberglass Mat: Tnemec Series 211-0215SC	NA
Saturant Coat: Tnemec Series 239SC RCK	10.0 - 12.0
Top Coat: Tnemec Series 282	<u>8.0 - 10.0</u>
Dry Film Thickness	84.0 - 110.0

Notes:

1. See Tnemec's *Fiberglass Mat Reinforced Mortar Application Guide for System details*
2. *Series 282 is not color stable. For extended color and gloss retention, apply a finish coat of Tnemec Series 290 CRU @ 2.0-3.0 mils DFT*

B. System No. 61-1: Cycloaliphatic Amine Epoxy

This system offers superior resistance to gasoline, diesel fuel, and other hydrocarbons. Use TNEMEC Series 215 between coats as a filler and surfacer wherever it is required.

Surface Preparation: Allow new concrete to cure for 28 days. Sweep abrasive blast per SSPC-SP13 to remove all laitance, fines, curing compounds, form release oils, and other contaminants, and to establish a surface profile equal to ICRI CSP 5 or greater.

Moisture vapor transmission should not exceed three lbs per 1,000 sq ft in a 24 hour period. (Reference ASTM F 1869 "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride.") Relative humidity should not exceed 80%. (Reference ASTM F 2170 "Standard Test Method for Determining Relative Humidity in Concrete using in situ Probes.") Note: For moisture content up to 10 lbs per 1,000 sq ft or relative humidity up to 90%, Series 241 may be applied prior to the "Primer" coat. Refer to the Series 241 product data sheet for more information.

Apply Tnemec Series 218 to all **vertical** surfaces at a minimum of 1/16" to re-surface concrete, fill voids and bugholes, mitigate concrete outgassing, and to create a monolithic, paintable surface.

Apply Tnemec Series 215 or 218 as needed to fill voids in **horizontal** surfaces.

Primer: 61-5002 Tneme-Liner (Beige)	8.0 - 12.0
Topcoat: 61-5001 Tneme-Liner (Gray)	<u>8.0 - 12.0</u>
Dry Film Thickness	16.0 - 24.0

3.29 CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK

A. Silane /Siloxane Sealer (Min. 42% Solids)

Surface Preparation: Allow new concrete to cure 28 days. All surfaces must be clean, dry, and free of oils, curing compounds, form release oils, and other contaminants that might interfere with the penetration of the sealer.

COATING: BRICK, CONCRETE
Tnemec Series 662 Two Coats @ 75-200 SF/GAL

SPLIT FACED OR POROUS MASONRY
Tnemec Series 662 Two Coats @ 35-100 SF/GAL

3.31 CANAL PIPE (AERIAL) CROSSINGS

- A. System 701-1: NEW. Zinc/Epoxy/Fluoropolymer for New Pipe or Existing Pipe Requiring Removal of Existing Coatings

Surface Preparation: SSPC-SP6 Commercial Blast Cleaning

Primer: 90-97 Theme-Zinc	2.5 - 3.5
2nd Coat: 66HS-Color Hi-Build Epoxoline	2.0 - 3.0
3rd Coat: 701-Color Hydroflon	<u>2.0 - 3.0</u>
Dry Film Thickness	6.5 - 9.5
Minimum	8.0 Mils

- B. System No. 701-2: EXISTING. High Build, Semi- Gloss Fluoropolymer for Marginally Cleaned Surfaces or Topcoating Over Existing Systems

Surface Preparation: High Pressure Water Blast (min. 3500 psi) or Solvent Clean (SSPC-SP1) and Spot Hand or Power Tool Clean (SSPC-SP 2 - 3) or Brush Blast (SSPC-SP7). Existing coatings must be clean, dry and tightly adhering prior to application of coatings.

Spot Coat: 135-Color Chembuild	3.0 - 5.0
Prime Coat: 135-Color Chembuild	3.0 - 5.0
2nd Coat: 701-Color Hydroflon	<u>2.0 - 3.0</u>
Minimum Dry Film Thickness (NIC Spot Coat)?	6.0

3.32 PROJECT DESIGNER SYSTEMS REFERENCE GUIDE

- A. STEEL

EXTERIOR (NON-IMMERSION)

- A.1 System No. 1095-1-1: Epoxy/High Build Urethane
- A.2 System No. 1095-2: High Build Urethane
- A.4 System 90-97: Zinc/Epoxy/Urethane

INTERIOR EXPOSURE (NON-IMMERSION)

- B.1 System No. 66HS-1: High Solids Epoxy
- B.2 System No. 66HS-2: High Build Epoxy

IMMERSION

- C.1 System No. 104-1: High Solids Epoxy (Non-Potable)
- C.2 System No. 20HS-1: High Build Epoxy (Non-Potable)
- C.3

- B. OVERHEAD METAL DECKING, JOIST (INTERIOR EXPOSURE)

System No. 115-1: Uni-Bond

- C. OVERHEAD METAL DECKING, JOINT (EXTERIOR EXPOSURE)
 - System No. 1029-1 Enduratone
- D. GALVANIZED STEEL-PIPE AND MISCELLANEOUS FABRICATORS
 - System No. 1095-3: Epoxy/High Build Urethane
- E. GALVANIZED STEEL-INTERIOR EXPOSURE (NON-IMMERSION) AND ALUMINUM IN CONTACT WITH CONCRETE
 - System No. 66HS-3: Polyamide Epoxy
- F. CONCRETE
 - EXTERIOR-ABOVE GRADE
 - A.1 System No. 1026-1: Acrylic Emulsion Low Sheen
 - A.2 System No. 156-1: Modified Acrylic Elastomer
 - EXTERIOR-BELOW GRADE
 - B.1 System No. 46-61: Coal Tar Pitch Solution
 - B.3
 - EXTERIOR/INTERIOR EXPOSURE (NON-IMMERSION)
 - C.1 System No. 1026-2: Acrylic Emulsion Low Sheen
 - C.2 System No. 66HS-4: Epoxy-Polyamide
 - IMMERSION (POTABLE & NON-POTABLE)
 - D.1 System No. 104-2: High Solids Epoxy (Non-Potable)
 - D2 System No. 20HS-2: Epoxy Polyamide (Potable)
 - INTERIOR EXPOSURE (NON-IMMERSION)
 - E.1 System No. 66HS-5: High Solids Epoxy
 - E.2 System No. 113-1: Acrylic Epoxy Semi-Gloss
- G. CONCRETE FLOORS
 - A.1 System No. 290-1: Epoxy-Polyamide
 - A.5 System No. 241/222: Decorative / Functional Flooring (Non-Slip)
- H. POROUS MASONRY - EXTERIOR/INTERIOR EXPOSURE
 - A.1 System No. 156-2: Modified Epoxy-Sand Texture
 - A.2 System No. 104-3: High Solids Epoxy (Interior Only)
 - A.3 System No. 113-2: Acrylic Epoxy Semi-Gloss (Interior Only)
 - A.4 System No. 156-3: Modified Acrylic Elastomer

- I. GYPSUM WALLBOARD
 - A.1 System No. 113-3: Acrylic Epoxy
 - A.2 System No. 66HS-5: Hi-Build Epoxoline
 - A.3 System No. 1026-3: Acrylic Emulsion, Low Sheen

- J. WOOD EXTERIOR/INTERIOR EXPOSURE
 - A.1 System No. 1029-2: Acrylic Emulsion Semi-Gloss
 - A.2 System No. 6-5: Acrylic Latex

- K. PVC PIPE EXTERIOR/INTERIOR EXPOSURE
 - A.1 System No. 1095-5: Acrylic Polyurethane

- L. INSULATED PIPE-INTERIOR EXPOSURE
 - A.1 System No. 1026-4: Acrylic Emulsion, Low Sheen

- M. HIGH HEAT SURFACES-FERROUS METAL
 - A.1 System No. 1528-1: Silicone Aluminum (1200deg F Maximum)

- N. SURFACES EXPOSED TO H₂S/H₂SO₄ (SEVERE EXPOSURE/IMMERSION)
 - A.1 System No. 434-1: Polyamine Epoxy Mortar Systems
 - A.2 System No. 142-1: Flake / Aluminum Oxide Filled Polyamine Epoxy

- O. EXTERIOR OF PRESTRESSED CONCRETE TANKS
 - A. System 156-4 New Tanks
 - B. System 156-5: Existing Tanks (Previously Painted)

- P. SECONDARY CONTAINMENT AREAS
 - A. System No. 239SC-1: Modified Novolac Epoxy
 - B. System No. 61-1: Cycloaliphatic Amine Epoxy

- Q. CLEAR WATER REPELLENT FOR CONCRETE, MASONRY AND BRICK
 - A. Silane /Siloxane Sealer (Min. 42% Solids)

- R. CANAL PIPE (AERIAL) CROSSINGS
 - A. System No. 701-1: Zinc/Epoxy/Fluoropolymer
 - B. System No. 701-2: High Build/Fluoropolymer
 - C. Ductile Iron Pipe Above Grade: Series 66 High Build Epoxy

3.33

COATING SCHEDULE - TO BE DEVELOPED BY PROJECT AS NEEDED

END OF SECTION

SECTION 09970 SURFACE PROTECTION SPRAY SYSTEM

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. The Contractor shall furnish all labor, materials, equipment and incidentals required to install and test the coating system complete and ready for operation for the structures listed in the specifications and as shown on the Drawings.
- B. The work includes coating of all surfaces as shown and specified on the Drawings. This includes, but is not limited to stairs, walls, floors, concrete divider, concrete slabs, manholes wet wells, and all other work obviously required to be coated unless otherwise specified herein or on the Drawings. The omission of minor items in the Schedule of Work shall not relieve the Contractor of his obligation to include such items where they come within the general intent of the Specification as stated herein.

1.02 RELATED WORK

- A. Bypass pumping is the responsibility of the General Contractor.
- B. Concrete surface cleaning in each lift station is the responsibility of the General contractor.
- C. Removal and offsite disposal of rubble is the responsibility of the General Contractor.

1.03 SUBMITTALS

- A. Submit to the County shop drawings and schedules of all surfacing systems and appurtenances required. Submit design data and specification data sheets listing all parameters used in the surfacing system design and thickness calculations based on applicable provisions of ASTM.
- B. Submit to the County the name of the surfacing supplier, a list of materials to be furnished, and the qualification (per 1.05 A) of the application contractor.

1.04 REFERENCE STANDARDS

- A. American Society for Testing and Materials (ASTM)

ASTM D-638
ASTM D-790
- B. Where reference is made to one of the above standards, the revision in effect at the time of bid opening shall apply.

1.05 QUALIFICATIONS

- A. The Contractor performing the surfacing work shall be fully qualified, experienced

a minimum of seven years and equipped to complete this work expeditiously and in a satisfactory manner. The Contractor shall submit the following information to the County for review and approval before any surfacing work is performed.

1. The number of years of experience in performing this type of specialized work must be seven years minimum.
 2. Name of the surfacing manufacturer and supplier for this work and previous work listed below. The Contractor shall be an approved installer as certified and licensed by the surfacing manufacturer and equipment supplier.
 3. A list of clients that the Contractor has performed this type of work.
 - a. The list shall contain names and telephone numbers of persons who can be called to verify previous satisfactory performance.
 - b. Installation dates and a description of the actual work performed.
 - c. The surfacing manufacturer shall provide an installation list of his product used for similar sewer rehabilitation projects. The list shall provide the same information as required in paragraphs 3.a and 3.b above.
- B. The County reserves the right to approve or disapprove the Contractor, based on the submitted qualifications.

1.06 GUARANTEE

- A. All surfacing shall be guaranteed by the Contractor for a period of five years from the date of acceptance. During this period, all defects discovered in the surfacing, as determined by the County, shall be repaired or replaced in a satisfactory manner at no cost to the County, this shall include, but is not limited to, all work and costs associated with the shut down of any pump stations and all bypass operations needed for the proper repairs to be made.

1.07 QUALITY ASSURANCE

- A. All surfacing products shall be from a single manufacturer. The supplier shall be responsible for the provisions of all test requirements specified in ASTM Standards D-638 and D-790 as applicable.
- B. The Contractor shall employ specialty workers who have proven ability to perform the Work included herein. This will consist of a minimum of two years or two project experiences installing this product. This is a requirement for each and every employee.

1.08 DELIVERY, STORAGE AND HANDLING

- A. Care shall be taken in shipping, handling and placing to avoid damaging. Any material damaged in shipment shall be replaced as directed by the County.
- B. Any material showing deterioration, or which has been exposed to any other adverse storage condition that may have caused damage, even though no such damage can be seen, shall be marked as rejected and removed at once from the work.

PART 2 PRODUCTS

2.01 GENERAL

- A. The material sprayed onto the surface shall be a urethane resin system formulated for the application within a sanitary sewer environment. The urethane will exhibit suitable corrosion resistance to corrosive gases and fluids found within domestic sanitary sewage. Unless dictated by varying effluent, the spray system shall be a urethane and exhibit the cured physical strengths specified herein.
- B. When cured, the surface coating shall form a continuous, tight-fitting, hard, impermeable surfacing data which is suitable for sewer system service and chemically resistant to any chemicals or vapors normally found in domestic sewage.
- C. The surface shall be an integral part of the structure being rehabilitated after being placed and cured. The surface shall cover the complete interior of the existing structure. The surface shall provide a continuous watertight seal or barrier.
 - 1. The surface shall effectively seal the interior surfaces of the structure and prevent any penetration or leakage of groundwater infiltration.
 - 2. Provide water resistance data on surface based on ASTM Standards.
 - 3. The surface shall be compatible with the thermal conditions of existing sewer lift stations and manholes. Surface temperature will range from 30 to 80 degrees F. Provide test data on thermal compatibility based on ASTM Standards.

2.02 MATERIALS

- A. Approved materials include
 - 1. Aquatapoxy A-6 and Raven 405 epoxy by Raven Lining Systems
 - 2. Green Monster
 - 3. Sauereisen 210 system (210T & 210GL - Manatee County Light Brown Formula)
- B. Polyurethane spray application shall comply with the following specifications:

The cured urethane system shall conform to the minimum physical standards, as listed below. The long-term data is for a 50-year design life of the process.

<u>Cured Urethane</u>	<u>Standard</u>	<u>Long-Term Data</u>
Tensile Stress	ASTM D-638	5,000 psi
Flexural Stress	ASTM D-790	10,000 psi
Flexural Modulus	ASTM D-790	550,000 psi

- C. Epoxy spray application shall be 100% VOC free / 100% solids.

PART 3 EXECUTION

3.01 SURFACE PREPARATION

- A. The contractor shall clean each structure and shall dispose of any resulting material.
- B. All contaminants including: oils, grease, incompatible existing coatings, waxes, form release, curing compounds, efflorescence, sealers, salts, or other contaminants shall be removed.
- C. All concrete or mortar that is not sound or has been damaged by chemical exposure shall be removed to a sound concrete surface or replaced.
- D. Surface preparation method(s) should be based upon the conditions of the substrate, service environment and the requirements of the protective coating to be applied.
- E. Surfaces to receive protective coating shall be cleaned and abraded to produce a sound surface with adequate profile and porosity to provide a strong bond between the protective coating and the substrate. Generally, this can be achieved with a high pressure water cleaning using equipment capable of 5,000 psi at 4 gpm. Other methods such as abrasive blasting, shotblasting, grinding, scarifying or acid etching may also be used. Detergent water cleaning and hot water blasting may be necessary to remove oils, grease or other hydrocarbon residues from the concrete. Whichever method(s) are used, they shall be performed in a manner that provides a uniform, sound clean neutralized surface that is not excessively damaged.
- F. A concrete structure suitably prepared for coating shall have all loose, soft, discolored or otherwise deteriorated material removed from the manhole and the surface profile of the manhole shall be in accordance with ICRI Guidelines No. 03732. Expose aggregate and obtain a uniform surface texture resembling an ICRI - CPS (Concrete Surface Profile) #4-6. The County may use one or more of the following observations/tests to determine whether the manhole substrate has been properly cleaned and prepared:
 - 1. Visual appearance of the manhole - The prepared substrate shall have the appearance of sound concrete, free from discolored, white, chalky and cracked areas.
 - 2. Aural observations - When struck with a metal hammer or similar metal tool, the prepared substrate shall exhibit the characteristic sound of solid, competent concrete (or brick). Care should be taken not to fracture sound concrete.
 - 3. Mechanical abrasion tests - The substrate should be competent enough such that it cannot be scraped off with the claw of a hammer or similar metal tool.
 - 4. pH testing - The County may use wetted litmus paper applied to the surface of the substrate to ensure that the pH of the substrate is 7 or higher.
 - 5. Phenolphthalein testing - The County may apply a few drops of phenolphthalein to the surface of the concrete, which if the concrete is competent should yield a purple color.

- G. The County is not obligated to use all of the above tests, but may do so at the County's sole discretion. Often visual, mechanical and/or aural observations and tests alone will be adequate, but the pH and/or phenolphthalein tests may be used if there is still some uncertainty.
- H. If after cleaning, a new or existing manhole does not meet these requirements, the County shall have authority to require additional cleaning effort and/or increased blasting pressure as required to adequately prepare the manhole. If necessary, the County may also require acid etching of the concrete surface to create the desired texture. For existing manholes, the County may also require mechanical removal of deteriorated concrete or other substrate materials.
- I. A mild chlorine solution may be used to neutralize the surface to diminish microbiological bacteria growth prior to final rinse and coating system if approved by the Manufacturer's Representative.
- J. The time between structure cleaning and preparation activities and application of the first coating layer shall be within the coating manufacturer's recommendation.
- K. All infiltration shall be stopped by using a material which is compatible with and is suitable for topcoating with the specified protective coating.
- L. The area between the manhole and the manhole ring and any other area that might exhibit movement or cracking due to expansion and contraction, shall be grouted with a flexible grout or gel before surface coating spray application.
- M. All surfaces should be inspected by the Inspector during and after preparation and before the repair material is applied.
- N. No separate payment shall be made for any preparatory work required prior to application of the surface coating.

3.02 INSTALLATION

- A. The Contractor shall notify the Project Manager at least 48 hours in advance, giving the date, start time and estimated completion time for the work being conducted.
- B. The Contractor shall provide bypass pumping of sewage flows (as required) where and when the rehabilitation work is being performed. No flows will be permitted in the structure until the spray coating has properly cured to the manufacturer's specifications.
- C. The installation of the surface coating shall be in complete accordance with the applicable provisions of ASTM and the manufacturer's specifications. A representative of the manufacturer shall be present during the actual installation.
 - 1. Prior to placing the surface coating, the manufacturer's representative must approve the surface preparation work and installation conditions including temperatures.
 - 2. All surfaces shall be sufficiently smooth and even, to ensure good flow handling characteristics when complete.

- 3. All surfaces shall have the surface coating applied to the required thickness by spray application.
- D. Application procedures shall conform to the recommendations of the protective coating manufacturer, including material handling, mixing, environmental controls during application, safety, and spray equipment.
- E. The spray equipment shall be specifically designed to accurately ratio and apply the specified protective coating materials and shall be regularly maintained and in proper working order.
- F. The protective coating material must be spray applied by a Certified Applicator of the protective coating manufacturer.
- G. Polyurethane spray application shall be applied such that all surfaces shall be coated in accordance with the manufactures recommended thickness but not be less than 125 mils.
- H. Epoxy spray application shall be applied such that all surfaces shall be coated in accordance with the following:

- 1. Specified surfaces shall be coated by spray application of a moisture tolerant, solvent-free, 100% solids, epoxy protective coating as further described herein. Spray application shall be to a minimum wet film thickness in accordance with the following table or manufacturer's recommendation, whichever is greater:

Concrete, New/Smooth	80-100 mils for immersion, 60-80 mils for atmospheric, splash and spill exposure
Concrete, Rough	100-125+ mils
Masonry/Brick	125-150+ mils
Steel	16-80 mils for immersion, 16-40 mils for atmospheric, splash and spill exposure; also profile dependent
Fiberglass Systems	40-60 mils tack coat, 9 oz/yd ² fabric, 40-60 mils top coat. Varies with circumstances

- 2. Airless spray application equipment approved by the coating manufacturer shall be used to apply each coat of the protective coating. Air assisted spray application equipment may be acceptable, especially for thinner coats (<10 mils), only if the air source is filtered to completely remove all oil and water.
- 3. If necessary, subsequent topcoating or additional coats of the protective coating should occur as soon as the basecoat becomes tack free, ideally within 12 hours but no later than the recoat window for the specified products. Additional surface preparation procedures will be required if this

recoat window is exceeded.

3.03 FIELD TESTING AND ACCEPTANCE

- A. Field acceptance of surface coatings shall be based on the County's evaluation of the proper surfacing of the structure and the appropriate installation and curing test data along with review of the structure inspections.
- B. The surface coatings shall provide a continuous monolithic surfacing with uniform thickness throughout the structure interior. If the thickness of the coating surface is not uniform or is less than specified, it shall be repaired or replaced at no additional cost to the County.
 - 1. The County will measure the surface cured thickness from a specimen retrieved by the Contractor. The Contractor shall retrieve the specimen by physically cutting through the surfacing (by drilling or coring). There will be up to three thickness measurement locations in each structure. A suitable non-destructive type of thickness measurement may also be used.
 - 2. All the surface coating thickness measurement locations shall be repaired by the Contractor in accordance with the manufacturer's recommendations. These repairs shall be included in the five year surface coating guarantee.
- C. All pipe connections shall be open, clear, and watertight.
- D. There shall be no cracks, voids, pinholes, uncured spots, dry spots, lifts, delaminations or other type defects.
- E. If any defective surface coating is discovered after it has been installed, it shall be repaired or replaced in a satisfactory manner within 72 hours and at no additional cost to the County. This requirement shall apply for the entire five year guarantee period.

END OF SECTION

DIVISION 10 SPECIALTIES

SECTION 10520 FIRE EXTINGUISHERS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install fire extinguishers and the requisite wall mounting brackets at the locations shown on the Contract Drawings.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Fire extinguishers shall be 10 pound capacity, dry chemical type, rated for A, B and C Class fires. Extinguishers shall be red enamel painted steel cylinders with indicating gauge and shall be as manufactured by Larsen's Manufacturing Company, Fyr-Fyter Company, or County Fire Equipment Company.
- B. Brackets for wall mounting, as manufactured by extinguisher manufacturer, shall be furnished for all fire extinguishers.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Fire extinguishers and brackets shall be wall mounted.
- B. Mount brackets 4 feet 6 inches above finish floor with expansion bolts or toggle bolts into concrete blocks.

END OF SECTION

DIVISION 13 SPECIAL CONSTRUCTION

SECTION 13350A WET WELL CLEANING

PART 1 GENERAL

1.01 SCOPE

A. Description

The Contractor shall provide the necessary labor and equipment for the removal of waste generated from Sanitary Sewage Lift Station Wet Wells. Cleaning of the sewer wet wells will be conducted at the direction of the County.

B. Work Included

The successful bidder will provide services for the “total elimination” of the waste within the wet well. Cleaning shall include stopping the flow into the station, the physical removal of all floating material, grease/oil, organic compounds, bottom sediment, grit, and materials that have collected on the walls, floor, and all other extraneous materials within said wet wells, are cleaned from the lift station structure and all items within. Vacuum Trucks with the ability to remove the sludge, dirt, grease, etc. from the interior walls and bottom of the wet well.

1.02 EQUIPMENT

- A.** All cleaning machines must be capable of efficient, reliable operation. A high-pressure water washing or wet abrasive sand blasting, use 3500-psi water pressure, minimum. Remove dirt, oil, loose concrete, any previously applied coatings (except liners) or other deleterious materials.

1.03 CLEANING

- A.** Continue the cleaning procedures using pressure washing and/or mechanical methods until a uniform and sound profile is obtained. All contractors shall be expected to have and make available extension equipment on an as needed basis in order to properly clean deeper basins. Actual operation of equipment may need to be witnessed/verified by the inspector upon and prior to awarding a purchase order for this requirement.
- B.** The Removal and Disposal of all material from the Wet Wells is the responsibility of the Contractor. The cost for this shall be included in the bid price. No dumping or stock piling of these materials will be allowed at any of the lift stations.
- C.** The Contractor is fully responsible for compliance with all Federal, State, and local laws, including but not limited to the OSHA Confined Space Entry regulations.
- D.** Existing liner, control floats and/or pressure transmitters located in each wet well must be protected from damage by the Contractor during his/her operations. Any damage done to the liner, floats and/or pressure transmitters must be immediately repaired by the Contractor at his/her expense.

- E. Some of the wet wells are configured to allow for direct vertical access; some will require flexible suction lines and/or bends. The Contractor must remove and replace grating in the wet wells to allow for complete and total access to all areas of the wet wells for the removal of grease, grit, and other material. No additional compensation will be allowed for special piping, rigging, etc. required to complete the work.
- F. See plans for the approximate dimensions of each wet well.
- G. Each lift pump station is considered to be a locked, secure facility. Access will need to be arranged through the Wastewater Superintendent accordingly.
- H. The Contractor, at his/her sole risk, may store his/her equipment at the lift stations during the project. Insurance for said equipment will be the responsibility of the contractor/equipment owner.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 15400 PLUMBING

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish all labor, materials, equipment and incidentals necessary for complete installation of a plumbing system complete and ready for use.

1.02 GENERAL

- A. The general arrangement of the plumbing shall be as indicated on the Drawings. Detached drawings of proposed departures shall be submitted to the County for approval prior to the start of work. The Contractor shall carefully examine the Drawings and shall be responsible for the proper fittings of materials and equipment in each building. All work shall comply with local code requirements.
- B. Plumbing fixtures, devices and pipe shall be installed in such a manner to prohibit a cross connection or interconnection between a potable water supply and a polluted supply. The plumbing installation shall further prohibit the backflow of sewage, polluted water, or waste into the water supply system. Potable water hose bibs shall include vacuum breaker installation.
- C. Required materials not covered by the detailed Specifications shall meet the requirements of the local Plumbing Code, other applicable State and Local Ordinances and Codes, and shall conform to accepted plumbing practice.
- D. Drainage connections shall be trapped except as noted. The service line to each item of equipment shall be equipped with a cutoff valve and union for isolation of the item for repair and maintenance. Interference with the operation of other equipment or fixtures during repair or maintenance work is prohibited. The Contractor shall coordinate all work called for in the Contract Documents including, but not limited to furnishing the equipment with the services under this Section of the Specifications.
- E. The Drawings show a general concept of the plumbing system, but are not intended to show all of the offsets, fittings and accessories that may be required. The Contractor shall carefully investigate the structural and finish conditions affecting all his work and shall arrange such work accordingly, furnishing such fittings, traps, valves and accessories as may be required to meet such conditions, at no additional cost to the County.
- F. The work shall be carefully laid out in advance and no excessive cutting of construction will be permitted. Damage to buildings, piping, wiring, or equipment as a result of cutting for installation shall be repaired by mechanics skilled in the trade involved, at no additional cost to the County.
- G. Pipe openings shall be closed with caps or plugs during installation. Fixtures and equipment shall be tightly covered and protected against dirt, water and chemical or mechanical injury. Upon completion of all work, the fixtures, materials and equipment shall be thoroughly cleaned, adjusted and operated.

1.03 SUBMITTALS

- A. The Contractor shall submit to the County for review and approval in accordance with the Contract Documents: complete shop drawings, working drawings, and product data for all materials and equipment furnished under this Section.

1.04 CODES, ORDINANCES AND PERMITS

- A. The Contractor shall comply with all of the laws, ordinances, and codes, rules and regulations of the local and state authorities having jurisdiction over any of the work specified herein. He shall apply and pay for all necessary permits.
- B. If any part of the Plans and Specifications conflict with the laws and codes, the Contractor shall call it to the County's attention prior to the commencement of work.

1.05 GUARANTEE

- A. The Contractor shall warrant all labor and materials free from defects for a period of one (1) year from the date of acceptance and shall, upon notification during this period, promptly repair or replace any defective items of material or equipment at no additional cost.

1.06 ACCESSIBILITY

- A. The Contractor shall inform himself fully regarding the peculiarities and limitations of the space available for the installation of all material in this Contract.
- B. The Contractor shall install the equipment, such as valves, traps, clean-outs, etc., so that it is readily accessible. He shall provide access panels where required. The foregoing shall also apply in general to any part of the system which may be necessary to be reached from time to time for maintenance and operations of the system.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Unless otherwise specified, all materials shall conform to the South Florida Plumbing Code.
- B. The revision of the particular ASTM, SBC or AWWA standard in effect at the time of advertisement for bids shall be the minimum acceptable.
- C. Copper water pipe shall be Type L, hard drawn tubing and fittings shall be cast brass or wrought copper.
- D. A dielectric coupling shall be provided between ferrous and nonferrous materials.
- E. The Contractor shall furnish certified statements from the manufacturer that the material conforms to the requirements specified above.

2.02 SOIL, WASTE, DRAIN AND VENT PIPING

Underground soil, waste and drain pipe and fittings shall be coated hub-and-spigot cast iron or cast ductile iron pipe, with dual-tite or tyseal joints. Above-ground soil, waste, drain and vent piping shall be service weight, cast iron soil pipe with No-Hub fittings. Waste arms and condensate waste, from air conditioning equipment, may be DWV copper. Cast ductile iron and galvanized steel pipe rainwater drainage systems shall be provided where shown on the Drawings, and as provided under this Section.

2.03 CLEANOUT PLUGS AND TEST TEES

Cleanouts shall be the same sizes as the pipe except that cleanout plugs larger than four inches shall not be required. A cleanout installed in connection with cast iron hub-and-spigot pipe shall consist of a long-sweep 1/4 bend or one or two 1/8 bends extended to the place indicated on the drawings, or, if not indicated, to an easily accessible place. All cleanouts extended through all floors shall be provided with cast access boxes which shall be Josam Series #58730 with Nikaloy cover.

2.04 FLASHING

Vent pipes and roof drains shall be flashed and made watertight at the roof with not lighter than 4-pound sheet lead. Flashings shall be extended up the vent pipes a minimum of six inches to form counter-flashing or rain guards for pipe. Flashings in connection with cast iron pipe vents shall be turned down into the pipes or hubs. Flashing shields shall extend not less than eight inches from the vent pipes and roof drains in all directions.

2.05 TRAPS

Unless otherwise indicated, each fixture and piece of equipment requiring connections to the drainage system shall be equipped with a trap. Traps are specified to be supplied with the fixtures. Each trap shall be placed as near the fixture as possible, and no fixture shall be double-trapped. Traps installed on bell-and-spigot pipe shall be cast iron. Traps installed on threaded pipe shall be recess drainage pattern. All floor drains shall have deep seal traps and be provided with Josam #88250 trap seal primer valve, where a single is required. Where multiple primers are required, see Drawings for primers and detail or as approved, to preclude trap liquid seal evaporation.

2.06 SHOWER PAN

The floor of each individual shower shall be made watertight with a metal pan or other approved materials fabricated in place. The metal pan shall be constructed from either 6-pound sheet lead or 16-ounce copper. The sheet metal shall be cut to size and shape of the shower area, allowing six inches for turn-up.

The corners shall be folded, not cut, and the corner seam shall be soldered or burned. The upstands shall be recessed so that the pan will receive any seepage through materials above. The pans shall be coated with two coats of asphalt. Both sides of the pan including upstands shall be coated with asphalt paint. The pan shall be installed and the trap flange shall be countersunk to assure drainage. The trap shall be plugged and the pan filled with water as a test before installing the cement and

tile.

2.07 DRAINS

Provide floor drains (FD) as manufactured by Josam, Zurn or Wade. All drains shall have nickel-bronze tops. All floor drains shall be as scheduled on the Drawings. Provide flashing clamp devices on all drains.

2.08 WATER PIPE, FITTINGS AND CONNECTIONS

- A. All water piping shall be Copper Type "L" except where otherwise noted on the Drawings. Copper pipe where code allows to be under slabs shall be continuous without joints, and encased in plastic pipe sleeves, its total length to include the turn to above slab.
- B. The piping shall be extended to all fixtures, outlets, and equipment from the gate valve. Plugged or capped fittings shall be provided for draining low points of the piping system. Outlets shall be capped or plugged and left ready for future connections.
 - 1. Piping shall be installed as indicated on the Drawings. Pipe shall be cut accurately to measurements established at the building by the Contractor and shall be worked into place without springing or forcing. Care shall be taken not to weaken structural portions of the building. Aboveground piping shall be run parallel with the lines of the building unless otherwise shown or noted on the drawings. Branch pipes from service lines may be taken from top, bottom, or side of main using such crossover fittings as may be required by structural or installation conditions. Service pipes, valves, and fittings shall be kept a sufficient distance from other work and other services to permit not less than 1/2-inch between finished covering and other work and not less than 1/2-inch between finished covering on the different services. Changes in pipe sizes shall be made with reducing fittings. Use of long screws and bushing will not be permitted.
 - 2. All water piping shall be installed so as to allow complete drainage through hose bibs, or 1/2-inch globe valves.
 - 3. Allowance for expansion and contraction shall be made throughout the system. Horizontal runs over 50 feet long shall be anchored to the wall or to the supporting construction about midway on the run to force the expansion movement to divide equally, half at each end. Sufficient flexibility shall be provided on all branch runouts from mains to risers to provide for expansion and contraction of piping. Flexibility shall be provided by installing one or more turns in the line so that the piping will spring enough to allow for expansion without staining.
 - 4. Air chambers shall be provided on all hot and cold supplies near each faucet, control valve, or flush valve, except hose faucets. Chambers shall be self-draining when the system is drained. If not definitely shown on the Drawings, air chambers shall consist of an 18-inch length of pipe one diameter larger than the branch supply, capped. Provide a mechanical shock absorber equal to Zurn Z-200 at any quick-closing valve, and other places air chambers are not approved.

- C. Threaded pipe shall conform to the requirements of other applicable paragraphs and sections of these Specifications. Unions shall be provided where required for disconnection of exposed piping. Unions shall be accessible.

2.09 VALVES

- A. Valves shall be provided on all supplies to fixtures and equipment. Valves indicated in connection with runouts, risers, branches, and mains shall be in accordance with this Specification. No valve shall be installed on any line with its stem below the horizontal. All valves shall be gate valves unless otherwise specified or indicated. Valves three inches and smaller shall be all bronze construction. Larger valves shall have iron bodies with brass trim. All valves shall be designed for a minimum working pressure of 125 psig saturated steam. Valves for use with ferrous pipe shall have threaded ends through 2-inch size, and flanged ends for larger sizes. Valves shall be equal to the following figure numbers as manufactured by the William Powell Company:

<u>TYPE</u>	<u>3" & SMALLER SCREWED ENDS</u>	<u>3" & 3-1/2" FLANGED</u>	<u>VALVES FOR COPPER PIPING SWEAT ENDS</u>
Gate	2700	1793	Nibco #S112
Gate (NRS)	2707	1787	Nibco #S113(NRS)
Check	578	559	Nibco #S413

1. Nonrising stem valves shall be used only where space conditions prevent use of rising stem valves, or where installed underground in valve boxes.
2. Check valves subject to back pressure, pulsations or reversal of flow, shall have provisions for quick closing by means of springs, weight and lever, or as approved.
3. A complete list shall be submitted for written approval. All valves shall be products of the same manufacturer.
4. Valves shall be products of William Powell Co., Crane, or approved equal.

2.10 UNIONS

Unions on ferrous pipe three inches in diameter and smaller shall be 150 pounds malleable iron, zinc-coated. Unions on water piping 3-1/2 inches in diameter and larger shall be flanged pattern, 125-pound class, zinc-coated. Gaskets for flanged unions shall be of the best quality fiber, plastic, or leather. Unions shall not be concealed in walls, ceilings, or partitions.

2.11 HOSE BIBS

Hose bibs shall be brass, polished chromium plated, as manufactured by Chicago Faucet Company. Potable water bibs shall be No. 952, 3/4-inch or 1-inch with vacuum breaker as noted on the Drawings. Equal by N1BCO, Purtecor Sill Cocks Model 763VB with built-in backflow preventor.

2.12 RELIEF VALVE

Provide an approved temperature and pressure relief valve for the electric water heater. Relief valve shall be equipped with manual test lever. Pipe relief valve

discharge to building exterior or as approved.

2.13 PIPE SLEEVES, HANGERS AND FIXTURE SUPPORT

- A. Pipe sleeves, hangers and fixture support shall be furnished and set, and the Contractor shall be responsible for their proper and permanent location.
1. Pipe sleeves shall be installed for pipes passing through footings, floors, walls and roof decks constructed with concrete and other cast-in-place materials. Clearance between sleeves and pipe covering and/or pipes shall be approximately 1/2-inch. Construction shall not be cut except where approved by the County. Where cutting of construction is permitted, the construction shall be repaired to match its original condition. Sleeves located in exterior walls, concrete roof slabs, and floors on and below grade shall be sealed to make the space between pipe and sleeve watertight. Sleeves shall not be installed in structural members except where indicated or where the Contractor has received prior approval of the County.
 - a. Pipe sleeves shall be installed for pipes that will pass through exterior walls and floors. Sleeves that pass through the floor shall extend 1 to 2 inches above the floor. The space between sleeve and pipe and/or pipe covering shall be sealed with plastic bituminous cement.
 - b. Where plumbing piping (6 inches and smaller) passes through finished floors and the pipe will be exposed, the sleeve shall be fabricated of 3/16-inch (minimum) 316 stainless steel, and the sleeve shall be cut off exactly 1-inch above finished floor unless otherwise noted on the Drawings.
 2. Pipe Hangers, Inserts and Supports:
 - a. Unless otherwise noted or detailed on the Drawings, pipe hangers and supports shall be Ginnell, ITT or approved equal. Pipe hangers shall be Fig. 107, Fig. 115 or Fig. 138; wall hooks Fig. 168; and brackets Fig. 223. Concrete inserts shall be equal to Fig. 281 and shall be installed before the concrete is poured. Wherever possible, ceiling hangers shall be supported utilizing toggle bolts of an approved type or ceiling flanges Fig. 128 or 128R, or as detailed on the Drawings.
 - b. Horizontal Piping: Hangers and supports shall be installed as specified hereinafter, and at locations not more than three feet from the end of each runout. A hanger shall be installed not over one foot from each change in direction of piping. In lieu of separate hangers, the Contractor may submit for approval by the County a detailed drawing of trapeze hangers. Rings shall have a diameter large enough to include pipe insulation and protective saddle. Hangers for copper piping shall be copper plated.
 - 1) Cast iron soil pipe shall be supported at not more than five foot intervals and supports shall be located near each hub, or joint.
 - 2) Threaded pipe shall be supported at eight foot intervals.
 - 3) Underground piping shall be laid on a firm bed for its entire length, except where support is otherwise provided.

3. Fixtures and equipment shall be supported and fastened in a satisfactory manner. Where secured to solid masonry, fixtures and equipment shall be fastened with brass bolts or machine screws in lead or corrosion-resisting-metal, sleeve type anchorage units or with brass expansion bolts. Expansion bolts shall be 1/4-inch brass bolts with 20 threads to the inch and of sufficient length to extend at least three inches into solid masonry construction, and shall be fitted with loose tubing or sleeves or proper length to ring expansion sleeves into the solid concrete or brick wall. Where secured to cellular masonry construction, fixtures and equipment shall be fastened with 1/4-inch brass toggle bolts or through bolts. Exposed heads of bolts and nuts shall be hexagonal with rounded tops finished and chromium plated; exposed ends of bolts shall be concealed by chromium plated hexagonal nuts. Exposed nuts and heads of screws shall be provided with chromium plated brass washers.

2.14 IDENTIFICATION TAGS

Identification tags made of brass, indicating function of the valve, size, and working pressure shall be installed on all valves except valves installed on supplies to plumbing fixtures. Tags shall be two inches in diameter and marking stamped and wired to valve with 0.0808-inch diameter (No. 12 AWG) copper wire. The Contractor shall also provide charts and diagrams of approved size giving the number, location and function of each valve, and distinguishing all pipe lines. Upon completion of the work, the Contractor shall furnish record drawings to the County.

2.15 FLOOR, WALL AND CEILING PLATES

Exposed insulated and uninsulated pipes through floors, finished walls, or finished ceilings shall be fitted with chromium plated or enameled cast iron or steel plates. Plates shall be large enough to completely close the hole around the pipes and shall be square, octagonal, or round, with the least dimension not less than 1-1/2 inches larger than the diameter of the pipe. Plates shall be secured in an approved manner.

2.16 PIPE INSULATION

- A. The Contractor shall provide insulation for all water lines above floor, the domestic hot water system, heat recovery system air conditioning condensate drain piping and the horizontal waste arm serving electric water cooler(s).
 1. Hot water pipe insulation shall be Johns-Manville J-M Micro-Lok fiberglass pipe insulation, Certianteed Corp., or approved equal, finished with standard four ounce canvas jacket. Installation shall be in accordance with manufacturer's published recommendations.
 2. Condensate and electric drinking fountain waste shall be insulated with Johns-Manville J-M Aerotube, Certianteed Corp., or approved equal.

2.17 STRAINERS

Strainers shall be 125-pound cast iron body Y-pattern with removable brass screen basket as manufactured by Sarco Company, or approved equal.

2.18 PRESSURE GAUGES

Pressure gauges shall be 4-1/2 inch dial size with bottom or rear connection, weatherproof, as manufactured by Marshalltown, equal to No. 23 or 44, and suitable for the specific service pressure, by Trerice, Series 600 or 615; Ashcroft, or equal. Provide brass shut-off cocks on the stem to each pressure gauge.

2.19 PAINTING

Exterior surfaces of piping to be installed in or through concrete shall be given one coat of acid resisting paint having a bituminous base. Pipe hangers, supports, and other iron work concealed or in unfinished spaces shall be thoroughly cleaned and painted with one coat of black asphaltic varnish. Finish painting of exposed pipe, pipe covering, hangers, supports, and other work is specified in the Contract Documents.

2.20 TYPES OF FIXTURES AND FIXTURE TRIMMINGS

Provide the fixtures noted on the Drawings complete with all necessary trim.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Drainage and Vent Pipes: Horizontal soil and waste pipes shall have a grade of 1/8-inch per foot except where 1/4-inch per foot is noted on the Drawings. All main vertical soil and waste stacks shall be extended full size to the roofline and above as vents, except where otherwise specifically indicated. Where practicable, two or more vent pipes shall be connected and extended as one pipe through the roof. Vent pipes in roof spaces shall be run as close as possible to the underside of the roof without forming traps in pipes, using fittings as required. Vertical vent pipes may be connected into one main vent riser above vented fixtures. All vent and branch vent pipes shall be so graded and connected as to drip back to the vertical stack by gravity. Cast iron no-hub pipes inside buildings shall be extended six inches above the floor. Roof vents shall be offset to maintain a distance of ten (10) feet minimum from air conditioning outside air intake, or any ventilating opening.
- B. Fittings: Changes in pipe size on soil, waste, and drain lines shall be made with reducing fittings or recessed reducers. All changes in direction shall be made by the appropriate use of 45 degree wyes, long or short sweep 1/4 bends, 1/6, 1/8 or 1/16 bends, or by a combination of those of equivalent fittings. Single and double sanitary tees and 1/4 bends may be used in drainage lines only where the direction of flow is from horizontal to vertical.
- C. Union Connections: Slip joints will be permitted only in trap seals or on the inlet side of the traps.
- D. Joints:
 - 1. Joints in hub-and-spigot cast iron soil, waste and vent pipes, or between cast iron soil, waste, and vent pipes and threaded pipe or caulking ferrules, shall be firmly packed with tarred-twisted jute packing and caulked with lead at least one inch deep.

2. Threaded pipe joints shall be made by use of an approved mechanical cutter and all joints shall be reamed. No more than three threads shall remain exposed after assembly.

3.02 TESTS

- A. Soil, waste, vent and water piping shall be tested by the Contractor and approved before acceptance. Underground soil and waste piping shall be tested before backfilling. Equipment required for test shall be furnished by the Contractor at no additional cost to the County.
- B. Drainage and venting system piping shall be tested with water or air before the fixtures are installed. After the plumbing fixtures have been set and their traps filled with water, the entire drainage and venting system shall be submitted to a final test with smoke or peppermint.
 1. Water test shall be applied to the drainage and venting system either in its entirety or in sections. If the entire system is tested, all openings in the pipes shall be tightly closed except the highest opening, and the system shall be filled with water to the point of overflow. If the system shall be tested in sections, each opening except the highest opening of the section under test shall be tightly plugged, and each section shall be filled with water and tested with at least a 10 foot head of water. In testing successive sections, at least the upper 10 feet of the next preceding section shall be tested so that each joint or pipe in the building except the uppermost 10 feet of the system has been submitted to a test of at least a 10 foot head of water. The water shall be kept in the system, or in the portion under test, for at least 15 minutes before the inspection starts; the system shall then be tight at all joints.
 2. If tests are made with air, a pressure of not less than five pounds per square inch shall be applied with a force pump and maintained at least 15 minutes without leakage. A mercury-column gauge shall be used in making the air test.
 3. When the smoke test is employed, the smoke shall be produced by a smoke machine, and a pressure equal to one inch water column shall be maintained for 15 minutes before inspection starts. When the peppermint test is preferred, two ounces of peppermint shall be introduced into each line or stack. Defects discovered shall be eliminated by resetting the fixtures and equipment with new gaskets.
- C. Water System: When the roughing-in is completed and before the fixtures are set, the entire hot and cold water piping system shall be tested at a hydrostatic pressure of not less than 100 pounds per square inch gauge, and proved tight at this pressure for not less than 30 minutes in order to permit inspection of all joints. Where a portion of the water piping system is to be concealed before completion, this portion shall be tested separately as described for the entire system.
- D. Defective Work: If inspection or test shows defects, such defective work or material shall be replaced, and inspection and tests repeated. Repairs to piping shall be made with new material; no caulking or peening of screwed joints or holes will be acceptable.

3.03 WATER FOR TESTING

- A. The Contractor shall provide steam and water necessary for testing the piping systems. The Contractor shall make all connections for testing and remove all debris resulting therefrom. The water shall be used in an efficient and economical manner.
- B. Provide all apparatus and all other supplies or materials which may be necessary for testing the systems and operating the apparatus during the period while tests of any kind are being made, or for carrying out the work of the Contract.

3.04 CLEANING

- A. At the completion of the work, the Contractor shall clean and polish, ready for use, all fixtures, equipment, apparatus and exposed trim.
- B. The Contractor shall protect this work during construction and all finished work damaged during construction shall be replaced at no additional cost to the County.

3.05 PROTECTION

- A. Materials, fixtures, and equipment shall be properly protected at all times and all pipe openings shall be temporarily closed so as to prevent obstruction and damage.

3.06 STERILIZATION

The entire potable water collection and distribution system shall be thoroughly sterilized with a solution of not less than 50 parts per million of available chlorine. The sterilizing solution shall be allowed to remain in the system for a period of three hours after which time all valves and faucets shall be opened and the system shall be flushed with clean water until the residual chlorine content is not greater than 0.92 parts per million, unless otherwise directed.

END OF SECTION

DIVISION 16 ELECTRICAL

SECTION 16050 ELECTRICAL - GENERAL PROVISIONS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, devices, equipment, appurtenances, and incidentals required for a complete electrical system as hereinafter specified and/or shown on the Contract Drawings. This work may necessarily include interfacing with and/or completely installing devices and/or equipment furnished under other sections of these Specifications.
- B. It is the intent of these Specifications that the electrical system be suitable in every way for the service required. All materials and all work/labor which may be reasonably implied as being incidental to the requirements of this Section shall be furnished at no additional cost to the County.
- C. All power interruptions to existing equipment shall be at the County's convenience. Each interruption shall have prior approval. Request(s) for power interruption(s) shall be made at least forty-eight (48) hours in advance.
- D. The work shall include complete testing of all electrical components, including wiring.
- E. All workmanship shall be of the highest quality. Substandard work will be rejected, and it shall be replaced entirely at the Contractor's expense with no cost to the County.
- F. It shall be the responsibility of each bidder or his authorized representative to physically visit the job site in order that he may be personally acquainted with the area(s), buildings and/or structures intended for use in the installation/construction under this Specification. The submittal of a proposal/bid by a bidder shall be considered evidence that he has complied with this requirement and accepts all responsibility for a complete knowledge of all factors governing his work. Therefore, failure to comply with this requirement of the Specifications will NOT be grounds for the successful bidder (Contractor) to request approval of change orders and/or additional monetary compensation.

1.02 TEMPORARY ELECTRICAL SERVICE

- A. The Contractor shall make the requisite arrangements for securing temporary electrical power for his use in accordance with Section 01510 of these Specifications.

1.03 CODES, INSPECTIONS AND FEES

- A. All materials and installations shall be in accordance with the National Electrical Code (latest edition) and the latest editions of all applicable national, state, county and local codes.

- B. To the extent that any item is routinely tested and rated by the Underwriter's Laboratories, Inc., that item shall bear the U.L. label. Additionally, all items shall be manufactured to the applicable NEMA standards.
- C. The Contractor shall make the necessary arrangements for obtaining all requisite permits and inspections and pay any applicable fees.

1.04 TESTS

- A. The Contractor shall test all items individually and as a system for proper operation.
- B. The Contractor shall, at his expense, make all the requisite repairs, adjustments and/or alterations to correct any shortcomings found as a result of the tests performed under Item 1.04.A above.
- C. A representative of the County shall be present during all testing. The County shall be notified at least two (2) days prior to any testing.

1.05 SLEEVES AND FORMS FOR OPENINGS

- A. Provide and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary slots for electrical work and form before concrete is poured.

1.06 CUTTING AND PATCHING

- A. All cutting, and patching shall be done in a thoroughly workmanlike manner - i.e., care shall be taken when cutting not to damage or mar surrounding areas, and when patching to match the original finish as closely as possible while providing a watertight seal. Refer to Item 1.01.E above.

1.07 INTERPRETATION OF DRAWINGS

- A. The layouts and arrangements as shown on the Contract Drawings are indicative of the physical arrangements desired; however, they are not intended to restrict the Contractor's freedom to accommodate the exact conditions as found in the field. Any deviations from the arrangements shown must be approved by the County prior to the final placement of the item(s) in question.
- B. The Contract Drawings are not intended to show exact locations of conduit runs.
- C. Circuit and conduit layouts shown are not intended to indicate the exact installation details. The Contractor shall furnish and install all requisite items, including all fittings, junction boxes, etc., to insure that the electrical system operates in conformance with the Specifications and the specific requirements of an individual piece of equipment.
- D. Where circuits are shown as "home-runs", all necessary fittings and boxes shall be provided for a complete conduit installation.
- E. All three-phase circuits shall be run in separate conduits unless otherwise shown on the Contract Drawings.

- F. Surface mounted items such as panelboards, junction boxes, conduit, etc., shall be supported by spacers to provide a clearance between the equipment and the mounting surface.
- G. The County shall make the final decision in determining the exact location(s) and mounting height(s) of any item(s) or piece(s) of equipment in question.
- H. All connections to equipment shall be made in accordance with the approved shop and manufacturer's drawings, regardless of the number of conductors shown on the Contract Bid Drawings.
- I. The Contractor shall coordinate the work of the different trades in order to prevent interferences between conduit(s), piping and other non-electrical equipment. In case any interference develops, an authorized representative of the County shall decide which equipment, conduit(s) or piping must be relocated, regardless of which was installed first. Any such interferences shall be remedied solely at the Contractor's expense without any additional cost to the County.

1.08 EQUIPMENT SIZING AND HANDLING

- A. The Contractor shall thoroughly check all entryways, doors, hallways, stairways, buildings and structures through which equipment must be transported to reach its final location.
- B. If necessary for safe passage of the equipment, the manufacturer shall be required to ship his material in sections sized to pass through the restricted areas. This requirement holds even if such equipment sizing differs from the manufacturer's standard shipping section.
- C. To the extent possible, the equipment shall be kept upright at all times. If equipment has to be tilted for ease of passage through restricted areas, the manufacturer shall provide specific handling instructions as well as any requisite bracing in order to assure both the functional integrity of the equipment and the validity of the equipment warranty.

1.09 SUBMITTALS

- A. As specified under Section 01340 of these Specifications, the Contractor shall submit shop drawings and/or manufacturer's cut sheets for approval of all materials, equipment, devices, apparatus, and other items as required by the County.
 - 1. Prior to submittal by the Contractor, all shop drawings shall be checked for accuracy and Contract requirements. Shop drawings shall bear the date checked and shall be accompanied by a statement that the shop drawings have been examined for conformity to the Specifications and Contract Drawings. This statement shall also list all discrepancies with the Specifications and Contract Drawings. Shop drawings not so checked and noted shall be returned unchecked by the County.
 - 2. The County's check shall be only for conformance with the design concept of the Project and compliance with the Specifications and Contract Drawings. The responsibility for, or the necessity of, furnishing materials

and workmanship required by the Specifications and Contract Drawings which may not be indicated on the shop drawings is included under the work of this Section.

3. No material shall be ordered, no equipment manufacturing shall be started, nor shall any shop work/fabrication commence until the County has approved the shop drawings. Any deviation from this requirement of the Specifications shall be entirely at the risk and expense of the Contractor without any additional cost to the County.
- B. Record Drawings: As the work progresses, the Contractor shall legibly record all field changes on a set of Contract Drawings. When the project is completed, the Contractor shall furnish the County with a complete set of reproducible "as-built" drawings.

1.10 MANUFACTURER'S SERVICES

- A. The Contractor shall arrange for an authorized manufacturer's representative who shall be an experienced field service engineer to be present for the inspection, installation, testing, calibration, adjusting and start-up of any item(s) or piece(s) of equipment as deemed necessary by the County.
- B. In addition to the duties of Item 1.11.A above, the manufacturer's representative shall also instruct the County's personnel in the proper operation and maintenance of the item(s) in question.

1.11 MATERIALS

- A. All materials used shall be new, unused and as hereinafter specified. Where not specifically called out, all materials shall be of the very best quality of their respective kinds. Unless specifically otherwise approved in writing by the County, only material manufactured in the United States shall be used!
- B. Where applicable, all materials and equipment shall conform with the requirements of Item 1.03.B above.
- C. Electrical equipment shall at all times during construction be adequately protected against both mechanical injury and damage by water. Electrical equipment shall be stored indoors in dry shelters. Any damaged equipment shall be replaced by the Contractor at his own expense.
- D. All items shall be manufactured from the materials specified - substitute materials will NOT be acceptable.
- E. Only the specified manufacturer's equipment shall be used unless an "or approved equal" is noted. The County shall be the sole determiner of what constitutes an "approved equal".

1.12 GUARANTEES AND WARRANTIES

- A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted, in writing, against defects in materials, construction and workmanship

as specified under Section 01740 of these Specifications.

END OF SECTION

SECTION 16075 IDENTIFICATION FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals shown, specified, and required to furnish and install identification for electrical apparatus and electrical Work. All manufactured equipment shall have nameplates in accordance with drawing naming conventions.

B. Related Sections:

1. 16120 Wires and Cables.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 110, Requirements for Electrical Installation.
2. NEC Article 210, Branch Circuits.
3. NEC Article 215, Feeders.
4. NEC Article 504, Intrinsically Safe Systems.
5. NEC Article 700, Emergency Systems.
6. NEC Article 701, Legally Required Standby Systems.
7. NEC Article 702, Optional Standby Systems.
8. 40 CFR 1910.145 (OSHA) - Specification for Accident Prevention Signs and Tags.
9. NFPA 70E, Electrical Safety in the Workplace.
10. NFPA 79, Electrical Standard for Industrial Machinery.

1.03 SUBMITTALS

A. Submit shop drawings and product data as described in Division 1 and following:

1. Shop Drawings: Submit the following:
 - a. Complete description and listing of proposed electrical identification and electrical identification devices for associated equipment or systems.
 - b. Conduit and wire identification numbering system and equipment signage.
2. Product Data:
 - a. Manufacturer's literature, cut sheets, specifications, dimensions and technical data for all products proposed under this Section.

PART 2 PRODUCTS

2.01 MANUFACTURED UNITS

A. Engraved Identification Devices (Nameplates and Legend Plates):

1. Nameplates: (To be put on all manufactured equipment including panelboards, disconnects, control cabinets, junction and terminal boxes 12" and larger.)
 - a. Laminated thermoset plastic, 1/16-inch thick, engraved condensed block black lettering on white background, square corners, and beveled front edges, or match existing. Nameplate shall have glued backing with stainless screws in each corner. Provide sufficient spacing for mounting screws.
 - b. Size: As required.
 - c. Letter Size: Minimum 3/16-inch.
 - d. Nameplates one-inch or less in height shall have one mounting hole at each end. Nameplates greater than one-inch in height shall have mounting holes in the four corners.
2. Legend Plates:
 - a. Legend plates for pushbuttons, pilot lights, selector switches, and other panel-mounted devices shall be large size with dimensions of approximately 2-7/16 inches wide by 2-13/32 inches tall (similar to Allen Bradley large automotive size), plastic, custom engraved with black letters on white background.
 - 1) Provide standard-size legend plates where devices are mounted on motor control centers and motor controllers and spacing of devices precludes using automotive-size legend plates.
 - b. Lettering size and line weight shall be the same for all legend plates on the same panel or enclosure. Maximum size shall be 1/4-inch and minimum size shall be 1/8-inch.

B. Safety Signs and Voltage Markers:

1. Provide high voltage signs for equipment operating over 600 volts.
2. High-Voltage Safety Signs for Outdoor Applications:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) B-120-45471 by Brady.
 - 2) Or approved equal.
 - b. Unless otherwise shown or indicated, high voltage safety signs shall be not less than 10 inches high by 14 inches wide, of fiberglass reinforced plastic, and shall comply with 40 CFR 1910.145. Signs shall resist fading from exposure to temperature

- extremes, ultraviolet light, abrasive, and corrosive environments, and shall read, "DANGER - HIGH VOLTAGE - KEEP OUT"
- c. Mounting hardware shall be Type 316 stainless steel.

3. Cable Tray Safety Signs:

- a. Products and Manufacturers: Provide one of the following:
 - 1) B-302-86139 by Brady.
 - 2) Or approved equal.
- b. Cable tray safety signs shall be pressure-sensitive vinyl conforming to 40 CFR 1910.145, 5 inches by 3.5 inches in size, and shall read, "DANGER - HIGH VOLTAGE"
- c. Low voltage safety signs shall be pressure-sensitive vinyl complying with 40 CFR 1910.145, five inches by 3.5 inches in size, and shall read, "DANGER - 480 VOLTS"

4. Low-Voltage Safety Signs:

- a. Products and Manufacturers: Provide one of the following:
 - 1) B-302-86060 by Brady.
 - 2) Or approved equal.
- b. Low voltage safety signs shall be pressure-sensitive vinyl complying with 40 CFR 1910.145, five inches by 3.5 inches in size, and shall read, "DANGER - 480 VOLTS".

5. Low-Voltage Markers:

- a. Products and Manufacturers: Provide one of the following:
 - 1) CV442xx by Brady.
 - 2) Or approved equal.
- b. Low voltage markers shall be either pressure-sensitive vinyl or vinyl cloth with black lettering on orange background and shall read, "120 VOLTS", "208 VOLTS", "120/208 VOLTS", or "240 VOLTS" as required.

C. Arc-flash Safety Signs:

- 1. Products and Manufacturers: Provide one of the following:
 - a. Brady.
 - b. Or approved equal.
- 2. Warning signs shall be adhesive-backed polyester.
- 3. Warning signs shall read, "Warning - Arc Flash and Shock Hazard". Appropriate PPE Required. Arc flash warning signs shall indicate the

flash protection boundary, incident energy in calories per square centimeter, hazard level, description of required protective clothing, shock hazard, limited approach boundary, restricted approach boundary, prohibited approach boundary, and equipment name.

D. Voltage System Identification Directories:

1. General:

- a. Directories shall be laminated thermoset plastic, 1/16-inch thick, engraved block black letters on white background, square corners, and beveled front edges.
- b. Directories shall identify all voltage systems within building or structure.
- c. Directories shall list the colors that identify ungrounded and grounded conductors of each system.
- d. Colors shall be in accordance with Section 16120, Wires and Cables
- e. Example Directory Text:

Voltage System Identification		
System	A, B, C	Neutral
277/480	Brown, Orange, Yellow	Gray
120/208	Black, Red, Blue	White
CONTROL	COLOR	REMARKS
120V	Yellow	External Powered
24VDC	Blue	Discrete Signal
120V	Red	Powered from PLC
24VAC	Orange	Discrete Signal

2. Large directories for rooms shall have text height not less than 1/2-inch.
3. Small directories for equipment shall have text height of not less than 1/4-inch.

E. Conduit Labels:

1. Products and Manufacturers: Provide one of the following:
 - a. Stainless Steel Tags and Strapping by Brady.
 - b. Or approved equal.
2. Tags shall be engraved or stamped with ID designation consisting of conduit designation number indicated on drawings and as outlined in Section 3.01, F. Verify conduit numbers match numbers shown on drawings. Same number on both ends of conduit.
3. Utilize stainless steel strapping with a minimum of 32 mil thickness to securely attach conduit labels to conduits.

F. Wire Identification:

1. Heat Shrinkable Wire and Cable Labeling System:

- a. Products and Manufacturers: Provide one of the following:
 - 1) ID Pro Plus WMS-xxx- by Brady.
 - 2) No equal.
- b. White heat-shrinkable irradiated polyolefin shrink-on sleeves. Labels shall be thermal printed. Labels shall be not less than one inch wide. Verify wire numbers match drawing numbers, same number on each end of wire.

2. Wrap-Around Wire and Cable Labeling System:

- a. Products and Manufacturers: Provide one of the following:
 - 1) ID Pro Plus WMS-xxx by Brady.
 - 2) No equal.
- b. Self-laminating white/transparent self-extinguishing vinyl strips. Length shall be sufficient to provide at least 2.5 wraps. Labels shall be thermally printed and not less than two inches wide. Verify wire numbers match drawing numbers, same number on each end of wire.

G. Detectable Underground Warning Tape:

- 1. Products and Manufacturers: Provide one of the following:
 - a. Indentoline by Brady.
 - b. Or approved equal.
- 2. Material: Polyethylene or polyester with detectable metal core and polyester underlamine.
- 3. Width: Two inches.
- 4. Color and Labeling: Yellow or red with permanently imprinted black letters: "CAUTION - Buried Electric Line", repeated continuously over full length of tape.

H. Thermal Printing System:

- 1. Utilize thermal transfer process to provide non-smearing labels and markers.
- 2. Wire and Cable Markers:
 - a. Portable, Products and Manufacturers: Provide one of the following:
 - 1) ID Pro Plus by Brady.
 - 2) No equal.
 - b. Desktop, Products and Manufacturers: Provide one of the following:

- 1) BB72 by Brady.
 - 2) Or approved equal.
3. Cable Markers:
- a. Portable, Products and Manufacturers: Provide one of the following:
 - 1) ID Pro Plus by Brady.
 - 2) No equal.
 - b. Desktop, Products and Manufacturers: Provide one of the following:
 - 1) BBP72 by Brady.
 - 2) No equal.

2.02 FABRICATION

- A. Engraved Identification Devices (Nameplates and Legend Plates):
1. Nameplate and legend plate text is preliminary and subject to change pending final review and approval of nomenclature by ENGINEER after start-up and testing. Verify device name plate matches drawing device name and/or number.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Provide electrical identification in accordance with manufacturer recommendations and as required for proper identification of equipment and materials.
- B. Engraved Identification Devices (Nameplates and Legend Plates):
1. Unless otherwise indicated in the Contract Documents, attach permanent nameplates with permanent adhesive and with 3/16-inch diameter, round head, stainless steel machine screws into drilled and tapped holes.
 2. Provide nameplate with 1.5-inch high letters to identify each console, cabinet, panel, or enclosure as shown or indicated.
 3. Provide nameplates for field-mounted motor starters, disconnect switches, manual starter switches, pushbutton stations, and similar equipment operating components, which shall describe motor or equipment function and circuit number.
 4. Provide nameplates with 1/2-inch high letters to identify each junction and terminal box shown or indicated.
 5. On switchgear, provide nameplates for each main and feeder circuit including control fuses, and for each indicating light and instrument.

- a. Provide nameplate with 1.5-inch high letters giving switchgear designation, voltage rating, ampere rating, short circuit rating, manufacturer's name, general order number, and item number.
 - b. Identify individual door for each compartment with nameplate giving item designation and circuit number.
6. Motor Control Centers:
- a. Provide nameplate with 1.5-inch letters with motor control center designation.
 - b. Identify individual door for each unit compartment with nameplate identifying controlled equipment.
7. Except conduit, all electrical appurtenances including lighting panels, convenience outlets, fixtures, and lighting switches, shall be provided with nameplates indicating appropriate circuit breaker number(s).
8. Push Buttons:
- a. Provide legend plates for identification of functions.
 - b. Provide nameplates for identification of controlled equipment.
 - c. Provide red buttons for stop function.
 - d. Provide black buttons for other functions.
9. Pilot Lights:
- a. Provide legend plates for identification of functions.
 - b. Provide nameplates for identification of controlled equipment.
 - c. Shall have lens colors as shown or indicated.

Where no color is indicated, provide the following lens colors:

Color	Legend
Red	Running, Open
Green	Stopped, Closed
Amber	Alarm
Blue	Power
White	Status

10. Selector Switches:
- a. Provide legend plates for identification of functions.
 - b. Provide nameplates for identification of controlled equipment.
11. Panel Mounted Instruments:
- a. Provide nameplates for identification of function.
12. Interiors of Cabinets, Consoles, Panels, Terminal Boxes, and Other Enclosures:

- a. Provide nameplates for identification.
- b. Provide each item inside cabinet, console, panel, terminal box, or enclosure with laminated plastic nameplate as shown on approved Shop Drawings and CONTRACTOR's other submittals. Install nameplates with adhesive.
- c. Interior items requiring nameplates include:
 - 1) Terminal blocks and strips.
 - 2) Bus bars.
 - 3) Relays.
 - 4) Rear of face-mounted items.
 - 5) Rear of door-mounted items.
 - 6) Interior mounted items that require identification when mounted externally.
- d. Circuit Breaker Directory:
 - 1) Provide engraved laminated plastic directory listing function and load controlled for each circuit breaker within panel used for power distribution.

13. Re-label existing equipment whose designation have changed.

C. Safety Signs and Voltage Markers:

- 1. Provide safety signs and voltage markers on and around electrical equipment as shown or indicated.
 - a. Install rigid safety signs using stainless steel fasteners.
 - b. Clean surfaces before applying pressure-sensitive signs and markers.
- 2. Provide cable tray safety signs on both sides of cable trays at maximum intervals of 20 feet. Install signs on side rails of tray as acceptable to ENGINEER.
 - a. Cable trays that contain conductors greater than 208 volts and less than 600 volts shall be labeled with low voltage safety signs.
 - b. Cable trays that contain conductors of 120/208 volts shall be labeled with low voltage markers.
 - c. Do not label cable trays that contain only instrument signal cables.
 - d. Label cable trays that contain intrinsically safe wiring or cables in accordance with NEC Article 504.
- 4. Install low voltage safety signs on equipment doors that provide access to uninsulated 480-volt conductors, including terminal devices.
- 5. Install low voltage markers on each terminal box, safety disconnect switch, and panelboard installed, modified, or relocated as part of the Work and containing 120/208 volt conductors.

D. Voltage System Identification Directories

1. Provide voltage system identification directories as required by NEC Article 210 and NEC Article 215.
2. Provide in each electrical room voltage system identification directory mounted on wall or door at each entrance to room.
3. For panelboards, switchboards, motor control centers, and other branch circuit or feeder distribution equipment that are not located in electrical rooms, provide voltage system identification directory mounted on equipment.
 - a. Directories shall be affixed using epoxy glue. Screws or bolts shall not penetrate equipment enclosures.
 - b. Directories shall be readily visible and not obscure labels and other markings on equipment.

E. Arc-flash Safety Signs:

1. Provide arc-flash safety signs as required by NEC Article 110.
2. Provide signs for switchboards, panelboards, motor control centers, and industrial control panels. Provide signs for control panels that contain 480 volt equipment. Provide arc flash warning signs on other equipment where the incident energy is greater than 1.2 calories per square centimeter.

F. Conduit Labels:

1. Provide conduits with conduit labels unless otherwise shown or indicated.
2. Do not label flexible conduit.
3. Do not label exposed single conduit runs of less than 25 feet between local disconnect switches and their associated equipment.
3. Conduit labels shall indicate the following information:
 - a. Contract Number: Alphanumeric, three or four digits, as applicable.
 - b. Conduit Number: Alphanumeric as shown on the Drawings, as assigned by CONTRACTOR for unlabeled conduits, and in accordance with approved submittals.
4. Conduits that contain intrinsically safe wiring shall have an additional pipe marker provided that has blue letters on white background and reads, "INTRINSICALLY SAFE WIRING".
 - a. Install intrinsically safe pipe markers in accordance with NEC Article 504 along entire installation. Spacing between labels shall not exceed 25 feet.
5. Provide conduit labels at the following locations:
 - a. Where each conduit enters and exits walls, ceilings, floors, or slabs.
 - b. Where conduit enters or exits boxes, cabinets, consoles, panels, or enclosures, except pull boxes and conduit bodies used for pull boxes.

- c. At maximum intervals of 50 feet along length of conduit.
7. Orient conduit labels to be readable.

G. Wire and Cable Identification:

- 1. Color-coding of insulated conductors shall comply with Section 16120, Wires and Cables.
- 2. Use heat-shrinkable wire labels where wire or cable is terminated. Use wrap-around labels where wire or cable is to be labeled but is not terminated.
- 3. Do not provide labels for the following:
 - a. Bare (uninsulated) conductors, unless otherwise shown or indicated as labeled.
- 4. Provide wire and cable labels for the following:
 - a. New, rerouted, or revised wire or cable.
 - b. Insulated conductors.
 - d. Wire and cable terminations:
 - 1) Wire labels shall be applied between 1/2-inch and one inch of completed termination
 - 2) Apply cable labels between 1/2-inch and one inch of cable breakout into individual conductors.
 - a) Label individual conductors in a cable after breakout as specified for wires.
 - e. Wire or cable exiting cabinets, consoles, panels, terminal boxes, and enclosures.
 - 1) Label wires or cables within two inches of entrance to conduit.
 - f. Wire or cable in junction boxes and pull boxes
 - 1) Label wires or cables within two inches of entrance to conduit.
 - g. Wire and cable installed in cable tray.
 - 1) Wire and cable shall have labels at maximum intervals of 20 feet.
 - h. Wire and cable installed without termination in electrical manholes.
 - 1) Wire and cable shall have wrap-around labels applied within one foot of exiting manhole.

- i. Vendor supplied equipment wire and cable
 - 1) Wire and cable shall have wire numbers on all wires.

5. Wire and Cable Identification System:

- a. Wire and cable labels shall be imprinted with an identifying designator.

- 1) Wire and cable extending between two devices or items and that does not undergo a change of function shall be identified by a single unique designator as specified below. Vendor O&M and panel drawings shall reflect field wire numbering.

- b. Field Wiring:

- 1) Wire or cable designator shall consist of
 - a) Three left-most characters shall consist of the Contract number under which wiring or cable was installed.
 - b) Between designations of contract, terminal, and equipment, the group of characters shall be separated by an asterisk (*), a plus sign (+) or a hyphen (-). Do not use other punctuation symbols in a wire designator.
 - c) Remaining characters shall be alphanumeric.

(i.) Fifth thru Seventh characters for wires coming from control panel or PLC cabinet to the field, wire number shall match Vendor panel terminal block numbers and have instrument or equipment designation and number. EX. 870-001-FIT-001, 870-001-PUMP-1

(ii.) For field wiring at instrument or equipment, fifth thru seventh number shall have terminal block number of control enclosure or terminal box and name of control enclosure or terminal box. EX. 870-001-PLC-7, 870-001-MCC-7

- d) Numbering shall reflect actual designations used in the Work and shall be documented in record documents.

- c. Cabinet, Console, Panel, and Enclosure Wiring, Internal:

- 1) New Cabinets, Consoles, Panels, and Enclosures:

a) Wire and cable inside cabinets, consoles, panels, and enclosures shall have designators as shown on the Drawings or be assigned a ten-character designator equivalent to field wire designator, with the exception that Drawing number shall be fifth thru seventh number and terminal block number shall be ninth thru eleventh number. EX. 870-E21-013-UPS.

2) Modified Cabinets, Consoles, Panels, and Enclosures:

a) New or rerouted wire or cable in existing cabinets, consoles, panels, and enclosures shall be labeled as shown on the Drawings or be assigned a ten-character designator equivalent to field wire designator, with the exception that Drawing number shall be fifth thru seventh number and terminal block number shall be ninth thru eleventh number. EX. 870-E23-001-HVAC.

H. Terminal Strip Labeling:

1. Label panel side of terminal to match panel wire number.
2. Label field side of terminal to match field wire number. Terminal number shall not include the Contract number.

END OF SECTION

SECTION 16110 CONDUITS AND FITTINGS

PART 1 GENERAL

1.01 SCOPE OF WORK

Furnish and install the conduits, fittings, devices and appurtenances as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

The requirements of Section 01340 and Section 16050 shall be met.

1.03 APPLICATIONS

- A. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all wiring shall be run in rigid conduits.
- B. PVC Sch 80 or rigid aluminum conduits shall be used at all locations aboveground and within structures and buildings, except where otherwise shown on the Contract Drawings.
- C. PVC Sch 80 or rigid aluminum conduits shall be used at all locations for shielded instrumentation and shielded control wiring, except where otherwise shown on the Contract Drawings.
- D. Schedule 80 PVC conduits shall be used for all underground, under-slab and in-slab applications except where otherwise shown on the Contract Drawings.
- E. Schedule 80 PVC conduits shall be used in highly corrosive areas such as chlorine storage areas, digesters, fluoride storage and handling areas, etc.
- F. All conduits of a given type shall be the product of one manufacturer.
- G. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be metal.
- H. Flush mounted switch, receptacle and control station boxes shall be pressed steel.
- I. Surface mounted switch, receptacle and control station boxes shall be cast or malleable iron.
- J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.
- K. Devices designated as NEMA Type 4X shall be fiberglass, gasketed, except as otherwise shown on the Contract Documents.
- L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Conduit

1. Rigid aluminum conduit shall be approved equal.
2. Rigid PVC conduit shall be Carlon Plus 80 rigid PVC non-metallic conduit (extra heavy wall EPC-80) as manufactured by Carlon, or approved equal.

B. Liquidtight, Flexible Conduit

1. Liquidtight, flexible metal conduits shall be Sealtite, Type UA, as manufactured by Anaconda, American Flexible Conduit Co., Inc., or approved equal.
2. Liquidtight, flexible non-metallic conduits shall be Carflex Liquidtight Flexible Non-Metallic Conduit as manufactured by Carlon, or approved equal.

C. Rigid Conduit Fittings

1. Rigid Aluminum Conduit Fittings:
 - a. Aluminum elbows, bends, sweeps, nipples, couplings, etc., approved equal.
2. Rigid Non-Metallic Conduit Fittings: PVC elbows, bends, sweeps, nipples, couplings, device boxes, etc., shall be Plus 80 fittings as manufactured by Carlon, or approved equal.

D. Flexible Conduit Fittings

1. Flexible Metal Conduit Fittings: Fittings used with flexible metal conduit shall be of the screw-in type as manufactured by Thomas and Betts Company, or approved equal.
2. Flexible Non-Metallic Conduit Fittings: Fittings used with flexible non-metallic conduit shall be Carflex Liquidtight Non-metallic Fittings as manufactured by Carlon, or approved equal.

E. Flexible Couplings: Flexible couplings shall be as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.

F. Wall Seals: Conduit wall seals shall be type "WSK" as manufactured by the O.Z. Electrical Manufacturing Company, or approved equal.

G. Expansion Fittings: Combination expansion-deflection fittings shall be type "XD" as manufactured by Crouse-Hinds, or approved equal.

H. Boxes

1. Device Boxes
 - a. Flush mounted wall device boxes shall be galvanized pressed steel

as manufactured by the Raco Manufacturing Company, or approved equal.

- b. Surfaced mounted wall device boxes shall be cast or malleable iron as manufactured by Crouse-Hinds, Appleton Electric Company, or approved equal.
- c. Flush mounted in-floor device boxes shall be cast metal, shall be watertight, shall have adjustable cover frames, and shall be as manufactured by Russell & Stoll Company, Steel City Electric, or approved equal.

2. Other Boxes

- a. Terminal boxes, junction boxes, pull boxes, etc., except as otherwise specified and/or shown on the Contract Drawings, shall be PVC or 316 S.S.
- b. The boxes shall have continuously welded seams and shall be ground smooth.
- c. The box bodies shall be flanged, shall be not less than 14-gauge metal, and shall not have holes or knockouts.
- d. The box covers shall be not less than 12-gauge metal, shall be gasketed, and shall be fastened to the box bodies with stainless steel screws.

I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be 316 stainless steel as manufactured by Unistrut Corp., or approved equal.

J. Fixture Support System

- 1. The fixture support system shall be the channel type and shall be furnished complete with all requisite mounting hardware and appurtenances.
- 2. The channel, mounting hardware and related appurtenances shall be 316 stainless steel.
- 3. The fixture support system shall be as manufactured by the Unistrut Corp., or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. No conduit smaller than 3/4-inch electrical trade size shall be used nor shall either 1-1/4-inch conduit or 3-1/2-inch conduit be used. Minimum size underground, under slab or in-slab shall be 1-inch.
- B. No wires shall be pulled until the individual conduit runs are complete in all details. Additionally, each conduit shall be cleaned and reamed and certified clear of all burrs and obstructions before any wire is pulled.
- C. The ends of all conduits shall be tightly capped to exclude dust and moisture during construction.
- D. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid

installation.

- EF. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.
- F. Single conduits shall be supported by one-hole pipe clamps in combination with one-screw backplates to provide space between the conduits and the mounting surface.
- G. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.
- HI. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.
- I. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.
- J. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.
- K. Conduits terminating in pressed steel boxes shall have double locknuts and insulated bushings.
- L. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.
- M. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.
- N. Liquidtight, flexible conduit - metal or non-metallic as shown on the Contract Drawings - shall be used for all motor terminations and for all connections/terminations where vibration is anticipated.
- O. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.
- P. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.
- Q. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.
- R. Rigid aluminum conduits entering manholes and/or below grade pull boxes shall be terminated with grounding type bushings which shall be connected to a 5/8-inch by 10-foot long driven ground rod with No. 6 AWG bare copper wire.
- S. Rigid aluminum conduit shall be used for all risers. The underground portion of the riser and a 12-inch section of the riser immediately above the ground or slab/floor level shall be painted with a bitumastic coating.
- T. The use of electrical metallic tubing shall be restricted to low voltage applications (600V or less) in non-process areas where specifically approved by the County on a "per installation" basis - e.g., above suspended ceilings in office areas.

3.02

GUARANTEES AND WARRANTIES

The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16120 WIRES AND CABLES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install all wires, cables and appurtenances as described hereinafter and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.
- B. Samples of the actual wires and cables proposed for use shall be submitted for approval. There shall be a sample for each size and type of wire and cable proposed for use. The samples shall be of sufficient length to show the maximum rated voltage, insulation type and class, conductor size, the manufacturer's name, trademark or identifying logo, and the U.L. listing number.
- C. The wires and cables as approved for use shall be compared with the wires and cables actually installed. If any unapproved wires and cables are installed, they shall be removed and replaced solely at the Contractor's expense with no additional cost to the County.

1.03 APPLICATIONS

- A. The wire for lighting and receptacle circuits shall be type THHN/THWN, stranded.
- B. The wire for all power circuits and motor leads shall be type THHN/THWN, stranded.
- C. Single conductor wires for control, indication and metering shall be type THHN/THWN, No. 14 AWG, stranded.
- D. Multiconductor control cable shall be No. 14 AWG, stranded.
- E. The wire for process instrumentation shall be No. 16 AWG, stranded.

1.04 MINIMUM SIZES

- A. Except for control and signal leads, no conductor smaller than No. 12 AWG shall be used.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Wire and cables shall be made of annealed, 98% conductivity, soft drawn copper conductors.
- B. All conductors shall be stranded except that the uninsulated copper grounding conductors shall be solid.

2.02 600 VOLT WIRE AND CABLE

- A. Type THHN/THWN insulation shall be used for all 600 Volt wires and cables. The insulation shall be a flame-retardant, heat-resistant thermoplastic, and shall have a nylon, or equivalent, jacket.
- B. The 600 Volt wires and cables shall be as manufactured by Anixter, Rome Cable, Southwire, or approved equal.

2.03 INSTRUMENTATION AND CONTROL WIRING

- A. Process instrumentation wiring shall be No. 16 AWG stranded twisted pair, 600 Volt, cross-linked polyethylene insulated, aluminum tape shielded, PVC jacketed. Multiconductor cables with individually twisted pairs shall be installed where shown on the Contract Drawings.
- B. Multiconductor control cables shall be No. 14 AWG, stranded, 600 Volt, cross-linked polyethylene insulated, PVC jacketed.
- C. Instrumentation and control wiring shall be as manufactured by Belden, Alpha, or approved equal.

2.04 5KV CABLES

- A. All 5KV cables shall be manufactured and tested in accordance with ICEA Publication No. 5066-524 and AEIC No. 5, latest revisions.
- B. 5KV cables shall be single conductor, stranded, shielded, cross-linked polyethylene insulated, PVC jacketed, 133% insulation level, ungrounded.
- C. 5KV cables shall be as manufactured by Anixter, or approved equal.

2.05 5KV CABLE TERMINATIONS AND SPLICES

- A. Both ends of 5KV cables shall be terminated in accordance with IEEE Standard 48, Class 1.
- B. Terminations shall be of the preformed stress cone type, shall be approved by the cable manufacturer for use with his cable, and shall be as manufactured by Anixter, or approved equal.
- C. Unless otherwise shown or indicated on the Contract Drawing, no splices may be made in the 5KV cables without the prior written approval of the County.
- D. Where splicing is permitted, the splicing methods and materials shall be approved by the cable manufacturer for use with his cable and shall be as manufactured by Anixter, or approved equal.
- E. All 5KV cable terminations and splices shall be made by a qualified and certified high/medium voltage cable splicer whose qualifications shall be submitted to the County for approval before any work is begun.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wires and cables shall be sized as shown on the Contract Drawings and/or, where applicable, sized to match existing wiring.
- B. All conductors shall be carefully handled to avoid kinks or damage to the insulation.
- C. Lubricants or pulling compounds shall be used to facilitate wire pulling. Such lubricants/compounds shall be U.L. listed for use with the insulation specified.
- D. Use pulling means - fish-tape, cable, rope, basket weave wire/cable grips, etc. - which will not damage the wire/cable insulation or the raceway.
- E. Shielded instrumentation wire shall be installed from terminal to terminal with no splicing at any intermediate point.
- F. Shielded instrumentation wire shall be installed in rigid steel conduit and pull boxes that contain only instrumentation cables. Instrumentation cables shall be separated from control cables in manholes.
- G. Shielding on instrumentation cables shall be grounded at the transmitter end only.
- H. All new wires and cables shall be continuous and without splices between points of connection to equipment terminals. However, the County will permit a splice provided that the length between the connection points exceeds the greatest standard shipping length available from the submitted manufacturer and no other manufacturer acceptable to the County is able to furnish wires or cables of the required length.
- I. All 600 volt wire and cable connections shall be made using compression type connectors. Insulated connectors shall be used for all terminations. The connections shall be made so that both the conductivity and the insulation resistance shall be not less than that of the uncut conductor.
- J. All 5KV cable connections shall be made using approved terminators.
- K. 5KV cables exposed in manholes, vaults, pull boxes, switchgear and other areas where the cables are not protected by conduits shall be fireproofed using fireproof tape and/or glass tape in accordance with the manufacturer's recommendations and instructions. Fireproofing using asbestos tape shall not be used.
- L. All wires shall be numbered at both ends and at all intermediate junction points. Screw type terminations shall be made with forked tongue (spade), self-insulated, crimp terminals. All other wire terminations shall be made on appropriate terminal strips.

3.02 TESTS

- A. Upon the completion of the pulling-in of and prior to the terminating/connecting of the 600 Volt wiring, all wires shall be individually checked and tested for continuity and short circuits, and each wire/cable shall be meggered to check insulation resistance.

The test voltage shall be not less than 500 Volts. Three (3) copies of these test results shall be submitted to the County.

- B. Similarly, the 5KV cables shall also be tested, except that a 15 minute test shall also be made using a DC voltage not less than 80% of that used for the factory tests. A plot of leakage current versus voltage shall be made and three (3) copies of the test results shall be submitted to the County.
- C. An authorized representative(s) of the County shall witness all testing. The County shall be notified at least two (2) days in advance of the testing.
- D. Any faulty conditions and/or shortcomings found during the testing shall be corrected at no cost to the County. However, a retest to demonstrate compliance shall be conducted before any hook-ups or terminations are made. Any such requisite retesting shall be witnessed by an authorized representative(s) of the County.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16135 PULL, JUNCTION AND TERMINAL BOXES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install pull, junction, and terminal boxes.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16505, Hangers and Supports for Electrical Systems.

1.02 REFERENCES

A. Standards referenced in this Section are.

1. AASHTO, Standard Specifications for Highway Bridges.
2. UL 886, Outlet Boxes and Fittings for Use in Hazardous (Classified) Locations.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 314, Outlet, Device, Pull and Junction Boxes; Conduit Bodies; Fittings; and Handhole Enclosures.

1.04 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Product Data:

- a. Manufacturer's technical information for pull, junction, and terminal boxes proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Pull, Junction, and Terminal Boxes:

1. General - Applicable to All Boxes:

a. Description and Performance Criteria:

- 1) Provide pull, junction, and terminal boxes rated at not less than NEMA 12. Boxes shall be appropriate for each location in accordance with NEMA requirements and as required for area classifications specified in NFPA 820 and contract drawings.
- 2) For flush-mounted pullboxes in slabs or pavement potentially subject to vehicular traffic, boxes and covers shall be constructed for H-20 loading in accordance with AASHTO Standard Specifications for Highway Bridges.

b. Manufacturers: Provide products of one of the following:

- 1) Appleton Electric Company.
- 2) Crouse-Hinds Company.
- 3) Hoffman Engineering Company.
- 4) Or equal.

c. Materials: Pull boxes embedded in concrete slabs shall be cast iron.

d. Terminal strips and terminal blocks in terminal boxes shall be mounted on terminal box sub-panels.

e. Identification: Boxes shall be identified in accordance with Section 16075, Identification for Electrical Systems.

2. Materials and Construction - Dusty Locations:

a. Material: Welded and galvanized sheet steel of USS gage.

b. Gasket: Oil-resistant gasket.

c. Access: Lift-off hinges and quick-release latches.

d. Material Thickness:

- 1) Boxes with dimension two feet and smaller shall be 14-gage.
- 2) Boxes with dimension between two and three feet shall be 12 gage.
- 3) Boxes with dimension of three feet or more in any direction shall be 10-gage.

3. Materials and Construction - Wet, Corrosive, or Hazardous Locations:

a. Rating:

- 1) Pull boxes in wet, corrosive, or outdoor areas shall be NEMA 4X.
- 2) Boxes for areas classified as hazardous locations, where required by NEC, shall be explosion-proof and comply with

UL 886.

b. Material:

- 1) Cast gray iron alloy with hot-dip galvanized finish, or cast malleable iron bodies and covers.
- 2) Large boxes not generally available in cast iron construction shall be copper-free aluminum alloy or Type 316 stainless steel, as required by location.
- 3) In corrosive locations, where the conduit system is PVC-coated, boxes shall be cast metal with factory-applied 40-mil PVC coating, Type 316 stainless steel, or non-metallic thermoplastic or fiberglass reinforced plastic material.

c. Gasket:

- 1) Provide neoprene gaskets for wet and corrosive locations.
- 2) Gaskets shall be an approved type designed for the purpose. Improvised gaskets are not acceptable.

d. Access: Stainless steel cover bolts.

e. Features:

- 1) External mounting lugs.
- 2) Drilled and tapped conduit holes.
- 3) Boxes where conduits enter building or structure below grade shall have 1/4-inch drain hole at bottom of the box.
- 4) Provide threaded connections for explosion proof boxes.

B. Terminal Blocks:

1. Products and Manufacturers: Provide one of the following:

- a. Allen-Bradley Company, Bulletin, Model 1492.
- b. General Electric Company, Model CR151K.
- c. Or Approved equal.

2. Material and Construction:

- a. NEMA-rated nylon modular terminal blocks.
- b. 600-volt rated.
- c. Control and alarm circuit terminals shall be screwed type with permanently affixed numeric identifiers beside each connection.
- d. Power terminals shall be copper and rated for the circuit ampacity.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work.

Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Mount boxes so that sufficient access and working space is provided and maintain clearance of not less than 1/4-inch from walls.
- B. Securely fasten boxes to walls or other structural surfaces on which boxes are mounted. Provide independent supports that comply with Section 16505, Hangers and Supports for Electrical Systems, where boxes will not be mounted on walls or other structural surface.
- C. Install pull boxes where shown or indicated, and provide pull boxes where one or more of the following conditions exist:
 - 1. Conduit runs containing more than 270-degrees of raceway bend.
 - 2. Conduit runs exceeding 200 feet in length.
- D. Provide removable, flame-retardant, insulating cable supports in boxes with any dimension exceeding three feet.
- E. Field-apply PVC touch-up to scratched PVC boxes damaged during installation. Touch-up work shall be in accordance with manufacturer's recommendations and instructions.
- F. Size junction, pull, and terminal boxes in accordance with NEC Article 314 and manufacturer guidelines.
- G. Provide terminal blocks in boxes where shown and where cable terminations or splices are required.

END OF SECTION

SECTION 16136 OUTLET BOXES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install outlet boxes for mounting wiring devices and lighting fixtures.

B. Related Sections:

1. Section 16050, Electrical - General Provisions
2. Section 16075, Identification for Electrical Systems.
3. Section 16141, Low-Voltage Receptacles.
4. Section 16142, Snap Switches.
5. Section 16505, Hangers and Supports for Electrical Systems.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 314, Outlet, Device, Pull and Junction Boxes; Fittings; and Handhole Enclosures.
2. NEC Article 501, Class I locations.
3. UL 514A, Metallic Outlet Boxes.
4. UL 514B, Fittings for Conduit and Outlet Boxes.

1.03 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Product Data:
 - a. Manufacturer's technical information for outlet boxes proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Device Boxes:

1. Manufacturers: Provide products of one of the following:

- a. Crouse-Hinds Company.
- b. Appleton Electric Company.
- c. Or equal.

2. Material:

- a. In Wet Locations: Cast gray iron alloy or cast malleable iron with zinc electroplate finish, or aluminum bodies consistent with conduit material.
- b. In Dusty Locations: Zinc-coated sheet steel or aluminum bodies consistent with conduit material.
- c. Where conduit is installed concealed, boxes shall include suitable extension rings and covers, as required.
- d. Where used with PVC-coated conduit system, boxes shall include factory applied 40-mil-thick PVC coating.
- e. Cast boxes shall be hub-type and include external mounting lugs.
- f. Metallic outlet boxes shall comply with UL 514A.
- g. Fittings for outlet boxes shall comply with UL 514B.

3. NEMA rating of box shall be as required for area classifications specified in Section 16050, General Provisions for Electrical Systems.

4. Cover Plates:

- a. Type 302 stainless steel alloy for indoor finished areas.
- b. Plates in corrosive locations shall include factory-applied 40-mil PVC coating.
- c. Stainless steel screws and hardware.
- d. For receptacle and switch cover plates, comply with Section 16141, Low-Voltage Receptacles, and Section 16142, Snap Switches.

B. Flexible Fixture Hangers:

1. For Class I, Division 1 Hazardous Areas:

a. Product and Manufacturers: Provide one of the following:

- 1) Type EFH by Crouse-Hinds.
- 2) Or equal

b. Materials:

- 1) Iron alloy with electro-galvanizing and aluminum acrylic paint.
- 2) Products shall have brass bellows and stainless-steel spring.
- 3) Product shall be capable of 15-degree swing from perpendicular in all directions.
- 4) Product shall allow fixtures to be pendant-hung in accordance with NEC Article 501.130(A)

2. For Class I, Division 2 Hazardous Areas:
 - a. Product and Manufacturers: Provide one of the following:
 - 1) Type AHG by Crouse-Hinds.
 - 2) Or Approved equal
 - b. Materials:
 - 1) Malleable iron top section and removable malleable iron bottom fixture support assembly with electro-galvanizing and aluminum acrylic paint.
 - 2) Include vapor-tight cushion to support fixture stem.
 - 3) Provide neoprene diaphragm to exclude moisture and dirt from conduit system.
 - 4) Provide with manufacturer's neoprene gasket between fixture hanger and box.
 - 5) Product shall be capable of eight-degree swing from perpendicular in all directions, before and after coating.
 - 6) Product shall allow fixtures to be pendant-hung in accordance with NEC Article 501.130 (B).

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Fasten boxes rigidly and neatly to supporting structures.
- B. Securely fasten equipment to walls or other surfaces on which materials or equipment is mounted. Provide independent supports complying with Section 16505 Hangers and Supports for Electrical Systems, where boxes are not mounted on walls or other surface capable of supporting the materials or equipment.
- C. For units mounted on masonry or concrete walls, provide suitable 1/2-inch spacers to prevent mounting back of box directly against wall.
- D. Leave no open conduit holes in boxes. Close unused openings with capped bushings.
- E. Label each circuit in boxes and identify each circuit in accordance with Section 16075, Identification for Electrical Systems.
- F. Install outlet boxes in accordance with NEC Article 314.

END OF SECTION

SECTION 16137 UNDERGROUND DUCTBANKS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install underground ductbanks.

B. Coordination:

1. Ductbank routing on the Drawings is diagrammatic. Coordinate installation with piping and other underground facilities and locate ductbanks clear of interferences.
2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before underground ductbank Work.
3. Notify other contractors in advance of installing underground ductbanks to provide other contractors with sufficient time for installing items included in their contracts that will be installed with or before underground ductbank Work.

C. Related Sections:

1. Section 02220, 02221, Excavations, Trenching and Backfilling
2. Section 03300, Cast-in-Place Concrete.
3. Section 16075, Identification for Electrical Systems.
4. Section 16110, Conduits and Fittings
5. Section 16450, Grounding and Bonding for Electrical Systems

1.02 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Layouts showing proposed routing of ductbanks and locations of manholes, handholes, and areas of reinforcement.
- b. Profiles of ductbanks showing crossings with piping and other underground facilities.
- c. Typical cross sections for each ductbank.

E. Informational Submittals: Submit the following:

1. Special Procedure Submittals:
 - a. Installation procedures.
 2. Field Quality Control Submittals:
 - a. Field test report.
- F. Closeout Submittals: Submit the following:
1. Record Drawings:
 - a. Include actual routing of underground ductbank runs on record documents in accordance with Section 01720, Project Record Documents.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Duct: Provide conduit and fittings in accordance with Section 16110, Conduits and Fittings. Conduit types shall be as follows:
 1. Schedule 40 PVC conduits for steel reinforced concrete ductbanks.
 2. Schedule 80 PVC conduits for direct buried ductbanks.
- B. Backfill: Provide backfill, including select backfill, in accordance with Section 02221.
- C. Reinforcing: Provide Ductbank reinforcing in accordance with Section 03300, Cast in Place Concrete.
- D. Concrete: Provide ductbank concrete in accordance with Section 03300, Cast-in-Place Concrete.
- E. Grounding: Provide ground cable in accordance with Section 16450, Grounding and Bonding for Electrical Systems.
- F. Conduit Spacers: Conduit spacers shall be nonmetallic, interlocking type to maintain spacing between conduits. Provide spacers suitable for all conduit types used in multiple sizes. Carlon or approved equal.
- G. Duct Sealing Compound:
 1. Products and Manufacturers: Provide one of the following:
 - a. O-Z/Gedney, Type DUX.
 - b. Or approved equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Excavation and Backfilling:

1. Provide excavation and backfilling for ductbank installation in accordance with Section 02221.
2. Do not backfill with material containing large rock, paving materials, cinders, large or sharply angular substances, corrosive material, or other materials that can damage or contribute to corrosion of ducts or cables, or prevent adequate compaction of backfill.

B. Ductbank Layout:

1. Top of ductbank concrete shall be a minimum of 2.0 feet below grade, unless shown or indicated otherwise on the Contract Drawings or Engineer approved.
2. Slope ductbank runs for drainage toward manholes and away from buildings with slope of approximately 3 inches vertical per 100 feet of run.

C. Ductbank Assembly:

1. Assemble ductbanks using non-magnetic saddles, conduit saddles by Carlon or approved equal every six feet. Saddle to provide minimum two-inch concrete separation between outer surfaces of each conduit. Provide side forms for each ductbank.
2. Make bends with sweeps of not less than 4 foot radius or 5.0 degree angle couplings.

D. Concrete Placing:

1. Provide minimum 4 inch concrete covering on each side, top, and bottom of concrete envelopes around conduits. Concrete covering shall be as shown or indicated on the Contract Drawings.
2. Provide red dye in concrete for easy identification during subsequent excavation; all concrete in entire ductbank, including top and bottom, shall be dyed.
3. Firmly fix conduits in place during concrete placing. Carefully place and vibrate concrete to fill spaces between conduits.

E. Conduit Transitions:

1. Conduit installations shall be watertight throughout entire length of ductbank.

2. Transition from non-metallic to rigid aluminum conduit where ductbanks enter structure walls and slabs.
3. Terminate conduits with insulated grounding bushings.
4. Continue conduits inside buildings in accordance with Section 16110, Rigid Conduits, and as shown or indicated in the Contract Documents.
5. Plug and seal empty spare conduits entering structures. Conduits in use entering structures shall be sealed watertight with duct sealing compound.

F. Ductbank Reinforcing:

1. Provide reinforcing for all ductbanks:
2. Install ductbank reinforcement as shown or indicated on the Contract Drawings.
3. Provide minimum of 2 inches and maximum clearance of 4 inches from bars to edge of concrete encasement.

G. Connections to Structures:

1. Firmly anchor ductbanks to structure walls or slabs. Epoxy-grout ductbank rebar into structure concrete to eliminate shear forces between ductbank and structure wall concrete.
2. Ductbank penetrations through structure walls shall be watertight.

H. Grounding:

1. Provide bare stranded copper ductbank ground cable in each ductbank envelope. Make ground electrically continuous throughout entire ductbank system.
2. Connect ground cable to building and station ground grid or to equipment ground buses. Also, connect ground cable to steel conduit extensions of underground ductbank system.
3. Provide ground clamp and bonding of each steel conduit extension to maintain continuity of ground system.
4. Terminate ground cable at last manhole or handhole for outlying structures.

H. Detectable Underground Warning Tape:

1. Provide detectable underground warning tapes complying with Section 16075, Identification for Electrical Systems, over the full length of each underground ductbank.
2. Install warning tapes approximately 12 inches below grade.
3. Provide multiple tapes across the width of each ductbank. Locate center of a warning tape above each edge of ductbank, and at intervals across top width of ductbank so that clear space between tapes does not exceed 6 inches.

J. Reused Existing Ducts:

1. Pull rag swab through duct to remove water and to clean conduits prior to installing new cable.
2. Repeat swabbing until all foreign material is removed.
3. Pull mandrel through duct, if necessary, to remove obstructions.

K. Conduit Spacing

1. Provide PVC or Nylon conduit spacers minimum 6 feet apart in all ductbanks.
2. Do not use metal tie raps to hold conduit in place. Use only nylon tie raps for anchoring of conduit in ductbank.

END OF SECTION

**SECTION 16138
MANHOLES AND HANDHOLES FOR ELECTRICAL SYSTEMS**

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install manholes and handholes for electrical systems Work.

B. Coordination:

1. Coordinate manhole and handhole installation with piping, sheeting other excavation supports, and other underground facilities, and locate clear of interferences.
2. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before manhole and handhole for electrical systems Work.
3. Notify other contractors in advance of installing manholes and handholes for electrical systems to provide other contractors with sufficient time for installing items included in their contracts that will be installed with or before manhole and handhole for electrical systems work.

C. Related Sections:

1. Section 03300, Cast-in-Place Concrete.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. AASHTO, Specifications for Highway Bridges.
2. ANSI A14.3, Fixed Ladders - Safety Requirements.
3. ANSI/SCTE 77, Specification for Underground Enclosure Integrity.
4. ASTM A48/A48M, Specification for Gray Iron Castings.
5. ASTM A615/A615M, Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement
6. ASTM C478, Specification for Precast Reinforced Concrete Manhole Sections
7. ASTM C1028, Test Method for Determining the Static Coefficient of Friction of Ceramic Tile and Other Like Surfaces by the Horizontal Dynamometer Pull-Meter Method.
8. ASTM D4101, Specification for Polypropylene Injection and Extrusion Materials

1.03 QUALITY ASSURANCE

- A. Component Supply and Compatibility:
 - 1. Obtain all manholes and handholes furnished under this Section from a single Supplier.
 - 2. Manhole and handhole Supplier shall review and approve the Shop Drawing submittals for the manholes and handholes to be furnished prior to submitting to the Client for review.

1.04 SUBMITTALS

- A. Shop drawings and product data as described in Division 1.
- B. Operation and maintenance data as described in Division 1.
- C. In addition, submit the following:
- D. Action Submittals: Submit the following:
 - 1. Shop Drawings:
 - a. Manholes: Plan and section drawings showing arrangement of each manhole, including interior and exterior dimensions, elevations, location of manhole wall penetrations, details of typical openings, jointing, inserts, and reinforcing.
 - b. Handholes: Submit schedule of handholes to be furnished and dimensions and pertinent data for each.
 - c. Castings:
 - 1) Schedule of casting types and models to be furnished, with dimensional data and other pertinent data for each.
 - 2) Fabrication and erection of all frame and cover assemblies. Include plans, elevations, and details of sections and connections. Show anchorage and accessory items. Provide setting drawings for location and installation of castings and anchorage devices.
 - 3) Where Site-specific castings are specified with unique lettering on manhole or handhole cover, provide Shop Drawing for castings indicating appropriate detail to indicate conformance to the Contract Documents.
 - d. Layout of Manhole Electrical Systems: Where manholes have extensive electrical systems and supports for electrical systems, submit for each plans, sections, and details indicating proposed layout of such materials and equipment in each manhole.
 - 2. Product Data:
 - a. Manufacturer's technical information, specifications, and literature for manholes, handholes, castings, and accessories proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Material and Construction:

1. Material shall be precast or cast-in-place reinforced concrete. Concrete shall be in accordance with Section 03300, Cast-in-Place Concrete.
2. Provide minimum interior dimensions as shown or indicated. Provide a 12-inch by 12-inch by 6-inch deep sump in manhole floor.
3. Duct entrances shall be sized and located to suit the ductbanks.
4. Precast Hand Hole or Manholes:
 - a. Except where otherwise specified, precast manhole components shall consist of reinforced concrete specially designed and constructed for use as electrical manholes and manufactured in accordance with ASTM C478, except as modified in this Section.
 - b. Precast, reinforced concrete manhole bases, riser sections, flat slabs, and other components shall be manufactured by wet-cast methods, using forms that provide smooth surfaces free of irregularities, honeycombing, and other imperfections.
 - c. Joints between manhole components shall be tongue-and-groove type employing a single, continuous rubber O-ring gasket. Circumferential and longitudinal steel reinforcing shall extend into bell and spigot ends of joint without breaking steel continuity. Joints between base sections, riser sections, and top slabs of manholes six feet in diameter and less shall be rubber and concrete joints. Joints for manhole components greater than 6-foot diameter shall have steel bell and spigot rings.
 - d. Precast manhole components shall:
 - 1) have sufficient strength to withstand loads imposed upon them; and
 - 2) be constructed for minimum earth cover loading of 130 pounds per cubic foot, AASHTO H-20 wheel loading, and an allowance of 30 percent in roadways and 15 percent in rights-of-way for impact.
 - 3) Manhole bases shall have two cages of reinforcing steel in the walls, each reinforcing cage shall be of area equal to that required in the riser sections.
 - 4) Wall thickness shall be not less than 5 inches.
 - 5) Concrete top slabs shall be not less than 8 inches thick.
 - e. Lifting holes, when provided, shall be tapered. Not more than 2 lifting holes shall be cast into each section. Provide tapered, solid rubber plugs to seal lifting holes. Lifting holes shall be made to be sealed by plugs driven from the outside face of section only.
 - f. Point of intersection (P.I.) of ductbank centerlines shall be marked with 1/4-inch diameter steel pin firmly enclosed in floor of each

manhole base and protruding approximately 1-inch above finished floor of base.

- g. Mark date of manufacture and name or trademark of manufacturer on inside of manhole barrel.
- h. Barrel of manhole shall be constructed of various lengths of riser pipe manufactured in increments of 1 foot to provide correct height with the fewest joints. Provide not less than 1 foot clear between openings in barrel of manholes for ductbanks or other penetrations and the nearest joint. Provide special manhole base or riser sections as required.
- i. Provide at top of manhole barrel a precast or cast-in-place slab, or precast eccentric cone, as shown or approved, to receive manhole frame and cover.

5. Manufacturers;

- a. Old Castle Infrastructure
- b. Or approved equal.

B. Accessories:

1. Frames and Covers:

- a. Manufacturers: Provide products of one of the following:
 - 1) US Foundry
 - 2) Or approved equal
- b. Material: Covers and frames shall be cast aluminum alloy to AASHTO H-20/HS-20 traffic specifications. 25,000 pounds proof load in accordance with CID A-A 60005 or 40,000-pounds proof load per AASHTO M-306.
- c. Covers: Watertight, sealed type marked "ELECTRICAL" in raised two-inch letters. Identify covers as shown or indicated on the Contract Drawings.
- c. Provide opening assist mechanism for hatch doors.
- d. Grout the frame to the manhole or handhole.

2. Pulling Irons:

- a. Products and Manufacturers: Provide one of the following:
 - 1) Catalog No. 8119 by A.B. Chance Company.
 - 2) Catalog No. DU2T3 by McGraw Edison Company.
 - 3) Or approved equal
- b. Material: Galvanized steel.
- c. Cast in the wall opposite to centerline of each incoming ductbank and 12 inches below centerline of bottom line of ducts.

3. Cable Racks:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) MacLean Power Systems.
 - 2) A.B. Chance Company.
 - 3) Or approved equal
 - b.
 - c. Material: ABS Plastic.
 - c. Cable racks shall adequately support cables with space allowed for future cables.
 - d. Each rack shall be a vertical assembly of two-foot cable racks extending from within 6 inches of manhole roof slab to within 6 inches of manhole floor.
4. Cable Hooks:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Power Systems.
 - 2) A.B. Chance Company.
 - 3) Or approved equal
 - b. Material: Non-Metallic .
 - c. Length: 7.5-inch minimum.
5. Manhole Steps - Polypropylene
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Lane International.
 - 2) Or approved equal.
 - b. Material: Polypropylene complying with ASTM D4101 with 1/2-inch diameter Grade 60 steel reinforcing bar complying with ASTM A615/A615M.
 - c. Color: Black
 - d. Provide manhole steps as shown or indicated. Manhole steps shall have raised treads and comply with ANSI A14.3, ASTM C478, and OSHA requirements.
 - e. Steps shall be 15.25 inches wide and, when installed, protrude from manhole wall by 6 inches.
 - f. Space steps uniformly at a maximum of 12 inches on centers, and project evenly from manhole or chamber walls.
6. Manhole Steps - Aluminum:
 - a. Products and Manufacturers: Provide one of the following:
 - 1) R-1982-W, by Neenah Foundry Company.
 - 2) Part No. FR14-OR, by Washington Aluminum Company
 - 3) Aluminum manhole step by Campbell Foundry Company.

4) Or approved equal.

- b. Material: Extruded aluminum.
- c. Provide manhole steps as shown or indicated. Comply with ANSI A14.3 and OSHA requirements
- d. Space steps uniformly at maximum of 12 inches on centers, and project evenly from manhole or chamber walls.

2.02 SMALL HANDHOLES

A. Material and Construction:

1. Manufacturer: Provide products of one of the following:
 - a. Strongwell Quazite
 - b. Old Castle
 - b. Or approved equal
2. Material: Precast polymer concrete.
3. Duct entrances sized and located to suit ductbanks.
4. Enclosures and covers shall be UL-listed.
5. Enclosures, boxes, and covers shall comply with test provisions of ANSI/SCTE 77 for Tier 15 & 22 applications.
6. Covers shall have coefficient of friction of not less than 0.50, in accordance with ASTM C1028.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. Excavation and Backfill:

1. Provide manholes and handholes for electrical systems where shown on the Contract Drawings or indicated and verify at the Site the required locations.
2. Perform excavation, back-filling and compaction required for installing manholes and handholes for electrical systems, in accordance with Section 02220.
3. Provide manholes and handholes on granular sub-base course as shown or indicated. If not shown, provide layer of compacted select fill not less than six inches deep on which manhole or handhole for electrical systems will be installed.
4. Carefully set, level, and align at 2-inches above finished site grade manhole bases and handholes.

- B. Precast Manholes:
1. Set manhole sections vertical with steps and sections in true alignment. Butter the base of each bell or groove end at joints between components with one-to-two proportion cement-sand mortar to provide uniform bearing between components. Seal joints with cement mortar inside and out and trowel smooth to contour of wall surface. Raised or rough joint finishes are unacceptable.
 2. Install sections, joints, and gaskets in accordance with manufacturer's recommendations.
 3. Tightly seal each lifting hole with solid rubber plug driven into hole from outside of barrel; fill remaining void with one-to-two proportion cement-sand mortar.
- C. Manhole and handhole structures shall be watertight. Provide foam sealant to seal all penetrations into manholes and handholes for electrical systems.
- D. Cable Supports in Manholes:
1. Attach cable racks with 3-inch by 3/8-inch diameter "tamp-in" studs mounted in 1-inch holes drilled into walls of manholes in absence of inserts. Provide PVC coating on racks.
 2. Provide cable hooks to support each cable on each rack along the cable run within manholes. Provide PVC coating on hooks.
 3. Individually support each cable at each hook on porcelain insulators. Provide sufficient slack for each cable.
 4. Securely tie each cable in place at each insulator block to prevent excessive movement of insulators, cables, or fireproof tape. Tie cables with non-metallic 3/4-inch strapping tape manufactured by 3M or equal, or tie down with nylon straps.
- E. Grounding:
1. Provide 3/4-inch by 10-foot copper-clad ground rod for each manhole.
 2. Bond all exposed metal manhole accessories and concrete reinforcing rods with No. 4 AWG minimum bare copper wire and connect to ground rod and to the ductbank ground cable.
- F. Grade Rings:
1. Provide grade rings for manholes when required to adjust cover to proper grade. Construct grade ring on manhole roof slab or cone section on which manhole frame and cover will be placed.
 2. Height of grade ring shall be as required to bring frame to proper grade and shall not exceed 12 inches in height.
- G. Grading at Manholes and Handholes:
1. Unpaved Areas:

- a. Install manholes and handholes in unpaved areas as shown or directed by ENGINEER to rim elevation higher than finished grade.
 - b. Grade the ground surface to drain away from manholes and handholes.
 - c. Provide fill around manholes and handholes to level of upper rim of manhole or handhole frame, and evenly grade the surface to a one (vertical)-to-five (horizontal) slope to surrounding grade, unless otherwise shown or directed by ENGINEER.
2. Paved or Travelled Areas:
- a. Install manholes and handholes in paved or travelled areas to meet final grade of paved or concrete surface.
 - b. In paved areas in state or county highways or municipal streets or roads, manholes and handholes shall be 1/2-inch below elevation of final surface course (also known as top course or wearing course) of pavement.
 - c. Manholes and handholes shall not project above finished roadway pavement.
3. CONTRACTOR shall be solely responsible for proper height of manholes and handholes necessary to reach final grade. ENGINEER's review of Shop Drawings and other submittals for manholes and handholes is general in nature. Provide random-length precast manhole riser sections to adjust manholes to accommodate field conditions for final grading and final elevations.

3.03 FIELD QUALITY CONTROL

- A. Watertightness:
1. Manholes and handholes for electrical systems shall be free of visible leakage. Inspect each manhole and handhole accompanied by ENGINEER, and repair leaks.

END OF SECTION

SECTION 16141 LOW VOLTAGE RECEPTACLES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install low-voltage receptacles.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16136, Outlet Boxes.

A. Standards referenced in this Section are:

1. UL 498, Standard for Attachment Plugs and Receptacles.
2. UL 514D, Cover Plates for Flush-Mounted Wiring Devices.
3. UL 943, Standard for Ground-Fault Circuit-Interrupters.
4. UL 1010, Standard for Receptacle-Plug Combinations for Use in Hazardous (Classified) Locations.
5. UL 1449, Standard for Surge Protective Devices.

1.02 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. Americans with Disabilities Act.
2. NEC Article 406, Receptacles, Cord Connectors, and Attachment Plugs (Caps).

1.03 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for receptacles and cover plates proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Receptacles:

1. Grounding receptacle, 2-pole, 3-wire, NEMA 5-20R configuration, ivory color.
 - a. Single:
 - 1) Products and Manufacturers: Provide one of the following:
 - a) HBL5361I by Hubbell, Inc.
 - b) 5361-I by Pass & Seymour.
 - c) Or equal.
 - b. Duplex:
 - 1) Products and Manufacturers: Provide one of the following:
 - a) HBL5362I by Hubbell, Inc.
 - b) PS5362-I by Pass & Seymour.
 - c) Or equal.
 - c. Weather-resistant Duplex:
 - 1) UL-listed as weather-resistant.
 - 2) Products and Manufacturers: Provide one of the following:
 - a) HBL5362IWR by Hubbell, Inc.
 - b) WR5362-I by Pass & Seymour.
 - c) Or equal.
2. Corrosion-resistant grounding receptacle, 2-pole, 3-wire, yellow color.
 - a. Single, 125-volt, 20 ampere, NEMA 5-20R configuration:
 - 1) Products and Manufacturers: Provide one of the following:
 - a) HBL53CM61 by Hubbell, Inc.
 - b) CR6301 by Pass & Seymour.
 - c) Or equal.
 - b. Duplex, 125-volt, 20 ampere, NEMA 5-20R configuration:
 - 1) Products and Manufacturers: Provide one of the following:
 - a) HBL53CM62 by Hubbell, Inc.
 - b) CR6300 by Pass & Seymour.
 - c) Or equal.
 - c. Single, 125-volt, 30 ampere, NEMA 5-30 configuration:

- 1) Products and Manufacturers: Provide one of the following:
 - a) HBL9308 by Hubbell, Inc.
 - b) 3802 by Pass & Seymour.
 - c) Or equal.
 2. Grounding receptacle, 2-pole, 3-wire, 250-volt, 20 ampere, NEMA 6-20 configuration, brown color.
 - a. Single:
 - 1) Products and Manufacturers: Provide one of the following:
 - a) HBL5461 by Hubbell, Inc.
 - b) 5871 by Pass & Seymour.
 - c) Or equal.
 - b. Duplex:
 - 1) Products and Manufacturers: Provide one of the following:
 - a) HBL5462 by Hubbell, Inc.
 - b) 5862 by Pass & Seymour.
 - c) Or equal.
 4. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover where shown on the Contract Drawings as "WP" or "WPU", and provide where receptacles are located in wet or corrosive location.
 5. Receptacles shall comply with UL 498.
- E. Receptacles for Hazardous Locations:
1. Material: Factory-sealed receptacle suitable for installation in Class I, Group D hazardous locations. Copper-free aluminum receptacle and cover with cast gray iron alloy or cast malleable iron mounting box with zinc electroplate finish. Receptacle rated at 20 amperes, 125 to 250 volts AC, 2-wire, and 3-pole. Provide matching plug for each receptacle.
 2. Receptacles for hazardous locations shall conform to UL 1010.
 3. Products and Manufacturers: Provide one of the following:
 - a. Series CPS by Crouse-Hinds Company.
 - b. Type CPS by Appleton Electric Company.
 - c. Or equal.
- F. Ground Fault Interrupting Receptacles:
1. Duplex grounding receptacle, 2-pole, 3-wire, NEMA 5-20R configuration, 125-volt AC, 20 amperes, gray color with ground fault circuit interrupting (GFCI) protection.

2. Ground fault interrupting receptacles shall comply with UL 943.
 3. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover where shown on the Contract Drawings as “WP” or “WPU”, and provide where located in wet or corrosive location.
 4. Products and Manufacturers: Provide one of the following:
 - a. GFR5362SGY by Hubbell, Inc.
 - b. 2091-GRY by Pass & Seymour.
 - c. Or equal.
 5. Weather-resistant Ground Fault Interrupting Receptacles
 - a. Products and Manufacturers: Provide one of the following:
 - 1) 2095TRWRGRY by Pass & Seymour.
 - 2) Or equal.
- C. Surge Suppression Receptacles:
1. Duplex grounding, surge suppression receptacle, two-pole, three-wire, NEMA 5-20R configuration 125-volt AC, 20 amperes, blue color, capable of absorbing transient surge of 6,000 volts minimum. Receptacle shall include power-on indicator light.
 2. Surge suppression receptacles shall comply with UL 1449.
 3. Provide Type 302 stainless steel cover-plate conforming to UL 514D. Provide weatherproof-while-in-use cover when shown on the Drawings as “WP” or “WPU”, and provide where located in a wet or corrosive location.
 4. Products and Manufacturers: Provide one of the following:
 - a. HBL5362SA by Hubbell, Inc.
 - b. 5362BLSP by Pass & Seymour.
 - c. 5380-GY by Leviton Manufacturing Company.
 - d. Or equal.
- E. Weatherproof Covers:
1. Where receptacles are installed in damp locations as defined in area classification portion of Section 16050, General Provisions for Electrical Systems, provide receptacles as specified in Paragraphs 2.1.A through 2.1.D of this Section, as applicable, with weatherproof covers as specified below.
 2. Provide covers that are UL-listed weatherproof and suitable for use in damp locations in accordance with NEC 406.
 3. Material:
 - a. Gasketed spring door type for wet and corrosive locations. Plates in corrosive locations shall have factory-applied 40-mil PVC coating.
 - b. Stainless steel screws and hardware.

4. Products and Manufacturers: Provide one of the following:
 - a. Hubbell, Inc.
 - b. Crouse-Hinds Company.
 - c. Appleton Electric Company.
 - d. Or equal.
- F. Weatherproof-While-in-Use Covers:
1. Where receptacles are shown on the Contract Drawings as “WP” or “WPU”, and where receptacles are installed in wet locations as defined in area classification portion of Section 16050, General Provisions for Electrical Systems, provide receptacles as specified in Paragraphs 2.1.A through 2.1.D of this Section, as applicable, with weatherproof-while-in-use covers as specified below.
 2. Provide covers that are UL-listed, weatherproof while receptacle is in use, and are of ultraviolet-resistant construction suitable for outdoor use in accordance with NEC 406.
 3. Material:
 - a. Non-metallic box with hinged, non-metallic cover.
 - b. Sealing gaskets between box and cover.
 - c. Stainless steel screws and hardware.
 - d. Color: Gray finish
 4. Products and Manufacturers: Provide one of the following:
 - a. TayMac Corporation.
 - b. Pass and Seymour Type WIU
 - c. Or equal.
- G. Power Receptacles: 480-volt interlocked receptacle with enclosed safety switch service outlet. Provide service outlets, quantity as shown or indicated, for portable equipment.
1. Material: Copper-free aluminum enclosures with operating handle NEMA 4, with gasketed, hinged door.
 2. Switch: Heavy duty, 3-pole, with visible blades, quick make-a-break mechanism with reinforced, positive-pressure-type blade and fuse clips. Switch shall be mechanically interlocked with receptacle. Switch cannot be closed until plug is fully inserted and plug cannot be withdrawn or inserted unless switch is open.
 3. Receptacle: Single ground receptacle, 3-wire, 4-pole, 600-volt, (-- 1--) amp. Provide 2 matching plugs.
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Type WSR, and Type APS plugs by Crouse-Hinds Company.
 - 2) Or equal.

- H. Power and Special Receptacles: Provide receptacles with number of poles and voltage and current rating as shown or indicated. Coordinate with equipment plugs. Provide matching plug for each receptacle.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.2 INSTALLATION

- A. Non-hazardous Locations: Install receptacles at locations shown, in outlet or device boxes in accordance with Section 16136, Outlet Boxes.
- B. Hazardous Locations: Install receptacles in rigid metallic conduit systems.
- C. Install receptacles with ground pole in the down position.
- D. Mount receptacles 18 inches above finished floor in non-hazardous locations and 4.5 feet above finished floor in hazardous locations, in accordance with the Americans with Disability Act, unless otherwise shown or indicated in the Contract Documents.
- E. Mount receptacles 18 inches above finished floor in non-hazardous locations and 4.5 feet above finished floor in hazardous locations, unless otherwise shown or indicated in the Contract Documents.
- F. Install in conformance with NEC Laws and Regulations.
- G. Identification:
 - 1. Identify each conductor with circuit number and lighting panel number in accordance with Section 16075, Identification for Electrical Systems.
 - 2. Identify each receptacle with permanent phenolic tag. Tags shall include circuit number and lighting panel number.

END OF SECTION

SECTION 16142 SNAP SWITCHES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install snap switches for lighting and other systems.

B. Related Sections:

1. Section 16075, Identification for Electrical Systems
2. Section 16136, Outlet Boxes.

1.02 REFERENCES

A. Standards referenced in this Section are listed below:

1. UL 20, General Use Snap Switches.
2. UL 894, Switches for Use in Hazardous (Classified) Locations.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements

1. Americans with Disabilities Act

1.04 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for switches proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Switches for Non-Hazardous Locations:

1. Single pole AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, specification grade.

- a. Products and Manufacturers: Provide one of the following:
 - 1) Catalog No. 1221-I, by Harvey Hubbel, Inc.
 - 2) Catalog No. 1991-I, by Arrow-Hart, Inc.
 - 3) Catalog No. 20AC1-I, by Pass & Seymour
 - 4) Or equal.

 2. Single pole, three-way AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, specification grade.
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Catalog No. 1223-I, by Harvey Hubbell, Inc.
 - 2) Catalog No. 1993-I, by Arrow-Hart, Inc.
 - 3) Catalog No. 20AC3-I, by Pass & Seymour
 - 4) Or equal.

 3. Two-pole AC toggle switch, quiet type, 120/277-volt AC, 20 amperes, Ivory, specification grade.
 - a. Products and Manufacturers: Provide one of the following:
 - 1) Catalog No. 1222-I, by Harvey Hubbel, Inc.
 - 2) Catalog No. 1992-I, by Arrow-Hart, Inc.
 - 3) Catalog No. 20AC2-I, by Pass & Seymour
 - 4) Or equal.

 4. Switches in non-hazardous areas shall be UL-listed in accordance with UL 20.
- B. Switches for Hazardous Locations:
1. Material: Factory sealed tumbler switch suitable for installation in Class I, Group D hazardous locations. Cast gray iron alloy or cast malleable iron body and cover with zinc electroplate finish. Switch rated at 20 amperes, 120/277-volt AC.
 2. Switches in hazardous areas shall be UL-listed in accordance with UL 894.
 3. Products and Manufacturers: Provide one of the following:
 - a. Series EDS by Crouse-Hinds Company.
 - b. Type EDS by Appleton Electric Company.
 - c. Or equal.
- C. Switch Covers:
1. Indoor covers shall be Type 304 stainless steel.
 2. Outdoor, wet, or corrosive location covers shall be weatherproof and corrosion resistant.

D. Key Operated On-Off Switches:

1. Key operated switches shall be complete with legend plate and NEMA 4 enclosure and two keys for each switch.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work is to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install switches at locations as shown or indicated in the Contract Documents in outlet or device boxes, in accordance with Section 16136, Outlet Boxes.
- B. Mount wall switches 4.0 feet above finished floor, and in accordance with the Americans with Disability Act, unless otherwise noted.
- C. Identify each conductor with circuit number and lighting panel number. Identification shall be in accordance with Section 16075, Identification for Electrical Systems.

END OF SECTION

SECTION 16143 DISCONNECT SWITCHES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install disconnect switches.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16142, Snap Switches.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. UL 98, Enclosed and Dead-Front Switches.
2. NEMA KS 1, Enclosed and Miscellaneous Distribution Equipment Switches (600 Volts Maximum).
3. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 404, Switches.
2. Disconnect switches shall bear the UL label.

1.04 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Listing of each switch to be furnished, including location, rating, and NEMA enclosure type for each.

2. Product Data:
 - a. Manufacturer's technical information for disconnect switches proposed for use.

B. Maintenance Material Submittals: Submit the following:

1. Extra Stock Materials:
 - a. Furnish one set of spare fuses for each fused disconnect switch to be installed.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Provide products of one of the following:

1. Square-D Company.
2. Eaton/Cutler Hammer.
3. Siemens.
4. Or approved Equal

2.02 MATERIALS

A. Service Disconnect Switches:

1. Type: Fused, heavy-duty, single throw, quick-make, quick-break mechanism, visible blades in "OFF" position and safety handle.
2. Rating: Voltage, current and short circuit ratings and number of poles as shown or indicated on the Contract Drawings. Switch shall bear UL label indicating suitability for use as service equipment and shall comply with UL 98, NEMA KS 1, and NEMA 250.

B. Single Throw, Circuit Disconnect Switches:

1. Type: Fused or unfused, horsepower rated, heavy-duty, single throw, quick- make, quick-break mechanism, visible blades in the "OFF" position and safety handle.
2. Rating: Voltage and current ratings and number of poles as required for motor or equipment circuits being disconnected. Switches shall bear a UL label and shall comply with the requirements of UL 98, NEMA KS 1 and NEMA 250.

C. Double Throw Safety Switches:

1. Type: Unfused, double throw with center "OFF" position, quick-make, quick-break mechanism, visible blades in the "OFF" position, and safety handle.
2. Rating: Voltage and current ratings and number of poles as required for circuits being disconnected. Switches shall bear UL label and shall comply with UL 98, NEMA KS 1, and NEMA 250.

- D. Disconnect Switches for 120-volt, Single-phase Circuits:
 - 1. Refer to Section 16142, Snap Switches.
- E. Enclosures: NEMA rating shall be as required for area classifications specified in Section 16050, General Provisions for Electrical Systems or as shown on drawings.
- F. Identification:
 - 1. Identify enclosures in accordance with Section 16075, Identification for Electrical Systems.
 - 2. Provide nameplate to identify the equipment served by disconnect switch and associated source of power.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.
- B. Securely fasten equipment to walls or other structural supports on which they are mounted. Provide independent stainless steel supports where no wall or other structural surface exists. Mount disconnect enclosures at a height not exceeding six feet.
- C. Provide suitable 1/4-inch spacers to prevent mounting enclosure directly against walls with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install equipment so that sufficient access and working space is provided for ready and safe operation and maintenance.
- B. Securely fasten equipment to walls or other structural supports on which they are mounted. Provide independent stainless steel supports where no wall or other structural surface exists. Mount disconnect enclosures at a height not exceeding six feet.
- C. Provide suitable 1/4-inch spacers to prevent mounting enclosure directly against walls.

END OF SECTION

SECTION 16150 MOTORS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish, install, connect and test all motors as hereinafter specified and/or shown on the Contract Drawings. This work may necessarily include furnishing/installing, connecting and testing motors required by and/or furnished under other sections of these Specifications.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.
- A. The Contractor shall submit to the County five (5) sets of the certified motor manufacturer(s) dimension drawings showing nameplate data and outline dimensions within three (3) weeks of receiving the order.
- C. The Contractor shall submit to the County five (5) sets of the standard motor manufacturer(s) test results (per 3.02 A) for the motors after they are constructed prior to the motors being shipped.

PART 2 PRODUCTS

2.01 RATING

- A. Motors shall be of the type and size to perform the required duty without exceeding their design ratings. Motors driving pumps shall not overload at any head or discharge condition of their respective pumps.
- B. Motors shall not be operated into their service factor range on a continuous basis as a means of supplying motors smaller than required by the specific applications.
- C. Unless otherwise specified and/or shown on the Contract Drawings, the following shall apply:
 - 1. Motors 200 HP and above shall be the medium voltage type for use at 4,160 Volts, 3-phase, 60 Hertz; motors smaller than 200 HP shall be the low voltage type. Where motors 100 HP and larger are used at 480 Volts, 3-phase, 60 Hertz, they shall be suitable for autotransformer type reduced voltage starting.
 - 2. Motors 1/2 HP through 100 HP shall be dual voltage for use at 230/460 Volts, 3-phase, 60 Hertz.
 - 3. Motors 125 HP through 199 HP shall be single voltage for use at 460 Volts, 3-phase, 60 Hertz.
 - 4. Motors smaller than 1/2 HP shall be dual voltage for use at 120/240 Volts, single phase, 60 Hertz.
- D. Use inverter duty motors with all adjustable speed drive systems. These motors shall be built with Class F or Class H insulation systems, designed to operate at 70 degrees C rise over ambient at full load, and be provided with insulated bearings. The drive

system should always be located within 150 feet of the motor it is servicing.

2.02 POWER FACTOR CORRECTION CAPACITORS

- A. Motors 100 HP and larger shall be furnished with power factor correction capacitors. The capacitors shall be located in the motor controller. The motor manufacturer shall provide suitable capacitors to the motor controller manufacturer.
- B. Capacitors shall have both integral fuse protection and a discharge resistor. Capacitor current shall not exceed the motor no-load magnetizing current.
- C. Capacitor insulating media shall strictly conform to the requirements of the Environmental Protection Agency, particularly with regards to non-flammability and environmental safety.
- D. With power factor correction, motors shall have a minimum power factor of .95 at full load running conditions.

2.03 EFFICIENCY

- A. Medium voltage motors shall have a minimum efficiency of 95% at full load.
- B. Low voltage motors 15 HP and larger shall have a minimum efficiency of 93% at full load, 91% for TEFC motors.

2.04 SPACE HEATERS

- A. Motors 50 HP and larger shall have a 120 Volt, single phase space heater for moisture control. The space heaters shall be the motor manufacturer's standard wattage rating for the specific motor size and type.
- B. If a motor is on the job site longer than three (3) days prior to its final installation, the motor's space heater shall be energized and the space heater shall remain energized until such time as the motor is transported for immediate final installation.
- C. After final installation, the motor's space heater shall be energized and the space heater shall remain energized until final testing. After final testing, the motor's space heater shall be connected for normal operation.

2.05 CONSTRUCTION

- A. General
 - 1. All drip proof and weather protected Type I motors shall have epoxy encapsulated windings. Non-encapsulated motors used outdoors or in specified conditions shall be totally enclosed, TENV or TEFC as specified and/or shown on the Contract Drawings. Totally enclosed motors shall be designed for severe duty.
 - 2. Motor stators shall have copper windings. The individual steel stator laminations shall be made from quality at least as good as M22 silicon steel with a lamination thickness no greater than .019 inches. The stacking factor of the assembled stator core laminations shall be 90% or higher.

3. Squirrel cage rotor laminations shall be made from steel with quality at least as good as M22 silicon steel with a lamination thickness no greater than .019 inches. The stacking factor of the assembled rotor core shall be 90% or higher.
4. All applicable NEMA, ANSI, IEEE and U.L. standards will be strictly followed.
5. Motors shall have factory stamped stainless steel nameplates.
6. Motor frames 254T and larger shall have lifting lugs or "O" type bolts for ease in handling.

B. Medium Voltage Motors

1. Medium voltage motors shall be of the squirrel cage induction type, shall be NEMA Design B with normal starting torque, shall be rated 4,160 Volts, 3-phase, 60 Hertz, and shall have enclosures as specified and/or shown on the Contract Drawings.
2. The stator windings shall be epoxy encapsulated, Class B or better insulation, with a maximum stator winding temperature of 90EC by resistance above a 40EC ambient when operated continuously at 115% of rated horsepower, voltage and frequency. The insulation system shall comply with all applicable NEMA standards, including the conformance test of Bulletin MG-1, 20.48.
3. The stator windings shall be provided with six (6) resistance temperature detectors (RTD=s), two (2) per phase. The RTD=s shall be at least six inches long (where core stack length permits) and inserted approximately midway in the stator slot between the coil sides. The leads shall be brought to terminals in the low voltage terminal box and labeled according to their respective RTD. The motor manufacturer shall provide any necessary relays or hardware for the RTD=s to initiate an alarm or shut the motor down in the event the RTD=s have reached a predetermined set point temperature.
4. The motors shall be equipped with both space heaters and power factor correction capacitors per Item 2.04 and Item 2.02 above, respectively.
5. The motors shall have oil lubricated thrust bearings of the spherical roller or Kingsbury type as required by the application. Minimum bearing life, in conformance with AFBMA standards, shall be ten (10) years.
6. The bearings shall be provided with RTD's, the leads of which shall be brought to terminals in the low voltage terminal box. The motor manufacturer shall provide suitable relays to the motor controller manufacturer to mount in the motor controller.
7. Bearing housings shall be equipped with sight gauges, fillers and drain plugs.
8. The high voltage terminal box shall be of adequate size to accommodate the motor lead stress cones.
9. The low voltage terminal box shall contain a terminal strip for the leads of the space heaters, stator winding RTD's, and the bearing RTD's. All wiring shall be factory installed.
10. Lightning arrestors and surge capacitors shall be provided in the motor controller by the motor controller manufacturer specified in other sections of these Specifications.
11. Medium voltage motors shall be as manufactured by General Electric Company, U.S. Motor, Ideal Electric Company, or approved equal.

C. Low Voltage, 3-Phase Motors

1. Low voltage three phase motors shall be of the squirrel cage induction types,

shall be NEMA Design B with normal starting torque unless otherwise specified, shall be designed for continuous duty, with a 1.15 service factor, shall have a KVA/HP as defined by NEMA of code G or less, shall be rated per Item 2.01.C.2 and C.3 above, and as specified and/or shown on the Contract Drawings, shall have normal or high thrust bearings, and a drip proof or totally enclosed housing.

2. Motors shall have a Class B nonhygroscopic insulation system. Class F insulation may be used, but shall be limited to a Class B temperature rise.
3. The output shafts shall be suitable for either belt drive or direct connection as required by the particular application.
4. Motor frames and end shields shall be made of heavy, rigid cast iron or fabricated steel construction.
5. Motor shafts shall be made from high-grade, cold-rolled steel machined to standard NEMA dimensions.
6. Motors shall have heavy-duty precision ball bearings with a minimum AFBMA bid life of five (5) years. Bearings of high thrust motors shall be locked for a momentary upthrust of 30% downthrust.
7. Vertical hollow shaft motors shall have non-reversing ratchets to prevent backspin.
8. Totally enclosed motors shall have epoxy coated motor windings.
9. Motor conduit boxes shall be gasketed. Internal motor leads shall enter the conduit boxes through grommets.
10. All interior and exterior motor surfaces shall have a final coating of a chemically resistant corrosion and fungus protective epoxy fortified enamel finish sprayed over two (2) coats of a red primer. Stator bore and rotor shall be epoxy coated.
11. All machined surfaces shall be coated with a rust inhibitor for easy disassembly.
12. All fittings, bolts, nuts and screws shall be plated to resist corrosion. Bolts and nuts shall be hex type.
13. Low voltage, 3-phase motors shall be as manufactured by General Electric Company, U.S. Motors, or approved equal.

D. Low Voltage, Single Phase Motors

1. Single phase motors shall be either the split-phase or the capacitor-start induction types rated for the continuous horsepower at the RPM specified and/or shown on the Contract Drawings.
2. Motors shall be rated 120/240 Volts, single phase, 60 Hertz, shall have a NEMA Class B insulation system, and shall have a dripproof or totally enclosed housing as required by the particular application.
3. Motors shall have a corrosion protective finish on all internal and external surfaces. All fittings shall have a corrosion resistant plating.
4. Mechanical characteristics shall be the same as those specified above for low voltage, 3-phase motors.
5. Low voltage, single phase motors shall be as manufactured by U.S. Motors, Baldor, or approved equal.

E. D. C. Motors

1. D. C. motors shall be of the size, type, rating, duty and construction as specified and/or shown on the Contract Drawings.

2. D. C. motors shall be as manufactured by U.S. Motors, Baldor, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Unless otherwise specified and/or shown on the Contract Drawings, all motors shall be connected to the conduit system with a short section of flexible conduit, 18-inches minimum and 60-inches maximum.
- B. Flexible conduit used for motor connections of No. 6 AWG or smaller wire shall have an approved grounding conductor incorporated inside the flexible section.
- C. For motor connections of No. 4 AWG and larger wire, the Contractor shall install an appropriately sized grounding conductor in the conduit and terminate the grounding conductor at both the motor end and the motor controller end with approved grounding clamps or connectors.

3.02 TESTS

- A. Prior to shipment, all motors shall be given the manufacturer's standard tests. These tests shall include, but not necessarily be limited to, the following:
 1. No-Load current.
 2. Air gap measurement.
 3. High potential test.
 4. Shaft alignment.
 5. Shaft and rotor balance.
 6. Bearing alignment and lubrication.
- B. After installation, but prior to putting the motors into service, the Contractor shall perform the following minimum checks:
 1. Motor alignment.
 2. Motor clearances.
 3. Bearing alignment and lubrication.
 4. Correct rotation direction.
 5. Megger motor windings. If insulation resistance is found to be low, the Contractor shall notify the County immediately and shall not energize the motor.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16160 PANELBOARDS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, devices, and incidentals required and install all panelboards as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.

PART 2 PRODUCTS

2.01 RATING

- A. All panelboards shall be rated for the intended voltage. Panelboard ratings shall be as shown on the Contract Drawings.
- B. Panelboards shall be U.L. listed.

2.03 CONSTRUCTION

- A. Interiors
 1. Interiors shall be completely factory assembled with main breakers, bus bars, branch circuit breakers, wire connectors, etc.
 2. All wire connectors, except screw terminals, shall be of the anti-turn solderless type.
 3. All wire connectors shall be suitable for use with copper wires of the size(s) indicated on the Contract Drawings.
 4. Branch circuits shall be arranged using double row construction except where narrow column panels are called for on the Contract Drawings.
 5. Branch circuits shall be numbered by the panelboard manufacturer.
 6. Interiors shall be so designed that circuits may be changed without machining, drilling or tapping; without disturbing adjacent units; and without removing the main bus connectors.
 7. Interiors shall be durably marked by the manufacturer with the voltage, current rating and number of phases for which the panelboards are designed. The markings, which shall be visible after installation without disturbing the interior parts or wiring, shall also include the manufacturer's name or trademark.
 8. All current carrying parts, including cross connectors, shall be copper.
- B. Bus Bars
 1. The bus bars for the mains shall be sized as shown on the Contract Drawings.
 2. Both a full-capacity neutral bus and a separate ground bus shall be provided. Neutral bus bars shall have a suitable lug for each outgoing feeder requiring a neutral connection.
 3. Phase bus bars shall be full height without reduction.

4. Bus bar taps for panelboards with single pole branches shall be arranged for sequence phasing of the branch circuit devices.
5. Bus bars shall be braced to conform to industry standards for short circuit stresses in panelboards.

C. Circuit Breakers

1. The panelboards shall be equipped with circuit breakers, main and branch, with trip settings as shown on the Contract Drawings.
2. The circuit breakers shall be of the molded case, bolt-on type with the number of poles as shown on the Contract Drawings.
3. Circuit breakers used in 120/240 Volt and 120/208 Volt panelboards shall have a minimum interrupting rating of 10,000 Amperes RMS symmetrical.
4. Three-pole circuit breakers used in 480 Volt panelboards shall have a minimum interrupting rating of 14,000 Amperes RMS symmetrical.

D. GFCI (Ground Fault Circuit Interrupter)

1. GFCI units shall be provided for all circuits where shown on the Contract Drawings.
2. The GFCI units shall be 1-pole, 120 Volt, molded case, bolt-on circuit breakers incorporating a solid state ground fault interrupter circuit which shall be insulated and isolated from the breaker mechanism.
3. The GFCI units shall be U.L. listed Class A, Group I devices (5 milliamp sensitivity, 25 millisecond trip time), and shall have an interrupting capacity of 10,000 Amperes RMS symmetrical.

E. Enclosures, Covers and Trim

1. The enclosures shall be of the NEMA Type (1, 3R, 4, 4X, 12), material (code gauge steel, stainless steel, fiberglass), and mounting configuration (flush, surface) as shown on the Contract Drawings.
2. Enclosures shall be of sufficient size to provide a minimum 4-inch gutter space on all sides. At least four (4) interior mounting studs shall be provided for each enclosure. Enclosures shall be furnished without conduit knockouts. Enclosures shall have hinged doors which cover all circuit breaker handles.
3. Stainless steel enclosures and covers shall have a natural metal finish. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
4. Fiberglass enclosures and covers shall be the manufacturer's standard color. Enclosures and covers shall be joined together with a concealed piano type stainless steel hinge. Conduit openings in the enclosures shall be field drilled and, if applicable, tapped.
5. Code gauge steel enclosures and covers shall be galvanized steel finished as per Item 2.03.E.7 below. Enclosures and covers shall be joined together with a concealed piano type hinge. Conduit openings in the enclosures shall be field punched.
6. Code gauge steel enclosures shall have panel trims of code gauge sheet steel. Trims for flush mounted enclosures shall overlap the enclosures by at least 3/4-inch all around. Surface mounted enclosures shall have trims the same height and width as the enclosures. Trims shall be fastened to the

- enclosures with quarter-turn clamps or screws.
7. All interior and exterior surfaces of the panelboards, enclosures and trims shall be properly cleaned, painted with a rust inhibitor (two coats), and over-coated with ANSI Z55.1, No. 61 light gray paint. The finish paint shall be of a type to which field applied paint will adhere.
 8. The inside surface of each cover shall have a directory frame with a transparent cover and a directory card.
 9. Covers shall have semi-flush type cylinder locks and catches, except that covers over 48-inches in height shall have vault handles and 3-point catches, complete with lock, arranged to fasten at top, bottom and center. Two (2) keys shall be furnished for each lock and all locks shall be keyed alike.

F. Manufacturer

1. 120/240 Volt and 120/208 Volt panelboards shall be type NQOD with QOB bolt-on circuit breakers as manufactured by the Square "D" Company or approved equal.
2. 480 Volt panelboards shall be the I-Line type as manufactured by the Square "D" Company or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Surface mounted panelboards shall be installed using spacers so that there is an air space between the enclosure and the mounting surface.
- B. Unless otherwise shown on the Contract Drawings, the tops of the enclosures shall be mounted at a height of 6-feet above the floor. The enclosures shall be properly aligned, true-and-square, and shall be adequately supported independently of the connecting conduits.
- C. All panelboard wiring shall be neatly formed, grouped, laced, and identified to provide a neat and orderly appearance.
- D. The Contractor shall type on the directory card the description/use of each active circuit. "Spare" shall be indicated in erasable pencil!

3.02 TESTS

- A. Each individual circuit breaker, including the main breaker and the GFCI breaker(s), shall be tested for proper operation under the appropriate overload/ground fault conditions.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

**SECTION 16215
ELECTRICAL POWER DISTRIBUTION STUDIES**

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, professional services, and incidentals required to perform electrical power distribution system studies on the following equipment:
 - a. New main circuit breaker.
 - b. New generator circuit breaker.
 - c. New automatic transfer switch.
 - d. New switchboard, including all equipment connected.
 - e. New manual transfer switch
 - f. New VFDs
 - g. New 120/208V panelboard
2. Motor starting and transformer information used in electrical power distribution system studies shall be based on equipment provided by CONTRACTOR equipment provided by other contractors on the project and, where applicable, existing equipment ratings and settings.
3. Electrical power distribution system studies shall include the following, as specified in this Section:
 - a. Short-circuit study.
 - b. Protective device evaluation study.
 - c. Protective device coordination study.
 - d. Arc flash analysis

B. Related Sections:

1. Section 16050, Electrical General Provision
2. Section 16075, Identification for Electrical Systems.
4. Section 16921, Motor Control Centers

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/IEEE C37.91, Guide for Protective Relay Applications to Power Transformers
2. ANSI/NCSL Z540.3 Requirements for the Calibration of Measuring and Test Equipment.
3. IEEE 141, Recommended Practice for Electric Power Distribution in Industrial Plants (IEEE Red Book).
4. IEEE 242, Recommended Practice for Protection and Coord. of Industrial and Commercial Power Systems (IEEE Buff Book).

5. IEEE 399, Analysis (IEEE Brown Book), Recommended Practice for Power System Analysis.
6. IEEE 1584-2018, Guide for Performing Arc-Flash Hazard Calculations.
7. NFPA 70E, Electrical Safety in the Workplace.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Professional Engineer:

- a. Engage a registered professional engineer legally qualified to practice in the jurisdiction where the Project is located and experienced in providing engineering services of the kind indicated. Professional engineer may be employed by independent consulting firm or manufacturer of power distribution equipment.
- b. Professional engineer shall have not less than five years of experience performing electrical power distribution system studies similar in scope and size to the studies required for the Project.
- c. Submit qualifications data.
- d. Responsibilities include but are not necessarily limited to:
 - 1) Performing or supervising the performance of electrical power distribution system studies and related field services.
 - 2) Preparing or supervising the preparation of test plans and test reports, and interpretation and engineering analysis of test data. Test reports shall bear the seal and signature of the professional engineer. State of licensure, license number, and professional engineer's name shall be clearly legible on the seal.
 - 3) Certifying that tests performed and results achieved conform to the Contract Documents.

2. Field Engineer:

- a. Field engineer performing protective device testing shall be experienced in type of testing required and testing equipment used on the Project.
- b. Field engineer may be an employee of the protective device equipment manufacturer.

- #### B. Test equipment and instrument calibration shall comply with accuracy standards of NIST and ANSI/NCSL Z540.3.

1.04 SUBMITTALS

- A. Shop drawings and product data as described in Division 1.
- B. In addition, submit the following:

C. Action Submittals: Submit the following:

1. Studies:
 - a. Calculations and results of the short-circuit study, protective device evaluation, and coordination studies in report format. Report shall be sealed and signed by the professional engineer retained for the studies. Submit preliminary reports (when specified) and final reports.
 - b. Time current curves for protective devices included within the power system studies.
 - c. Calculations and results of arc-flash analysis in report format sealed and signed by professional engineer retained for the studies. Submit preliminary reports (when specified) and final reports.
2. Testing Plan: Submit work plan for field testing. Submit and obtain ENGINEER'S approval prior to performing tests. Plan shall indicate schedule of field testing, time frames for tests, and duration of equipment outage for testing. Submit shutdown requests for each outage in accordance with Section 01 14 16, Coordination with Owner's Operations.
3. Field Survey Plan: Submit work plan for field survey and data gathering prior to beginning work. Plan shall indicate the schedule of work, time frames for data collection, and duration that equipment will be temporarily out of service. Submit shutdown requests for each outage in compliance with Section 01 14 16, Coordination with Owner's Operations.

D. Informational Submittals: Submit the following:

1. Test Reports:
 - a. Results of field testing.
2. Qualifications Statements:
 - a. Professional engineer.
 - b. Field engineer, when required by ENGINEER.

E. Closeout Submittals: Submit the following:

1. Final settings of protective devices. Submit compilation of final settings for each equipment lineup within 10 days of programming the associated protective devices.
2. Electronic Files:
 - a. Protective Devices:
 - 1) Settings for all microprocessor-based protective devices.
 - 2) Software versions used to program the protective devices.
 - b. Electrical Power Distribution System Studies:

- 1) Upon ENGINEER's approval or acceptance, as applicable, of submittals required under this Section, submit for OWNER's use all electronic files developed for the Work under this Section associated with the approved or accepted, as applicable, submittal to ENGINEER.
- 2) Electronic files submitted for OWNER's use shall become OWNER's property.
- 3) Source files for power studies performed under this Section.

1.05 ELECTRICAL POWER DISTRIBUTION SYSTEM STUDIES

A. General:

1. Perform a current and complete short-circuit study, protective device evaluation study, and protective device coordination study for the Site's electrical distribution system. Perform studies in accordance with IEEE 141, IEEE 242, and IEEE 399.
2. Studies shall include all portions of high-, medium-, and low-voltage electrical power distribution systems, from the normal and alternate sources of power through low-voltage distribution system. Thoroughly cover in the study normal system operating method, alternate operation, and operations that could result in maximum fault conditions.
3. Perform a complete study to evaluate both new and existing devices, and include recommendations on required adjustments. Studies shall include both the normal utility supply and standby generator systems.
4. Promptly bring to attention of ENGINEER and OWNER problem areas and inadequacies in equipment.
5. Perform both preliminary and final short-circuit and coordination studies. Preliminary study shall verify adequacy of equipment's short-circuit ratings and establish preliminary settings required prior for energizing equipment. Perform final short-circuit and coordination study and arc flash analysis after ENGINEER's acceptance of preliminary study, but not later than the date when equipment installed under the Project is placed into service. Study data shall include the following:
 - a. Preliminary Short-circuit and Coordination Study: Base the evaluation on the worst case operating mode. Include the utility-confirmed contribution plus an additional 5 percent. Base the evaluation on estimated cable lengths, and proposed equipment and protective devices.
 - b. Final Short-circuit and Coordination Study: Base the evaluation on utility-confirmed contribution. Evaluate the distribution system under each of the various operating modes. Base the evaluation on actual confirmed cable lengths, and installed equipment and protective devices.

B. Short-circuit Study:

1. Perform short-circuit evaluation using computer software specifically designed for such use.

2. Input data shall include electric utility company's short-circuit, single-, and three-phase contributions, with reactance/resistance (X/R) ratio, resistance and reactance components of each branch impedance, motor and generator contributions, base quantities selected, and other applicable circuit parameters.
 3. Calculate short-circuit momentary duties and interrupting duties on the basis of maximum available fault current at each switchgear bus, switchboard, motor control center, distribution panelboard, pertinent branch circuit panelboards, and other significant locations through the system.
 4. Short-circuit tabulations shall include symmetrical fault currents and X/R ratios. For each fault location, total duty on the bus and individual contribution from each connected branch, including motor back electromotive force (EMF) current contributions, shall be listed with its associated X/R ratio.
- C. Protective Device Evaluation Study:
1. Determine adequacy of circuit breakers, controllers, surge arresters, busways, switches, and fuses by tabulating and comparing short-circuit ratings of these devices with the available fault currents.
 2. Apply appropriate multiplying factors based upon system X/R ratios and protective device rating standards.
- D. Protective Device Coordination Study:
1. Perform study to select or to check selections of power fuse ratings, protective relay characteristics and settings, ratios and characteristics of associated voltage and current transformers, and low-voltage breaker trip characteristics and setting.
 2. Overcurrent device settings estimated in the protective device coordination study shall provide complete, 100 percent selectivity. Selectively coordinate system such that only the device nearest a fault will operate to remove the faulted circuit. System selectivity shall be based on both the magnitude and duration of a fault current.
 3. Study shall include all voltage classes of equipment starting at electric utility's incoming line protective device, down to and including medium- and low-voltage equipment. Phase and ground overcurrent and phase and ground fault protection shall be included, and settings for other adjustable protective devices.
 4. Plot time-current characteristics of installed protective devices on appropriate log-log paper. Maintain reasonable coordination intervals and separation of characteristic curves. Provide coordination plots for phase and ground protective devices for complete system. Use sufficient curves to clearly indicate selective coordination achieved through electric utility's main breaker, power distribution feeder breakers, and overcurrent devices at each major load center.
 5. Show maximum of eight protective devices per plot. Appropriately title each plot and include the following information as required for the circuits shown:

- a. Representative one-line diagram, legends, and types of protective devices selected.
 - b. Power company's relays or fuse characteristics.
 - c. Significant motor starting characteristics.
 - d. Parameters of transformers, magnetizing inrush and withstand curves in accordance with ANSI C37.91.
 - e. Operating bands of low-voltage circuit breaker trip curves, and fuse curves.
 - f. Relay taps, time dial and instantaneous trip settings.
 - g. Cable damage curves.
 - h. Symmetrical and asymmetrical fault currents.
6. Provide selection and settings of protective devices separately in tabular format listing circuit identification, IEEE device number, current transformer ratios, manufacturer, type, range of adjustment, and recommended settings. Provide a tabulation of recommended power fuse selection for all fuses in system.

E. Arc-Flash Analysis:

- 1. Conduct arc flash analysis after acceptance by ENGINEER of short-circuit study and coordination study. Perform arc flash analysis for each operating mode of the system, in accordance with IEEE 1584-2018 and NFPA 70E. Arc-Flash Analysis shall be performed on all new gear and any existing gear touched by the project. At minimum, this shall include MV Switchgear and MCC level modifications.
- 2. Document the protection and calculation procedures and coordination review in testing report. Present analysis results in tabular format showing the following:
 - a. Bus and protection device name.
 - b. Bolted and arcing fault values.
 - c. Protective device trip times.
 - d. Arc flash boundary, working distance, and incident energy.
 - e. Required protective flame-resistant (FR) clothing class.
- 3. Arc-Flash labels shall be provided for all equipment where Arc-Flash Analysis is performed, and equipment is not already provided with arc flash labels. Provide labels in accordance with NFPA 70E. Labels shall include at minimum:
 - a. Danger or Warning header
 - b. Working Distance for incident energy calculation
 - c. Minimum Arc Rating (calories/cm² or Joules/cm²)
 - d. Arc Flash Boundary
 - e. PPE Category
 - f. Limited Approach and Restricted Approach boundaries
 - g. Voltage

1.06 STUDY REPORT

- A. Summarize results of electrical power distribution system studies in a typed or computer-printed report that includes the following:
 - 1. One line drawing of system equipment studied showing equipment identity and rating, bus and cable connections with size and labels and breaker settings.
 - 2. Description, purpose, basis, written scope, and single-line diagram of power distribution systems evaluated.
 - 3. Tabulations of circuit breaker, fuses, and other equipment ratings versus calculated short-circuit duties. Evaluation of short-circuit calculations and identification of underrated equipment.
 - 4. Protective device time versus current coordination curves, tabulations of relay and circuit breaker trip settings, and fuse selection. Include an evaluation and discussion of logical compromises for proposed protection.
 - 5. Fault current tabulation including definition of terms and guide for interpretation.
 - 6. Tabulation of appropriate tap settings for relay seal-in units.
 - 7. Tabulation of equipment survey information.
- B. Electrical power distribution system studies report shall include a separate section addressing arc flash analysis. In addition to protection and calculation procedures, and coordination review and analysis results, report shall include protective device evaluation for each high-incident energy case to determine if adjustments can improve system performance relative to arc flash hazard level.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.01 TEST AND EVALUATION FIRM

- A. Power distribution system studies shall be performed by one of the following:
 - 1. Rozel

3.02 PREPARATION

- A. General:
 - 1. Coordinate with professional engineer performing the studies and assist professional engineer with collecting information necessary to complete the specified studies.
 - 2. Prior to performing studies, obtain information pertaining to existing system necessary for performing studies.

3.03 FIELD SERVICES

- A. CONTRACTOR'S professional engineer shall conduct an equipment survey and data gathering of existing devices and information necessary to perform electrical power distribution system studies.
- B. To the extent applicable, perform survey that includes the following information:
 - 1. Manufacturer, type, and size of each power fuse.
 - 2. Manufacturer, type, model, and settings for each protective relay, trip unit, and circuit breaker.
 - 3. Current transformer ratios for each protective relay.
 - 4. Appropriate data for motors and transformers included with the study.
- C. CONTRACTOR'S professional engineer shall confirm and establish proper settings for protective devices. Professional engineer shall collect data and coordinate with equipment Suppliers to establish proper settings for the devices provided. Document in the study all devices and settings.

3.04 FIELD TESTING

- A. Site Tests:
 - 1. Provide protective device field testing for new and existing equipment effected by this project or outlined in this study, in accordance with manufacturers' recommendations. Field testing shall be by CONTRACTOR'S field engineer, after submittal of and ENGINEER'S acceptance of electrical power distribution system studies. Field testing results shall be documented in a report that shall include final settings of protective devices.
 - 2. Field engineer shall provide necessary tools and equipment and adjust, set, calibrate, and test protective devices. Protective relays and meters in medium- and low-voltage equipment shall be set, adjusted, calibrated, and tested in accordance with manufacturers' recommendations and the coordination study. Provide minor adjustments, repairs, and lubrication necessary for proper operation.
 - 3. Electromechanical protective relays provided in accordance with the Contract Documents shall be set and tested for acceptance. Testing shall include visual and mechanical inspection. Testing shall include overcurrent time and pick-up tests.
 - 4. Solid state and multi-function trip devices shall be set, including required programming necessary for the protection required. Devices shall be checked, configured, and tested for setting and proper operation.

3.05 MAINTENANCE OF OPERATIONS

- A. Field testing may require that certain equipment be temporarily taken out of service. CONTRACTOR shall perform the Work with due regard to the need of OWNER for continuance of operations and in accordance with sequencing required in the Contract Documents, and in accordance with Owner's Operations.

Submit testing procedures and schedules and obtain acceptance by ENGINEER prior to starting testing and related Work.

3.06 INSTALLATION

- A. Provide personnel protective equipment labels in accordance with Section 16075, Identification for Electrical Systems. Arc-Flash labels shall be provided for all equipment where Arc-Flash Analysis is performed, unless equipment already provided with arc flash labels.
 - 1. Supplier Services: Provide training for OWNER's operation and maintenance personnel in personnel protection equipment. Provide at least 2 hours of training.

END OF SECTION

SECTION 16231 EMERGENCY GENERATOR SET

PART 1 GENERAL

1.01 SCOPE

- A. Provide and install complete and operable UL 2200 listed emergency/standby electric generating systems which contain all the devices and equipment specified herein and/or required for the service. Equipment shall be new, factory and field tested, installed, and ready for operation. Timely service and reliability after the installation is accepted are critical in the choice of equipment.
- B. The engine is to be of sufficient horsepower to drive the generator under full load conditions. It shall be 4-cycle, fueled with a diesel sub-base fuel tank and cooled with a closed looped radiator system. The generator is to be a low reactance brushless generator, with torque matched excitation and automatic voltage regulation. There is to be a set-mounted control panel with vibration insulators between it and the generator set. The generator, controls and associated cooling and exhaust systems are to be housed in a suitable weather protected enclosure which is to be permanently installed outdoors. The automatic transfer switch shall be installed in a separate NEMA 4X SS secure enclosure.
- C. Where conflict between drawings, specifications or code occurs, the Contractor shall assume and provide the more stringent of the alternatives to the County.
- D. Contractor shall secure all required building permits including the electrical, concrete and fire department reviews. Contractor to provide all required drawings and certifications required to secure these permits. If indicated below, contractor will also provide Flood Certification.

1.02 RATINGS

- A. Generator set at site number 1 is to be installed at:

MISSIONARY VILLAGE LIFT STATION

_____, Florida

This generator set is to be of suitable power to drive a total of 3 submersible 480 volt, 125 horsepower induction motor pumps, the current main breaker for the station is 600 ampere. This site shall be fueled by a diesel sub-base fuel tank. ATS with manual by-pass switch is required at this site. This site is not in a flood zone and flood certification is not required.

PLEASE NOTE : The induction pump motors providing the loads at the above sites all have the following characteristics and the generator sets supplied with this contract are to be built and sized bearing these facts in mind:

- 1. NEMA LRA Code H
- 2. Started with full voltage starters-maximum allowable voltage dip at start is

20%-loading will be sequential, (i.e., after each pump is brought up to speed the next one will be started)

3. 480 VAC
4. 3 Phase
5. 60 HZ.

ALSO: Each generator is to be built with the following characteristics/conditions:

1. Generator sized as a sequence load.
2. Standby Emergency Rating
3. Power Factor = .8
4. Site Altitude = 100 feet
5. Range of Site Ambient Temperatures = 20 - 120° F.

1.03 GENERATOR SET PERFORMANCE

- A. The voltage regulation of each set shall be $\pm .5\%$ of rated voltage for any constant load from the range of no load to full rated load.
- B. The frequency regulation of each set shall be accomplished through an isochronous electronic governor from the range of steady state no load to steady state full rated load.

1.04 SUPPLIER

- A. The complete package - engine, generator and other auxiliary components shall be provided from a single manufacturer/supplier. Other required items such as the enclosure, fuel tank, and automatic transfer switching equipment manufactured by others shall all be packaged together before delivery by the manufacturer / supplier. The supplier shall be the manufacturer's authorized distributor who shall maintain a service center capable of emergency maintenance and repairs with a consistent record of a maximum of four hours response time. The supplier shall have 24 hour/365 days per year service availability and factory trained service technicians authorized and capable to perform warranty service on all warrantable products.

1.05 SUBMITTALS

- A. Prior to and a requirement of contract award, the apparent low bidder shall provide references from at least 3 local municipalities or other businesses that have at least 5 similar type emergency generators in service with response time requirements similar to this contract. The actual service responses will be verified for response time consistency and customer satisfaction.
- B. As a minimum for all equipment specified and provided submit the following in pdf format to Manatee County. No equipment is to be ordered until the submittal is approved:
 1. Specification and application data sheets for the entire system supplied.
 2. Supporting calculations and/or documentation signed and sealed by a Professional Engineer licensed in the State of Florida in support of the

proposed pump capacity, reinforced concrete pad design, concrete anchors, and 160 mph wind load calculations in support of the concrete pad design and concrete anchors.

3. Shop drawings showing a dimensioned outline plan and elevation views of the system with certified overall and interconnection point dimensions. Indicate fabrication details, dimensions, weights, loads, required clearances, components, location and size of each field connection and method of field assembly.
4. Manufacturer's installation instructions.
5. Interconnection wiring and piping diagrams which show all external connections required. Show field wiring terminals with markings in a consistent point to point manner.
6. Manufacturer's certification of prototype testing which show evidence of compliance with specified requirement.
7. Manufacturer's applicable published warranty documents.
8. Shop drawings of the enclosure indicating basic layout, materials, and color. A color swatch shall be submitted for review.

C. Prior to the County's acceptance of generator site(s), the Contractor shall submit the following for each generator site(s):

1. Generator field test results showing compliance with the specifications.
2. Signed and sealed final record site plan prepared by a Professional Surveyor registered in the State of Florida showing all existing and new above ground facilities / improvements, new underground conduit and fuel line locations, and property corners. A CAD file of the project survey can be requested from the County, if available.

The following information shall be provided on the final record site plans:

Location in X & Y	ATS, natural gas meter (if applicable)
Location in X, Y & Z	Egen slab, fuel tank slab (if separate from Egen slab), all new underground pipes and conduits
Location in Z (elevation)	top of fuel tank, bottom of ATS, bottom of Egen (if not on top of a fuel tank)
Call outs	Egen size in KW, conduit size, fuel tank size in gallons (if applicable)

C. A single O&M manual shall be provided that covers all parts of the generator system and controls for all installations contained in this contract. It shall be tabbed for each different size or type of equipment. The cover page shall indicate the manufacturer, date and contract number as well as listing all pump station sites it applies to.

1.06 WARRANTY

- A. A comprehensive, no deductible warranty shall be supplied for the complete electrical power system (the generator set, controls and associated switches, switchgear, automatic transfer switch and all accessories) supplied for each installation. The complete systems shall be warranted by the manufacturer against defects in materials and workmanship for a period of five years or 1500 hours of operation; whichever occurs first from the date of system startup. This warranty coverage shall include parts, labor, and travel expenses.
- B. The warranty of the coating of the enclosure and fuel tank shall be a non-deductible, unlimited warranty against rust and corrosion of any coated part of the enclosure for a period of ten years.

PART 2 PRODUCTS:

2.01 EMERGENCY GENERATOR

- A. Each generator shall be:
 - 1. Used for 60 Hz Operation, 460 Volt output voltage
 - 2. 4- Pole - 1800 RPM - Revolving Field Synchronous Machine
 - 3. Stator Winding to be .667 Pitch
 - 4. Air Cooled by Shaft Mounted Fans
 - 5. 12 Leads for Output Connections
 - 6. Class H Insulation System
 - 7. Temperature Rise by Resistance not to Exceed 125° C at Full Load
 - 8. The stator shall have vacuum impregnated windings with fungus resistant epoxy varnish.
- B. Utilize a permanent magnet generator for excitation power to an automatic voltage regulator. The permanent magnet generator shall sustain main field excitation power for optimum motor starting and to sustain short circuit current for selective operation and coordination of system over current devices.
- C. The automatic voltage regulator shall be a temperature compensated solid state design. It shall be equipped with 3-phase RMS sensing. The regulator shall control buildup of AC generator voltage to provide a linear rise and limit overshoot. The regulator shall include an under frequency rolloff torque-matching characteristic which shall reduce output voltage in proportion to frequency below a threshold of 58 hz. The torque matching characteristic shall include differential rate of frequency change compensation to use maximum available engine torque and provide optimal transient load response. Regulators which use a fixed voltage per hz. characteristic are not acceptable.
- D. Provide a generator main circuit breaker. This breaker is to be set mounted and wired, molded case thermal-magnetic rated for proper generator set operation. The breaker shall be UL listed. Field circuit breaker shall not be acceptable for the purpose of generator overcurrent protection. The generator circuit breaker shall incorporate:

1. Tripping characteristic: designed specifically for generator protection.
 2. Trip rating is to be matched to generator rating.
 3. Shunt Trip: Connected to trip breaker when generator set is shut down by other protective devices.
 4. Mounting Position: Adjacent to or integrated with control and monitoring panel.
- E. Provide a microprocessor-based unit that will continuously monitor current level in each phase of generator output. When signaled by the protector or other generator set protective device, a shunt-trip device in the generator disconnect switch shall open the switch to disconnect the generator from the load circuits. This microprocessor-based unit shall also:
1. Initiate a generator overload alarm when the generator has operated at an overload equal to 110% of full load for 60 seconds.
 2. Under single or three phase fault conditions, it shall regulate the generator to 300% or rated full load current for up to 10 seconds.
 3. When the heating effect of overcurrent on the generator approaches the thermal damage point of the unit, the processor shall switch the excitation system off and open the generator disconnect switch to shut the generator down.
 4. Sense the clearing of a fault by other overcurrent devices and control the recovery of the rated voltage to avoid overshoot.
- F. Leads for water jacket heaters and space heaters shall be housed in their own separate conduit box.
- G. Provide alternator strip heater or thermostatically controlled space heater(s) per manufacturer's recommendation to keep moisture out of the windings.

2.02 INSTRUMENTATION AND CONTROL

- A. Each generator set is to be capable of being started and shutdown through an automatic transfer switch or manually.
- B. Manually, the control shall have automatic remote start capability from a panel mounted three position (Stop, Run, Remote) switch. When the control panel is selected to the "Run" position, the generator set starts and runs. When selected to the "Stop" position, a shutdown is initiated. The "Remote" position allows the set to be operated from a remote location.
- C. An emergency stop button will also be installed to shut the system down. This button should be red, a minimum of two inches in diameter, labeled "STOP" and installed in a conspicuous location on the generator set. It shall be reusable and resettable.
- D. The control shall shut down and lock out upon: failing to start (overcrank), overspeed, low engine oil pressure, high engine coolant temperature, or operation of a remote manual stop station. A panel mounted switch shall reset the engine monitor and test all the lamps. Lamp indications on the control panel shall include as a minimum:

1. Overcrank Shutdown - Red
2. Overspeed Shutdown - Red
3. High Coolant Temperature - Red
4. Low Engine Oil Pressure - Red
5. High Engine Coolant Temperature Prealarm - Yellow
6. Low Engine Oil Pressure Prealarm - Yellow
7. Low Fuel - Yellow
8. Run - Green

E. Each generator set is to be set up by the manufacturer to indicate to a remote location through the County's RTU system:

1. When generator set is in operation.
2. When generator fails (no commercial or generator power).
3. When low fuel level is reached in the fuel tank.

The contractor shall install four wires from the generator control panel to the RTU control panel; wire type shall be 16 AWG, 16 strand flexing type MTW or TFFN 600 volt. The County's RTU system uses discrete- type signals with N/O type contacts. County shall make the actual connections to the RTU system.

The wire coloring scheme shall be:

- | | |
|---------|---|
| Brown - | generator run |
| Red - | generator fail |
| Yellow- | low fuel/low pressure (natural gas) |
| Orange- | common to alarms and connected to control panel power either 24-volt DC or AC |

F. Regulation of NFPA 110 Level 2 shall apply for instrumentation, alarm and shutdown. The instrument panel shall include, but not necessarily be limited to:

1. Gages for engine: with $\pm 2\%$ full scale accuracy:
 - a. Oil Pressure
 - b. Engine Coolant Temperature
 - c. Voltmeter for the DC Battery
2. Gages for generator: with $\pm 2\%$ full scale accuracy:
 - a. AC Ammeter - dual range
 - b. AC Volt Meter - dual range
 - c. Frequency Meter - range of 45-65 Hz.
3. Elapsed Time Meter
4. 0-3000 RPM Tachometer - with $\pm 2\%$ full scale accuracy.
5. A seven-position phase selector switch with "OFF" position to show meter display of current and voltage of each generator phase. This selector switch may be manual or push-button.
6. A power source with circuit protection - 12 or 24 VDC.
7. An AC interlock to prevent starter re-engagement with engine running.
8. DC circuit protection.

9. A minimum of two panel lamps to illuminate instrument panel.

G. Switches and Controls

1. Rheostat for adjusting output voltage of the generator to $\pm 5\%$ of nominal voltage.
2. Over voltage protection shutdown switch.
3. Emergency stop switch mounted on control panel.
4. Engine start switch - with Run, Off, Reset, Automatic positions.
5. Five minute engine cool down timer.
6. Cyclic cranking switch.

H. All electrical penetrations in any enclosure shall be properly sealed from the weather.

I. Primary power disconnect switch on the LS control panel shall be identified with an NFPA compliant Main Disconnect label.

2.03 ENCLOSURE

A. The generator set and all the equipment supplied in this contract, shall be operated in a stationary outdoor environment.

1. Require weather protected enclosures. These enclosures shall protect the unit and all equipment and devices from the elements of the weather to include rain and winds.
2. The enclosure shall meet all federal, state, and local regulations.
3. All enclosures, boxes, trays, etc shall have weep holes for condensation or water intrusion drainage. Any oil containment / catchment areas shall have provision to completely drain off water. The enclosure shall provide adequate ventilation for cooling and operation under full load conditions.
4. The enclosure shall be constructed of aluminum with a minimum 14 gauge thickness. The enclosure shall have an electrostatically applied, baked on, powder coated enamel or polyester finish a minimum of 2.5 mil thick. The color of the powder coating shall be similar to "Buff" or Pantone Green 5545 C, as noted on the drawings, and must be approved by Manatee County prior to installation of the product.
5. The housing shall have hinged side access doors and a rear control door that are easy to remove. The side panels shall be easy to remove to allow access to all areas of the pump. All doors shall be secured by lockable handles as provided by the manufacturer or at a minimum with padlock hasps, so the County can install a standard padlocks.
6. All exterior assembly hardware, bolts and/or screws, handles, hinges, and hasps shall be 316 stainless steel. All exterior bolts and/or screws shall be tamper-proof. All tamper-proof screws shall utilize the 6 lobe pin TX or Torx® pin-head security fasteners. A neoprene washer shall be installed between all bolts/nuts/washers and the enclosure's exterior finish.
7. The housing shall be factory assembled to the generator set skid base. The skid base shall be firmly fastened to a concrete foundation pad which is to

be provided and installed as part of this contract. The connections shall be adequate to avoid movement from both wind and vibration loading. The skid base / framing surface protection coating shall be per the fuel tank coating requirements. All metal surfaces coming in contact with concrete or grout shall be coated with coal tar epoxy equal to Koppers 300M or a 1/32-inch neoprene gasket between the metal surface(s) and the concrete or masonry may also be used. The neoprene gasket shall be installed along the entire perimeter, not just at the fastening hardware.

8. The engine and generator shall be removable from the base for maintenance purposes.
9. The skid is to have adequate strength and rigidity to maintain alignment of mounted components without depending on the concrete foundation. Lifting attachments shall be arranged to facilitate lifting with slings without damaging any components.
10. The base shall incorporate a battery tray with battery hold down clamps within the rails. Provisions for stub up of electrical conduits shall be within the footprint of the set. Vibration isolation shall be integral between the generator set and base.
11. The enclosure shall be a low noise or sound attenuated enclosure. The noise level at any load operating condition, in any direction from the enclosure, shall not exceed 75 dBA at a distance of five (7) meters from the enclosure unless noted otherwise on the plans

2.04 ENGINE

- A. The engine shall be a 4-cycle, direct injection diesel (or carbureted natural gas) with forged steel crankshaft and connecting rods suitable for continuous operation. It shall be designed for stationary applications and shall be complete with all necessary auxiliaries needed for operation of the AC generator. The engine block shall be cast iron construction.
- B. The engine shall have an electronic governor which shall provide isochronous frequency regulation.
- C. The engine shall have an electric starter and battery(ies). See the Starting System section for further details.
- D. The engine shall have a mechanical, positive displacement, engine driven, lubrication oil pump. Provide full flow lubrication oil filters with replacement spin-on canister elements. Provide a dipstick for oil level indication and an easily accessible fill location.
- E. Supply a replaceable dry element air cleaner with restriction indicator.
- F. Provide an engine mounted thermostatically controlled water jacket heater. The heater(s) wattage size shall be determined by the manufacturer. The heater voltage shall be single phase, 120V, 60HZ.

2.04.1 STARTING SYSTEM - ENGINE

- A. The battery(ies) used for cranking the engine shall be the lead acid type, 12 or 24 volt, sized as recommended by the generator manufacturer. The battery(ies) shall have sufficient capacity to crank the engine for at least three cycles of 15 seconds on - 15 seconds off, for a total of 75 seconds. They shall be provided as new with the entire manufacturer's warranty.
- B. The battery(ies) shall be fastened securely in its(their) own tray within the foot print of the skid. The tray shall be acid resistant.
- C. Include all interconnecting conductors and connection accessories.
- D. A battery charger of appropriate rating which is voltage regulated, shall be provided for the engine. It shall be sized for the proper current, input AC voltage and output DC voltage. The charger shall be equipped with float, taper and equalize charge settings.
- E. A meter on the charger shall provide a visual output reading of the charger.
- F. On the engine, provide a factory mounted alternator with solid state voltage regulation and 35 Amp minimum continuous rating.

2.04.2 FUEL SUPPLY SYSTEM- DIESEL ENGINE

- A. Provide a double walled fuel tank, made of heavy gauge construction that is designed for full weather exposure. The tank shall be a sub-base type. There is to be visual tank to foundation clearance. The tank is to have the following features:
 - 1. Tank shall be UL 142 listed.
 - 2. The capacity of the fuel tank shall be sufficient to run the generator continuously for 96 hours at 75% load up to a maximum of 540 gallons, unless otherwise stated on the plans.
 - 3. Equipped with a mechanical fuel gage and low fuel level alarm that may be monitored from a remote location by a RTU which uses N/O type contacts.
 - 4. Two inch NPT fuel opening with spill protection and a lockable lid that is easily accessible.
 - 5. Emergency pressure relief vent opening on the inner and outer tanks.
 - 6. Inner tank leak alarm kit and low fuel alarm that may be monitored at a remote location by an RTU.
 - 7. Basin drain.
 - 8. Overfill protection / containment.
 - 9. Provide an integral fuel pump of sufficient capacity to sufficiently charge the fuel lines under any start or run condition.
- B. The overall fuel system is to comply with all applicable NFPA regulations as well as those required by the Florida Department of Environmental Regulation. This includes NFPA compliant labels for the fuel shut-off location and application of Diesel HAZMAT symbol stickers.

- C. Provide an anti-siphon valve in the fuel line at the output of the tank.
- D. A fuel filter shall be installed between the fuel tank and fuel inlet to the engine. It shall have a fuel water separator. The filter element shall be disposable and be easily removed and installed for maintenance purposes.
- E. Provide supply and return fuel lines of sufficient diameter for all load requirements, flexibility for maximum resistance to fatigue due to component operation and made of material which has maximum resistance to corrosion due to environment and fuel supply.
- F. The skid base for the fuel tank shall be firmly fastened to a concrete foundation which is to be provided and installed as part of this contract. The fuel tank & skid assembly shall be removable from the base. Lifting points shall be provided for the tank skid. All metal surfaces coming in contact with concrete or grout shall be coated with coal tar epoxy equal to Koppers 300M or provide a 1/32-inch neoprene gasket between the metal surface(s) and the concrete or masonry may also be used. The neoprene gasket shall be installed along the entire perimeter, not just at the fastening hardware.
- G. The exterior coating of the fuel tank and skid base shall be Sherwin Williams SherGlass FF glass flake reinforced amine epoxy (formulated for immersion service) or equal. Color shall be haze grey, two coats of 12-15 mils on top of a stripe coat over all welds, crevices, edges and sharp angles, per manufacturer's recommendations.
- H. The fuel tank shall be full and topped off by the contractor when it is accepted by the County.

2.04.3 COOLING SYSTEM- ENGINE

- A. The engine shall be cooled by a unit mounted closed loop radiator system rated for full load operation in 50° C ambient condition with the ambient temperature as measured at the air inlet to the radiator. Radiator shall be provided with a duct adapter flange. The cooling system shall use a 50/50 (Prestone, Xerex or equivalent coolant and water) mixture provided by the supplier.
- B. Provide drain cocks or plugs in the engine block and radiator for easy changing and flushing of the coolant. Provide coolant drain extensions where necessary for easy access to the drainage device.
- C. Protection from rotating parts (fan, fan belt) shall be provided.
- D. Install a self contained thermostat module to automatically regulate coolant flow to maintain optimum constant coolant temperature as recommended by the engine manufacturer.
- E. Provide a coolant heater which is thermostatically controlled in the jacket of the engine.

2.04.4 EXHAUST SYSTEM- ENGINE

- A. The muffler for the engine shall be the critical grade made from aluminized steel of thickness and design as recommended by the manufacturer. The muffler shall be housed within the generator enclosure.
- B. All exhaust piping shall be aluminized steel. Vertical discharge exhaust shall be equipped with a rain cap, appropriate condensation drains in the piping, and the outlet, and shall be designed so no external rain or moisture may enter the engine from the outside even if the rain cap fails.
- C. Rain Skirt - At the point where the exhaust pipe tubing penetrates the roof or side of the enclosure, a suitable "rain skirt" and collar shall be provided by the MANUFACTURER. It shall be designed to prevent the entrance of rain and allow for expansion and vibration of the exhaust piping without chafing or stress to the exhaust system. This detail must appear on the drawings submitted for approval. Care must be exercised so there is no recirculation of exhaust gases into the intake system.
- D. The connection of the engine to the exhaust system shall be a flexible section of corrugated stainless steel pipe. The connection of the exhaust pipe to the muffler shall be a stainless steel expansion joint with liners.
- E. The exhaust emissions shall fall within the guidelines of the EPA and other state and governmental agencies.

2.05 AUTOMATIC TRANSFER SWITCH

- A. Supply an automatic transfer switch with built-in control logic monitors to sense any interruption in the utility supplied power. When the power fails, the automatic transfer switch starts the engine and transfers the load after the generator has reached proper voltage and frequency. When the utility power has been restored to the proper voltage and frequency, the automatic transfer switch will switch the load back to the utility source and after a time delay to sufficiently cool down the generator, shut down the engine. The utility power service size shall be verified by the contractor and shall be factored in when determining the size of the automatic transfer switch.
- B. The automatic transfer switch shall be housed in a separate rack-mounted NEMA 4X SS secure (double door) enclosure. The enclosure shall be no more than 36" tall by 24" wide. The enclosure shall be equipped with a rain shield and shall be constructed of at least 14 gauge 304 stainless steel. Per MC Stds, the rack shall consist of 3" Sch 40 SS posts with SS supports & hardware. All ATS controls shall be secure inside the enclosure behind the front cover and not face mounted.
- C. The transfer switch shall meet or exceed the following standards for emergency standby power system automatic transfer switches:
 - 1. UL 1008
 - 2. NFPA 110
 - 3. NEC - articles 700 thru 702
 - 4. NEMA 1 CS-2-447

- D. The automatic transfer switch is to have the following features:
1. Unit may or may not have a bypass switch with rating equal to the automatic transfer switch. The bypass switch shall be a manual type switch. A manual type bypass switch, that is installed on a concrete pad, is not required, for existing lift station sites that have site constraints, if noted on the construction drawings to provide a non-bypass automatic transfer switch.
 2. Suitable for emergency and standby applications on all classes of load.
 3. Adjustable normal source voltage sensing for pickup and dropout. The voltage is to be monitored line to line for all three phases of the switch.
 2. The normal source voltage sensing is to be adjustable from a minimum of 70%-90% of nominal voltage for drop out and a minimum of 75%-100% for pickup.
 3. There shall be a single-phase sensing of the emergency source. It shall have an adjustable pickup setting of a minimum of 70% to 100% of nominal voltage.
- E. There shall be time delays activated in the automatic transfer switch as follows:
1. Provide an adjustable time delay to override momentary normal source outages. If the utility provided power does not correct itself to a nominal range of values for voltage and frequency before the time on the relay expires, then all applicable transfer and engine starting signals will be activated. If the power goes back into specification, then no transfer will take place.
 - a. Upon losing commercial power:
 - 30 seconds for time delay start
 - 2 minutes to neutral transfer
 - 1 minute from neutral to emergency power
 - b. After commercial power is restored:
 - 10 minutes to neutral transfer
 - 1 minute from neutral to utility
 2. Provide an adjustable time delay for transferring the load to emergency power.
 3. Provide an adjustable time delay for retransferring back to the utility power from emergency power.
 4. Provide a non-adjustable (five minute minimum) unloaded running time for cool down of the generator after the power has switched back to the utility supply mode.
 5. Provide a time delay to absorb momentary voltage and frequency spikes or dips during initial genset loading.
- F. The automatic transfer switch shall be a 3-pole switch.
- G. The automatic transfer switch is to have a disconnect switch which will prevent transfer.
- H. The automatic transfer switch shall have in phase transfer control logic which will initiate an in phase transfer of motor loads between line sources. This logic shall help prevent nuisance tripping of distribution circuit breakers and damage to

mechanical loads resulting from out of phase power transfer.

- I. The automatic transfer switch is to be designed to be completely front accessible.
- J. The automatic transfer switch is to have true double throw operation.
- K. The automatic transfer switch shall have a solid neutral connection with full rated terminal lugs for normal, emergency and load.
- L. The automatic transfer switch shall be equipped with a ground stud for the installation of customer provided ground terminations.
- M. The automatic transfer switch shall have, as a minimum, the following equipment for the control panel.
 - 1. Microprocessor based electrical controls with circuitry protected against EMI, voltage transients, ESD, shock vibration, and other hostile environments.
 - 2. Analog or digital kilowatt meter, frequency meter, AC voltmeter and ammeter.
 - 3. Reset switch.
 - 4. LCD display, touch key pad, and LED indicators for user access to system information and settings. Provide a green light for when normal source is in operation and red light when generator is operating.
 - 5. Generator set exerciser control.
 - 6. Test pushbutton to simulate a normal power source failure.
 - 7. Provision for optional interface with a P.C.
- N. The automatic transfer switch shall have a surge suppressor which provides protection from transient voltage surges produced by lightning and other sources. The surge suppressors are to be composed of an array of matched metal oxide varistors with sufficient capacity to protect the transfer switch. It is to be connected to the normal power source terminals and installed at the factory.

2.06 HOUSE KEEPING SLAB FOUNDATION

- A. The reinforced concrete slab(s) for the generator and fuel tank are to be suitable to fully support the complete load under all load conditions with a reasonable safety factor. The top of the slab shall be a minimum of two inches above the surrounding grade and extend a minimum of six inches past the footprint of the generator set.
- B. The Manatee County Building Department will require the contractor to submit a plan for each poured-in-place concrete slab being installed. The Building Department will accept a slab designed by the manufacturer for their respective generator, provided the back-up information accompanies each plan. If the manufacturer does not provide a slab design, then the contractor shall submit a slab design that is signed and sealed by a Professional Engineer and meets the Florida Building Code.

PART 3 EXECUTION:

3.01 INSTALLATION

- A. The contractor shall furnish and install the entire product to include all necessary site preparation, concrete foundation(s), electrical connections, and all devices described in this contract so that it is fully functional and operable as intended, including breakers and other modifications to the existing control panel for heaters, battery chargers, etc. The installation of the devices shall be per the manufacturer's instructions provided in item 1.05. The contractor shall connect the existing system equipment to the equipment he is providing and insure compatibility between the system he is providing and the existing system. The contractor shall complete the installation of the equipment he provides to the existing site equipment to the degree that it shall not be necessary for the County to make further modifications or connections in order to have a fully functional system.
- B. The contractor shall install the generator, automatic transfer switch, and conduit as shown on the approved site plan he has prepared.
 - 1. County to provide an existing site plan.
 - 2. Contractor and Lift Station Superintendent shall meet on site and determine the exact location for the generator, fuel tank and transfer switch.
- C. All wiring shall be installed in Schedule 80 PVC conduit sized according to the National Electrical Code for the number and size of conductors contained within. All trenches for underground installation of conduit shall be hand dug. Any electrical wiring that is installed between the lift station's wet well and the valve vault shall be installed in a carrier pipe that is strapped to the wet well or valve vault.
- D. Install the electrical components per Manatee County Standards (see typical wiring layouts in the latest Manatee County Public Works Utility Standards details US 23 & US 24).

3.02 FIELD QUALITY CONTROL

- A. Upon completion of item 3.01, a factory authorized service representative of the product supplied is to inspect all field assembled and installed components and make any necessary corrections to insure proper equipment operation.

3.03 TESTING

- A. All test instruments used to perform the testing are to have been calibrated within the past 12 months. The calibration shall be performed in accordance with the standards of the National Institute for Standards and Technology.
- B. Perform the following on-site tests after items 3.01 and 3.02 have been completed:
 - 1. All necessary tests recommended by the manufacturer
 - 2. All NFPA 110 tests that are in addition to:
 - System Integrity Test: Verify proper installation, connection, and integrity of each of the components of the diesel generator system before and during operation.

- Noise level test: Measure and calculate the A-weighted (DbA) levels emanating from the product assembly at five (7) meters for at least six equally spaced points around the enclosure while the machine is under load. Include such points as the exhaust discharge, and cooling air intake and discharge. The noise level test is to be taken at the site after installation and shall adhere to the conditions described in section 2.03A - item 9. Also refer to the test method as defined by ISO 3744.
- Load Bank test: Run a two hour minimum test with all applicable field load (See section 1.02 for the ratings of the pump loads at each respective site). The automatic transfer switch is to be engaged and fully tested for all phases of operation during this test. The load bank may be either resistive or inductive. For purposes of the load test, the NEMA LRKVA/HP Code of the pump motors is H.

- C. Compare all measured quantities with required values of testing. Correct all deficiencies identified by tests and repeat test and correction procedure until specified test requirements are met. All problems and shortcomings in the product provided shall be remedied and corrected with no cost to the County.
- D. The County shall have the option of whether or not to witness all testing that is performed. Report all test results in writing to the County.

3.04 TRAINING AND DEMONSTRATION

- A. A factory representative of the product is to provide the County’s maintenance personnel with a thorough period of instruction and hands-on session regarding the operation, trouble shooting and maintenance of all components of the product. Typical training period: one hour.

3.05 DELIVERY

- A. The product described in these specifications shall be fully installed and fully operational, tested and demonstrated within the agreed upon number of days after the award of the bid has been made.

3.06 NOTICE OF DELIVERY, TESTING, TRAINING AND DEMONSTRATION

- A. At least seven business days of notice is to be given by the contractor to the County for delivery, installation, testing, training and demonstration of the product.

END OF SECTION

SECTION 16271 DRY-TYPE LOW-VOLTAGE DISTRIBUTION TRANSFORMERS

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment and incidentals as shown, specified, and required to furnish and install dry type low-voltage distribution transformers.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16160, Panelboards.
3. Section 16450, Grounding and Bonding for Electrical Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. NEMA ST-20, Dry Type Transformers for General Applications.
2. NEMA TP-1, Guide for Determining Energy Efficiency for Distribution Transformers.
3. NEMA TP-2, Standard Test Method for Measuring the Energy Consumption for Distribution Transformers.
4. UL 1561, Dry Type General Purpose and Power Transformers.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements:

1. NEC Article 450, Transformers and Transformer Vault (Including Secondary Ties).

1.04 SUBMITTALS

A. Shop drawings and product data as described in Division 1.

B. Operation and maintenance data as described in Division 1.

C. In addition, submit the following:

D. Action Submittals: Submit the following:

1. Shop Drawings:

- a. Schedule of transformers to be furnished with ratings and other required technical data.

- b. Proposed location for each transformer, including pad layout, dimensions, and appurtenances.
2. Product Data:
- a. Supplier's technical information for transformers proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

A. Dry Type Two-Winding Transformer:

1. Type: Dry type, air cooled, low temperature rise. Transformers 15 kVA and larger shall be energy efficient, complying with NEMA TP-1 Class 1 efficiency levels. Transformers less than 15 kVA shall be general purpose.
2. Rating: KVA, primary voltage and connection, secondary voltage and connection, frequency and number of phases shall be as shown on the Drawings.
3. Insulation: Insulation and average winding temperature rise (in a 40 degree C maximum ambient) for rated kVA per the following table. Energy efficient transformers shall be capable of 15 percent continuous overload at 150 degrees C temperature rise.

kVA Rating	Insulation Class (degrees C)	Temperature Rise (degrees C)
1 to 15 kVA	150	80
25 to 500 kVA	180	115

4. Winding Taps, Transformers 15 kVA and Less: Two 5-percent below rated voltage, full capacity taps on primary winding.
5. Winding Taps, Transformers 25 kVA and Larger: Two 2-1/2-percent above rated voltage and four 2-1/2+ percent below rated voltage, full capacity taps on primary.
6. Basic impulse level shall be 10 kV.
7. Sound Level: NEMA ST-20 standard.
8. Enclosure: UL listed for the application.
9. Identification: Identify transformers in accordance with Section 16075, Identification for Electrical Systems, with the transformer number and voltages, connection data, kVA ratings, impedance, and overload capacity.
10. Transformers shall comply with NEMA ST-20, NEMA TP-1, NEMA TP-2, and UL 1561.
11. Transformers shall bear the label of the Underwriters' Laboratories, Inc.

B. Non-Linear Load, K Factor Rated Transformer:

1. K Factor rated transformers shall meet the requirements specified in this Section for dry-type two-winding transformers and, in addition, the following:

- a. Type: 100 percent non-linear rated, specifically designed to handle non-linear loads with double size neutral. Transformer shall include an electrostatic shield grounded to the transformer core.
- b. UL K Factor: K = 13.
- c. Impedance: Three percent minimum, five percent maximum.

C. Dry Type Buck and Boost Transformer:

- 1. Buck and boost transformers shall meet the requirements specified in this Section for dry-type two-winding transformers, except as specified below:
 - a. Insulation and average winding temperature rise for rated kVA as follows:

kVA Rating	Insulation Class (degree C)	Temperature Rise (degree C)
0.25 to 2 kVA	150	80
3 to 7.5 kVA	180	115

D. Dry Type Shielded Isolation Transformer:

- 1. Shielded isolation transformers shall meet the requirements specified in this Section for dry-type two-winding transformers, except as specified below:
 - a. Transformers shall be provided with quality, full width electrostatic shields in a maximum effective coupling capacitance between primary and secondary of 33 picofarads. With transformers connected under normal, loaded operating conditions, the attenuation of line noise and transients shall equal or exceed the limits listed in the table in Paragraph 2.1.D.1.b of this Section:.
 - b. Common mode noise attenuation:

Frequency	Attenuation
0 to 1.5k Hz	120 db
1.5 k Hz to 10k Hz	90 db
10 k Hz to 100k Hz	65 db
100 k Hz to 1M Hz	40 db

- c. Transverse mode noise attenuation:

Frequency	Attenuation
1.5 to 10k Hz	52 kb
10 to 100k Hz	30 db
100k to 1M Hz	30 db

- d. Provide electrostatic shield between the primary and secondary winding and grounded to the transformer core.
- e. Isolate core and coil from enclosure using vibration absorbing mounts.

- E. Manufacturers: Provide products of one of the following:
 - 1. Square D Company.
 - 2. Or approved equal.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine the conditions under which the dry type transformers are to be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions have been corrected.

3.02 INSTALLATION

- A. Install transformers on walls or floors at locations shown. Install floor mounted transformers on raised concrete bases. Provide sufficient access and working space for convenient and safe operation and maintenance.
- B. Mount transformers so that vibrations are not transmitted to the building structural parts and other equipment. Make connections to transformers with flexible conduit.
- C. Adjust tap settings to provide proper voltage at panelboards.
- D. Install dry type transformers in conformance with governing codes and manufacturer's instructions and recommendations, and the Contract Documents.

END OF SECTION

SECTION 16289 SURGE PROTECTIVE DEVICES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. Contractor shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install surge protective devices (SPD).
2. SPDs furnished under this Section shall be ANSI/UL 1449 Type 2 integrating both surge suppression and high-frequency noise filtering suitable for use on low-voltage distribution systems.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16160, Panelboards.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/UL 1449, Surge Protective Devices.
2. IEEE C62.11, Metal-Oxide Surge Arresters for AC Power Circuits (>1 kV)
3. IEEE C62.41, Recommended Practice on Surge Voltages in Low-voltage AC Power Circuits.
4. IEEE C62.45, Recommended Practice on Surge Testing for Equipment Connected to Low-Voltage (1,000 V and Less) AC Power Circuits.
5. UL 1283, Electromagnetic Interference Filters.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have at least five years of experience manufacturing and servicing products substantially similar to those required and shall be able to submit documentation of at least five installations in satisfactory operation for at least five years each.

B. Component Supply and Compatibility:

1. Obtain all products included in this Section regardless of component manufacturer from a single SPD manufacturer.
2. SPD manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.
3. Components shall be suitable for the specified service conditions and shall be integrated into overall assembly by SPD manufacturer.

C. Regulatory Requirements: Comply with the following:

1. NEC 110.9, Requirements for Electrical Installations, Interrupting Rating.
2. NEC 240.21, Overcurrent Protection, Location in Circuit.

1.04 SUBMITTALS

- A. Shop drawings and product data as described in Division 1.
- B. Operation and maintenance data as described in Division 1.
- C. In addition, submit the following:
- D. Action Submittals: Submit the following:
 1. Shop Drawings:
 - a. Electrical and mechanical drawings for each type of unit, showing electrical ratings, dimensions, mounting provisions, connection details, and layout diagrams.
 - b. Components list and nameplate schedule.
 - c. Summary sheets with schedules of equipment.
 2. Product Data:
 - a. Manufacturer's technical information, including catalog information.
 - b. Manufacturer's technical specifications with assembly and component ratings.
- E. Informational Submittals: Submit the following:
 1. Certifications:
 - a. Certification that SPD devices comply with standards referenced in this Section.
 2. Source Quality Control Submittals:
 - a. Report of results of testing and inspections performed at manufacturer's shop.
 3. Supplier Reports:
 - a. Submit written report of results of each visit to Site by Supplier's service technician, including purpose and time of visit, tasks performed, and results obtained. Submit within two days of completion of visit to the Site.
 4. Qualifications Statements:
 - a. Manufacture, when requested by ENGINEER.
- F. Closeout Submittals: Submit the Following

1. Operations and Maintenance Data:
 - a. Submit in accordance with Section 01730, Operating and Maintenance Data.
 - b. Include acceptable test reports, maintenance data and schedules, description of operation, wiring diagrams, and list of spare parts recommended for one year of operation with current price list.
2. Warranty Documentation: Submit example warranty at time of shipment of the equipment. Include final warranty accepted by ENGINEER in the operations and maintenance manual for the equipment.

1.05 STORAGE, AND HANDLING.

- A. Delivery:
 1. Upon delivery, check for evidence of water that may have entered equipment during transit.
- B. Storage:
 1. Store SPD equipment in a clean, dry location with controls for uniform temperature and humidity. Protect equipment with coverings and maintain environmental controls.
 2. Protect equipment from corrosion and deterioration.

1.06 WARRANTY

- A. General Warranty: The special warranty specified in this Article shall not deprive Owner of other rights or remedies Owner may otherwise have under the Contract Documents and shall be in addition to, and run concurrent with, other warranties made by Contractor under the Contract Documents. The obligations of Contractor under the Contract Documents shall not be limited in any way by the provisions of the specified special warranty.
- B. Special Warranty on Materials and Equipment:
 1. Provide manufacturer's written warranty, running to the benefit of Owner, agreeing to correct, or at option of Owner, remove or replace materials or equipment specified in this Section found to be defective during a period of five years after the date of Substantial Completion.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Provide equipment of one of the following:
 1. Schneider Electric/Square-D Company.
 2. Eaton/Cutler-Hammer.
 3. General Electric.
 4. Or approved equal.

2.02 EQUIPMENT

A. General:

1. SPD shall be modular, high-energy, parallel design with fast-acting transient voltage suppression using metal oxide varistors. Equipment shall provide noise attenuation with electromagnetic interference filter.
2. SPD shall comply with requirements of the following:
 - a. ANSI/UL 1449.
 - b. UL 1283.
 - c. IEEE C62.11, IEEE C62.41 and IEEE C62.45.
3. SPD shall be suitable for operation under the following environmental conditions:
 - a. Relative Humidity: Zero to 95 percent, non-condensing.
 - b. Frequency: 47 to 63 Hertz.
 - c. Temperature: Zero to 149 degrees F.
4. SPD operating voltage and IEEE C62.41 and IEEE C62.45 Category A, B, and C application environments shall be suitable for the associated SPD location(s) shown or indicated on the Drawings.
5. SPD shall be suitable for internal and external mounting. Where shown on the Drawings, SPD shall be factory-mounted and integrated into distribution equipment specified under the following Sections:
 - a. Section 16050, General Provisions for Electrical Systems.
 - b. Section 16423, Motor Control Centers.
 - c. Section 16160, Panelboards.

B. SPD shall include a surge suppression path for each mode as required for the system configuration shown on the Drawings. Each mode shall be individually fused and equipped with thermal cutouts. SPD short-circuit rating shall be 200 kA. Protection modes shall include, to the extent applicable, the following:

1. Line-to-line.
2. Line-to-neutral.
3. Line-to-ground.
4. Neutral-to-ground.

C. SPD shall include electromagnetic interference/radio frequency interference (EMI/RFI) noise rejection filter with attenuation up to 30 dB from 10 kHz to 100 MHz.

D. SPDs and components in the operating path shall have maximum continuous operating voltage greater than 115 percent of nominal system operating voltage.

E. ANSI/UL 1449 minimum withstand rating shall be 20 kA per pole, and ANSI/UL 1449 voltage protection rating for SPD shall not exceed the following:

Modes	208Y/120	480Y/277
L-N,L-G, N-G	800	1200
L-L	1200	2000

- F. SPD surge capacity based upon IEEE C62.41 location category shall, as a minimum, be the following:

Category	Application	Per Phase	Per Mode
C	Service entrance	240 kA	120 kA
B	High exposure locations (distribution equipment)	160 kA	80 kA
A	Branch locations	120 kA	60 kA

2.03 ACCESSORIES

- A. Provide SPD equipped with the following accessories:
1. Surge counter with display for indicating the number of surges detected.
 2. LED indicators for monitoring device status.
 3. Audible alarm and silence switch for indicating an inoperative condition.
 4. Dry contacts, "Form C", for remote annunciation of unit status.
 5. Indicators, counter, alarm, and silence switch shall be visible and accessible from front of the SPD. When SPD is integral to switchgear, motor control center, panelboard, or other equipment, indicators, counter, alarm, and silence switch shall be visible and accessible from front of the equipment in which the SPD is installed.

2.04 SOURCE QUALITY CONTROL

- A. Perform manufacturer's standard factory tests on equipment. Tests shall be in accordance with IEEE C62.45 and ANSI/UL 1449.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which materials and equipment will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Install SPD at locations shown on the Drawings in accordance with equipment manufacturer's recommendations, Laws, and Regulations, and the Contract Documents.
- B. Conductor length between suppressor and connection point shall be as short and as straight as possible.

END OF SECTION

SECTION 16370 VARIABLE FREQUENCY DRIVES

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish new variable frequency drives as specified hereinafter.

1.02 DRIVE APPLICATION

- A. The variable frequency drives will be used to control the speed of inverter duty rated NEMA B design squirrel cage induction motors driving submersible pumps in a wastewater lift station. Motors will be 125 HP.

1.03 DRIVE PARAMETERS

- A. The variable frequency drives shall be designed and sized for the loads intended, shall not exceed their full-rated capacity when the driven pumps are operating at maximum capacity, shall not overload under any operating condition of the pumps, and shall be provided with an integral bypass motor starter package.

1.04 SPARE PARTS

- A. As a minimum, each of the variable frequency drives shall be furnished with the following spare parts:
 1. One (1) circuit board of each type used.
 2. Three (3) spare bulbs of each type and size used.
 3. Three (3) lens caps of each color and size used.
 4. Three (3) sets of power fuses.
 5. Three (3) sets of control fuses.

1.05 MANUFACTURER'S QUALIFICATIONS

- A. The manufacturer shall have a factory authorized representative (s) and/or a certified repair shop(s) staffed with factory trained service personnel capable of providing installation and start-up assistance, routine and 24-hour emergency repair services (including parts), and training for the County's personnel in operating and maintenance procedures associated with the specific variable frequency drives furnished.
- B. The manufacturer shall offer both standard and extended period service contracts as part of his normal operating policy.
- C. ACCEPTABLE MANUFACTURERS: The VFD's shall be as manufactured by the Fuji Electric Corporation of America.

1.06 MANUFACTURER'S REPRESENTATIVE

- A. A factory trained authorized representative(s) of the manufacturer shall be available to perform the following functions:

1. Provide installation assistance to the County's personnel on an "as needed" basis, one (1) scheduled day minimum.
 2. Provide checkout and start-up services as well as conduct the final acceptance tests, two (2) scheduled days.
 3. Provide training for the County's personnel in the proper operation and maintenance techniques to be used with the specific VFD's furnished, two (2) scheduled days.
- B. The manufacturer shall include in his bid sufficient funds to cover all the costs (travel, meals, lodging) associated with providing the services listed in Item 1.06.A.1, 2 and 3 above.

1.07 SUBMITTALS

- A. Within three (3) weeks of receiving the order, the manufacturer shall furnish the County with certified dimension prints which clearly show the nameplate data and outline dimensions.
- B. Prior to start of manufacture of the variable frequency drives, the manufacturer shall submit sets of drawings which shall include, but not necessarily be limited to, enclosure drawings showing the location of both internally and externally mounted components, master wiring diagrams showing all interconnections to the discrete component level, elementary or control schematics including coordination with other external control devices operating in conjunction with the variable frequency drives, and outline drawings with sufficient details to allow for locating conduit stub-ups and field wiring.
- C. Failure to comply with Item 1.06.B above shall be entirely at the manufacturer's risk. Any changes required as a result of the County's review will be solely at the manufacturer's expense with no cost to the County.

1.08 WARRANTY

- A. The manufacturer shall warrant that the variable frequency drives shall be free from defects in all materials and workmanship for a period of two (2) years from date of final acceptance.
- B. During the Warranty period, any and all covered defects shall be corrected by the manufacturer solely at his own expense with no cost to the County.

PART 2 PRODUCTS

2.01 VARIABLE FREQUENCY DRIVES

A. GENERAL

1. The variable frequency drives shall be the adjustable frequency (AF), variable torque (VT), pulse width modulated (PWM) type designed to provide continuous speed adjustment of 3-phase NEMA B squirrel cage induction motors, inverter duty rated.
2. The adjustable frequency drives (VFD's) shall be designed to control 125 HP motors , and shall be rated for the horsepower (HP), full-load current (Amps),

- and speed (RPM) of the motors actually supplied.
3. The VFD's shall be furnished in NEMA Type 3R, 316 stainless steel, with forced ventilation, floor-mounted enclosures.

B. CONSTRUCTION

1. The VFD's shall be microprocessor based solid state devices consisting of three (3) basic sections:
 - a. A rectifier section to change the constant frequency AC input voltage to a DC voltage. A full wave rectifier shall be used to prevent input line notching. Internal fast acting semiconductor fuses shall be installed to preclude the necessity for having external AC line fuses.
 - b. A DC bus/link section to interconnect the rectifier section and the inverter section. A DC line reactor and capacitors shall be used to smooth the DC bus/link operation, improve displacement power factor, lower harmonic distortion, and eliminate the need for an isolation transformer.
 - c. An inverter section to convert the DC voltage to a variable frequency AC voltage. Insulated gate bipolar transistors (IGBT's) shall be used as output switching devices to allow "trip-less" operation, reduce motor noise, provide smoother motor operation, assure reliable and safe shutdowns under fault conditions, and increase drive efficiency; specifically, SCR's, GTO's, and Darlington Transistors are not acceptable as switching devices under this Specification.
2. The VFD's shall be capable of operating from a 3-phase input voltage of 480 Volts $\pm 10\%$ over a frequency range of 48-63 Hertz while providing a constant volts per Hertz excitation to the motors.
3. The VFD's shall have a one minute overload rating of 150%, minimum.
4. The VFD's shall employ surface mount technology for reduced size, high reliability, ease of maintenance, and resistance to vibration.
5. The VFD's shall incorporate full internal protection against short circuits, ground faults, over- and under voltage, over- and undercurrent, and temperature extremes.
6. The VFD's shall contain an adjustable electronic motor overload (I^2t) circuit to eliminate the need for an external motor overload relay.
7. The VFD's shall utilize advanced diagnostic techniques to simplify trouble shooting and correcting problems.
8. The VFD's shall have a minimum drive efficiency of 97% at full speed and full load.
9. The VFD's shall have a minimum fundamental power factor of 0.98 at all speeds and loads.
10. The VFD's shall be able to operate under the following environmental conditions without modification or derating:
 - a. Temperature: 0 to 40EC.
 - b. Altitude: Up to 3,300' above sea level.
 - c. Humidity: 0 to 95%, non-condensing.
11. The VFD's shall be UL listed and shall comply fully with the applicable standards and provisions of ANSI, NEMA, IEEE, IEC, and NEC, latest

revisions.

C. STANDARD FEATURES

1. The VFD's shall, as a minimum, have the standard features and adjustments listed below:
 - a. The VFD's shall have the same customer interface regardless of horsepower rating, including keypad, digital display, and user connections. The keypad and the digital display shall be accessible without opening the main door of the drive enclosures.
 - b. The keypad shall be the seven (7) button touch type and shall be used for start-up, for setting all parameters, for stepping through the displays and menus, and for local control, including speed adjustments.
 - c. In addition to the keypad speeds adjustment provisions, the VFD's shall also be furnished with a manual speed adjustment potentiometer. The potentiometer shall be accessible without opening the main door of the drive enclosures.
 - d. The digital display shall be the LCD alphanumeric type with 40-character, 2-line capability. The LCD display shall be backlit to provide easy viewing at any angle in any light condition. The display shall have adjustable contrast.
 - e. The display shall utilize plain English - i.e., all set-up parameters, indications, faults, warnings, and other such information must be displayed in words for easy user understanding; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification.
 - f. The VFD's shall incorporate pre-programmed application macros for ease of start-up. To reduce programming time, the macros shall provide one command operation to reprogram all parameters and user interfaces for a particular application.
 - g. The VFD's shall provide a user selectable option of either displaying a fault or running at a preset speed if a reference input is lost.
 - h. The VFD's shall be capable of a "flying start" into a rotating load and accelerating to set-point without safety tripping or damage to the drives or driven equipment.
 - i. The user terminal strip shall be isolated from both the line and ground.
 - j. The VFD's shall have the ability to automatically restart after an overcurrent, overvoltage, under voltage, or loss of input signal protective trip. The number of restart attempts, trial time, and time between reset attempts shall be programmable. If the time between reset attempts is greater than zero, the time remaining until reset occurs shall count down on the display to warn an operator that a restart will occur.
 - k. The VFD's shall be equipped with an automatic extended power loss ride-through circuit which will utilize the inertia of the load to keep the drive powered. Minimum power loss ride-through shall be one-cycle, based on full load and no inertia. Removing power from the motor will not be an acceptable method of increasing power loss ride-through under this Specification.

- l. The VFD's shall be optimized for a 3 kHz carrier frequency to reduce motor noise.
- m. The VFD's shall incorporate the following three (3) separate current limit circuits to provide "trip free" operation:
 - 1) A slow current regulation limit circuit which shall be an adjustable percentage of the VFD's variable torque current rating, minimum setting of 125%. This adjustment shall be made via the keypad and shall be displayed in actual amperes, not as a percentage of full load.
 - 2) A rapid current regulation limit circuit which shall be an adjustable percentage of the VFD's variable torque current rating, minimum setting of 170%.
 - 3) A current switch-off limit circuit which shall be a fixed percentage of the VFD's variable torque current rating, minimum setting of 255% instantaneous.
- n. In addition to any software items listed above, the VFD's shall, as a minimum, contain the following built-in software features:
 - 1) Automatic slip-compensation for maintaining motor speed under varying load conditions.
 - 2) A motor under-load function to protect the pumps.
 - 3) Starting torque up to 180% of full load torque.
 - 4) User selectable manual or automatic IR compensation for torque increases over a selected frequency range.
 - 5) Five (5) adjustable/selectable critical frequency lock-out bands to avoid load resonance points during ramp-up or ramp-down.
 - 6) Two (2) acceleration and two (2) deceleration ramps, adjustable from 0.1 seconds to 1800 seconds.
 - 7) Three (3) adjustable S-curve acceleration and deceleration patterns.
 - 8) User selectable linear, squared, or automatic control of the Volts-per-Hertz shape to assure maximum energy efficiency.
 - 9) Precise full range frequency resolution adjustable in 0.01 Hertz increments.
 - 10) Integral kilowatt-hour and elapsed-time displays.
 - 11) Integral PI and sequential control functions.
 - 12) Hand-Off-Auto function for local control through the integral keypad and remote control via pushbuttons and/or potentiometers.
- o. The VFD's shall have seven (7) programmable preset speeds as well as unidirectional rotation and coast-to-a-stop features.
- p. The VFD's shall have two (2) programmable analog inputs capable of accepting either a current or a voltage signal. Inputs shall be filtered and shall have adjustable gain and offset.
- q. The VFD's shall have six (6) programmable digital inputs.
- r. The VFD's shall have two (2) programmable analog outputs proportional to the chosen reference (frequency, motor speed, etc.).
- s. The VFD's shall have three (3) programmable digital outputs. Outputs

must be true Form C relays; specifically, open collector outputs will not be acceptable under this Specification.

t. The VFD's shall be equipped with an RS-485 serial port capable of communicating with external PLC's, DCS's, DDC's, and touch-screen graphic operator panels.

u. The VFD's digital display shall contain, as a minimum, the following information shown in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:

Output Frequency	DC Bus Voltage
Output Voltage	Heat sink Temperature
Motor Speed	Analog Input Values
Motor Current	Keypad Reference Values
Calculated Motor Torque	Elapsed Time
Calculated Motor Power	Kilowatt-hours

v. The VFD's shall, as a minimum, incorporate the following protective circuits which, in the case of a protective trip, shall stop the drive and announce the fault condition in complete English words; specifically, alphanumeric code numbers requiring memorization, cross-reference tables, or manuals for interpretation will not be acceptable under this Specification:

- 1) Overcurrent: Trip set at 315% instantaneous (225% RMS) of the VFD's variable torque current rating.
- 2) Overvoltage: Trip set at 130% of the VFD's rated voltage.
- 3) Under voltage: Trip set at 65% of the VFD's rated voltage.
- 4) Over temperature: Trip set at +70EC or +85EC dependent upon drive furnished.
- 5) Ground Fault: Both "running" and "at start".
- 6) Adaptable Electrical Motor Overload (I^2t): Motor protection shall be based on motor speed and load; specifically, circuits which are not speed dependent will not be acceptable under this Specification.

w. The VFD's shall incorporate a parameter lock feature which will prevent unauthorized personnel from altering the drive parameters without entering a programmable password or combination number. The parameter lock shall also be settable to a digital input.

D. FACTORY INSTALLED OPTIONS

1. In addition to the Hand-Off-Auto switch and speed potentiometer mentioned hereinabove, the VFD's shall include the following factory installed options:
 - a. Circuit Breaker: The circuit breaker shall be the thermal magnetic, thru-the-door interlock type, pad lockable in the Off position.
 - b. 115 VAC Control Transformer and Terminal Board: A terminal board shall be provided for convenient connection of all field control wiring, including all drive inputs and outputs and 115 VAC start input. A

- control transformer, 150 VA minimum, shall also be included.
- c. Manual Bypass with Service Switch: A manually operated bypass switch shall allow the motor to be connected directly across the line and operate at full synchronous speed. In bypass, power is to be removed from the drive, but the start signals and the safety interlocks are to remain active. Normal and bypass pilot lights and an external fault circuit with an indicating lamp which illuminates whenever any external safety device has shut down the motor shall be included. Pilot lights shall be the push-to-test type. The service switch shall allow power to be removed from the drive for servicing while the motor operates from line power. The service switch shall be internally mounted to prevent unauthorized personnel from disrupting operation.
 - d. Motor Overload Relay: A standard, manually resettable, bimetallic, motor overload relay with a Class 20 trip curve shall be installed to provide thermal motor protection in the bypass mode. A thru-the-door reset button for the motor overload relay shall also be included.
 - e. Numbered Wires: All internal drive wires shall be numbered at both ends to facilitate maintenance and trouble shooting.

PART 3 EXECUTION

3.01 FACTORY TESTING

- A. Prior to assembly in the VFD's, all printed circuit boards shall be thoroughly factory tested and given a minimum eight (8) hour burn-in.
- B. After assembly, the drives shall be given a minimum eight (8) hour load test using a driven motor. The load shall be continuously cycled from no-load to full rated load to induce maximum stress and thermal variations in the drive components.
- C. During the load test, the major drive parameters (input volts, output volts, output current, output speed, output frequency, percent load, etc.) shall be recorded and a copy of the test results shall be reviewed by the County prior to the shipment of the VFD's. Similarly, any failure(s) of the drives during the load test shall be recorded, analyzed, corrected, and reported to the County before shipment of the VFD's.

3.02 SHIPPING

- A. The VFD's shall be so packaged for shipment that they are maximally protected from both physical and environmental damage.
- B. The VFD's shall be transported to the County's job sites utilizing the manufacturer's customary method of shipment.

3.03 INSTALLATION

- A. The VFD's shall be installed by the County's personnel in accordance with the recommendations and procedures set forth in the installation manual furnished by the manufacturer.
- B. An authorized factory trained representative(s) of the manufacturer shall be available to assist the County's personnel on an "as needed" basis.

3.04 CHECKOUT AND START-UP

- A. Prior to start-up, a factory trained representative(s) of the manufacturer shall be on hand to assure that the VFD's have been properly installed and that all field wiring is correctly terminated.
- B. After checkout, the manufacturer's representative(s) shall then conduct a certified factory start-up using procedures and forms established by the manufacturer of the VFD's.
- C. A copy of the certified start-up form(s) for each drive shall be provided to the County, and a copy shall be kept on file by the manufacturer.

3.05 FIELD TESTING

- A. After satisfactory completion of the checkout and start-up procedures, the manufacturer's representative(s) shall begin an eight (8) hour acceptance test using actual plant loads.
- B. Any and all short-comings discovered and/or failures occurring during the acceptance test shall be remedied by the manufacturer solely at his own expense with no cost to the County.
- C. Any time after four (4) hours of acceptance testing, the County may, at his option, curtail further testing and take acceptance of the VFD's.

3.06 TRAINING

- A. As set forth in Items 1.05.B and 1.06.A above, a factory trained authorized representative(s) of the manufacturer shall be available at such a time(s) and place(s) established by the owner to train the County's personnel in the proper operation and maintenance procedures required by the specific VFD's furnished.

3.07 WARRANTY

- A. The manufacturer shall furnish to the County a written warranty which complies with the requirements set forth in Item 1.08 above.

END OF SECTION

SECTION 16410 - ENCLOSED CIRCUIT BREAKERS

PART 1 - GENERAL

1.01 REQUIREMENT SUMMARY

- A. Contractor shall furnish, install, connect, test, and place in satisfactory operating condition, ready for service, all Enclosed Circuit Breakers where indicated on the Contract Documents and as specified herein or required for proper operation of the installation. The scope of work installing Enclosed Circuit Breakers and associated devices shall be considered a part of this Section. All hardware, bolts, clamps, and fittings required for the installation of Enclosed Circuit Breakers shall be furnished and installed by the Contractor
- B. Enclosed Circuit Breakers to be furnished and installed for this Project shall be the product of manufacturers who have been in the business of manufacturing this equipment for a minimum of twenty-five years (25YR).

1.02 RELATED WORK SPECIFIED ELSEWHERE

- A. In addition to the requirements specified in this section, the requirements of Division 16 and those Project Documents referenced herein shall be applied.
- B. Related Specification Sections include but not limited to:
 - 1. Division 2 - Site Work
 - 2. Section 16120, Wires and Cables
 - 3. Section 16505, Hangers and Supports For Electrical Systems

1.03 REFERENCES

- A. Enclosed Circuit Breakers shall comply with the following applicable codes and standards as well as any others within the specifications and Contract Documents. In the event of any conflict between these codes, regulations, standards, and Contract Documents, the most restrictive shall apply.
- B. Codes and Standards
 - 1. National Electric Manufacturers Association (NEMA)
 - a. NEMA 250 Enclosures for Electrical Equipment
 - b. NEMA AB1 Molded Case Circuit Breakers
 - 2. National Electric Installation Standards (NEiS)
 - a. Project applicable standards and recommendations
 - 3. National Fire Protection Association (NFPA)
 - a. 70 National Electric Code (NEC).

- b. 70E Standard for Electrical Safety in the Workplace
- c. 79 Electrical Standard for Industrial Machinery
- 4. Underwriters Laboratories Inc (UL)
 - a. UL 489 Molded Case Circuit Breakers and Enclosures.

1.04 SUBMITTALS

- A. Contractor shall reference and provide all documentation for all Division 16 Sections as required per Specification Sections:
 - 1. 01340 Shop Drawings, Project Data and Samples
- B. Shop Drawings
 - 1. Contractor shall submit for approval Shop Drawings prepared in accordance with Specification Section 01340 and as required by other Sections of the Specifications.
 - 2. All shop drawings shall be reviewed and approved by the Engineer before procurement or fabrication of material and equipment.
 - 3. Submit five (5) copies of Product Data and Shop Drawings for equipment and component devices. Include time-current curves of circuit breaker trip units.
 - 4. Include dimensional outline drawings; conduit entrance locations and requirements; voltage rating, continuous and short-circuit current ratings; cable terminal sizes and temperature ratings.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Enclosed Circuit Breakers and associated components shall be handled and stored in accordance with manufacturer's instructions and recommendations.
- B. Inspect and report concealed damage to carrier within their required time period. Owner is not responsible for damages incurred during shipping, handling and storage.
- C. Store in a clean, dry space. an additional heavy canvas or heavy plastic cover to protect structure from dirt, water, construction debris, and traffic. Where applicable, provide adequate heating within enclosures to prevent condensation.

1.06 OPERATION AND MAINTENANCE MANUALS

- A. Furnish five (5) copies of recommended maintenance procedures and intervals. Include spare parts data listing; source and current prices of replacement parts and supplies.
- B. Furnish Time-Current curves for each circuit breaker unit utilized for the Project. Time-Current curves shall be first generation originals on full size ANSI B 11IN by 17IN paper.

1.07 WARRANTY

- A. Manufacturer shall warrant Enclosed Circuit Breakers to be free from defects in materials and workmanship for the lesser of one (1) year from date of installation or eighteen (18) months from date of purchase.

1.08 IDENTIFICATION

- A. Enclosed Circuit Breakers shall be identified with the equipment tag number indicated on the Contract Documents and the accepted shop drawings. Nameplate(s) shall be securely affixed in a conspicuous place on Enclosed Circuit Breakers. Nameplates shall be furnished and installed as required Specification Section(s):

1. Section 16075, Identification For Electrical Systems

PART 2 - PRODUCTS

2.01 MANUFACTURERS

- A. Enclosed Circuit Breakers shall be provided by one of the manufacturers listed:

1. Eaton Power and Industrial
2. General Electric Company
3. Siemens Power USA
4. Square D / Schneider Electric USA
5. Approved Equal

2.02 PROTECTIVE DEVICES

- A. The Enclosed Circuit Breaker protective device shall be a Molded Case Circuit Breaker (MCCB) with inverse time and instantaneous tripping characteristics
- B. MCCB shall be operated by a toggle-type handle and shall have a quick-make, quick-break over-center switching mechanism that is mechanically trip-free. Automatic tripping of the MCCB shall be clearly indicated by the handle position. Contacts shall be non-welding silver alloy and arc extinction shall be accomplished by means of arc chutes.
- C. MCCB shall have a minimum symmetrical interrupting capacity as indicated on the Contract Documents.
- D. MCCB with 15A less than or equal to 200A frames shall be provided with fixed thermal-magnetic trip units.
- E. MCCB with 225A less than or equal to 400A frames shall be provided with field-changeable, field-adjustable thermal-magnetic trip units with inverse time-current characteristics. Trip mechanisms shall be provided with the following trips:
 1. Instantaneous
 2. Long Time

3. Short Time
- F. MCCB with 400A and greater frames shall be provided with microprocessor-based RMS sensing trip units with features noted on the drawings. Trip mechanisms shall be provided with the following trips:
1. Instantaneous
 2. Long Time Pickup
 3. Long Time Delay
 4. Short Time Pickup
 5. Short Time Delay
 6. I²t function
 7. Ground Fault Pickup
 8. Ground Fault Delay
- G. Circuit breakers for HVAC and refrigeration unit equipment shall be listed by UL as Type HCAR.

2.03 ACCESSORIES

- A. Provide accessories as indicated on the Contract Drawings.
- B. Shunt Trip Device: Coil rated for [120] [] volts, [AC] [DC].
- C. Undervoltage Trip Device: Coil rated for [120] [] volts, [AC] [DC].
- D. Auxiliary Contacts: Rated at [120] [] volts, [] amperes, [AC] [DC]. Contacts on an auxiliary switch; operation is designated “a” if open when the main circuit breaker contacts are open and “b” if closed when the main circuit breaker contacts are closed.
- E. Alarm Switch: Rated at [120] [] volts, [] amperes, [AC] [DC]. Alarm switch shall operate upon the tripping of the circuit breaker. Contacts on an auxiliary switch; operation is designated “a” if open when the main circuit breaker contacts are open and “b” if closed when the main circuit breaker contacts are closed.
- F. Auxiliary Switch: Rated at [120] [] volts, [] amperes, [AC] [DC]. Switch shall be interlocked with the main circuit breaker contacts.
- G. Electrical Operator: Rated for [120] [] volts, [AC] [DC].
- H. Neutral Bus, insulated from enclosure: [] Ampere rating.

2.04 ENCLOSURES

- A. Provide Enclosed Circuit Breaker enclosures for those locations as indicated on the Contract Documents and as described below:

1. NEMA 1 surface or flush-mounted general-purpose enclosures intended for indoor use.
 2. NEMA 12 dust-tight enclosures intended for indoor use to provide protection against circulating dust, falling dirt and dripping non-corrosive liquids.
 3. NEMA 3R rain-tight enclosures intended for outdoor use in damp locations or to provide protection against rain.
 4. NEMA 4/4X watertight stainless steel intended for indoor or outdoor use to provide protection against windblown dust and rain, splashing rain, hose-directed water, and damage from corrosive agents
 5. NEMA 7, Class I, Group C and D hazardous location cast aluminum intended for indoor use in locations classified as Class I, Group C and D as defined in the National Electrical Code
 6. NEMA 9, Class II, Groups E, F and G hazardous location cast aluminum intended for indoor use in locations classified as Class II, Groups E, F and G as defined in the National Electrical Code
- B. Provide a factory installed ground termination block sized for the grounding conductor as indicated on the Contract Documents.
- C. Provide operator handle mechanisms that are padlockable in the OFF position. In the case of electrically operated breakers, provide a permanently installed device for padlocking in the OFF position.
- D. Enclosed Circuit Breakers shall have nameplates that contain a permanent record of catalog number and maximum rating.
- E. Enclosures shall be finished using the manufacturer's standard process and shall be ANSI 61 gray color unless otherwise noted on the Contract Documents.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Enclosed Circuit Breakers shall be mounted 60IN to top of enclosure above the finished floor, finished concrete or finished grade at the equipment height where appropriate, or as shown in the Contract Documents.
- B. Enclosed Circuit Breakers shall not be mounted to any hand-rail, safety rail stair-well, ladder-well or like structure that is designed for life-safety use. A minimum of 4IN shall be maintained from all life-safety structures and any edge of Enclosed Circuit Breakers.
- C. Contractor shall provide and install supports and/or support structures such as equipment racks to mount all Enclosed Circuit Breakers.
- D. Contractor shall furnish and install accessories as required or shown in the Contract Documents.

3.02 FIELD QUALITY CONTROL

A. Contractor shall comply with those requirements and procedures per Specification Section:

1. 16050. 1.04 - TESTING

3.03 PROJECT CLOSE OUT

A. All exterior and interior surfaces of the Enclosed Circuit Breakers shall be cleaned thoroughly, and all scratches and abrasions shall be retouched with the same paint coating as approved by the manufacturer for touch-up work.

B. Interiors of Enclosed Circuit Breakers shall be free of debris to include cleaning of wire/cable pulling compounds. The use of compressed air systems is not acceptable.

END OF SECTION

SECTION 16450 GROUNDING AND BONDING FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. Furnish and install a complete grounding system in strict accordance with Article 250 of the National Electrical Code and/or as hereinafter specified and/or as shown on the Contract Drawings.

1.02 SUBMITTALS

- A. The requirements of Section 01340 and Section 16050 shall be met.
- B. Test results as indicated in 3.02 C shall be submitted.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Ground Rods: The ground rods shall be solid copper or copper-clad steel having a diameter of 5/8-inch and a length of 10-feet. The ground rods shall be as manufactured by Copperweld or approved equal.
- B. Grounding Conductors
 - 1. All grounding conductors shall be copper. Aluminum or copper-clad aluminum grounding conductors will not be allowed.
 - 2. The grounding conductors shall be sized in accordance with the latest edition of the National Electrical Code, Table 250-94 or Table 250-95, whichever is applicable to the particular grounding conductor.
- C. Ground Rod Clamps: The ground rod clamps shall be malleable iron or cast bronze fittings suitable for use with copper conductors. The ground rod clamps shall be as manufactured by Bridgeport Fittings, Inc.; ITT Blackburn, Inc.; or approved equal.
- D. Dissimilar Metals Junctions: Connections between different metals shall be sealed using NO-OXIDE paint, Grade A, or approved equal.

PART 3 EXECUTION

3.01 INSTALLATION

- A. Wherever possible, the Contractor shall connect to an existing plant, area or building grounding grid. Where no such grounding grid exists, the Contractor shall provide grounding as hereinafter specified and/or as shown on the Contract Drawings.
- B. Building grounding grid conductors shall be embedded in backfill material around the structures.
- C. All underground conductors shall be laid slack and, where exposed to mechanical

injury, shall be protected by pipes or other substantial guards. If guards are iron pipe or other magnetic material, conductors shall be electrically connected to both ends of the guard.

- D. Grounding electrodes shall be driven as required. Where rock is encountered, grounding plates may be used in lieu of grounding rods.
- E. All equipment enclosures, motor and transformer frames, conduit systems, cable armor, exposed structural steel and similar items as required by Article 250 of the NEC shall be grounded.
- F. All steel building columns shall be bonded together and connected to the building ground grid.
- G. Exposed connections shall be made utilizing approved grounding clamps. Buried connections shall be Cadweld, or approved equal, welding process.
- H. The ground bus of service entrance equipment shall be connected to the plant, area or building ground grid, whichever is applicable.
- I. For reasons of mechanical strength, grounding conductors extending from the plant, area or building grounding grid or service entrance ground bus, whichever is applicable, to the ground buses of motor control centers and/or unit substations shall be No. 1/0 AWG bare copper.
- J. Lighting transformer neutrals shall be grounded to the nearest grounding electrode.
- K. Conduits stubbed-up below a motor control center shall be fitted with insulated grounding bushings and connected to the motor control center ground bus. Boxes mounted below motor control centers shall be bonded to the motor control center ground bus. The grounding wire shall be sized in accordance with Table 250-95 of the National Electrical Code, except that a minimum No. 12 AWG shall be used.
- L. Motors shall be grounded in accordance with Section 16150, Item 3.01.A of these Specifications.
- M. The Contractor shall exercise care to insure good ground continuity, in particular between conduits and equipment frames and enclosures. Where necessary, jumper wires shall be installed.

3.02 TESTS

- A. The Contractor shall test the ground resistance of the system. The Contractor shall provide all test equipment of which the County shall have approval.
- B. The dry season resistance of the system shall not exceed five (5) ohms. If a single driven rod does not produce this value, the Contractor shall drive additional rods and/or take other measures as directed by the County without any cost to the County.
- C. The Contractor shall furnish to the County three (3) copies of the test report certifying that the system is in compliance with the ohmic value requirement. The certified test report shall include, but not necessarily be limited to, the following:

1. Description of the test.
2. Type of test equipment used.
3. Moisture content of the soil.
4. Date and time of the test.
5. Resistance measurement of each rod cluster.
6. Name of individual(s) performing the test.
7. Contractor's certification stamp or seal.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16501 LIGHTING

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install lighting fixtures and associated controls.
2. Provide fixtures in accordance with NEC Class 1 Div 2 classified areas as shown on drawings.
3. Refer to Lighting Schedule shown on drawings.

B. Coordination:

1. Coordinate location of fixtures with piping, ductwork, openings, and other systems and equipment and locate clear of interferences.
2. Coordinate fixtures to be mounted in hung ceilings with the ceiling suspension system proposed.

C. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16075, Identification for Electrical Systems.
3. Section 16160, Panelboards.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. UL 844, Luminaires for Use in Hazardous (Classified) Locations.
2. UL 935, Safety of Fluorescent Lamp Ballasts.
3. UL 1029, Safety of High-Intensity- Discharge Lamp Ballasts.
4. UL 1598, Safety of Luminaires.
5. UL 8750, Safety of LED Lighting

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 410, Luminaires, Lamp holders, and Lamps.
2. Florida Building Code 2017, Wind Load Requirements

1.04 SUBMITTALS

- A. Shop drawings and product data as described in Division 1.
- B. Operation and maintenance data as described in Division 1.
- C. In addition, submit the following:

- D. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Schedule of light fixtures to be furnished, indicating fixture type and location for each.
 - b. Customized wiring diagrams.
 2. Product Data:
 - a. Manufacturer's technical information, specifications, standard wiring diagrams, and catalog cuts for lighting fixtures proposed.
 - b. Fixture construction details.
 - c. ETL photometric and isocandle curves for each fixture proposed.
 - d. Verification that recessed fixtures to be mounted in hung ceilings are compatible with ceiling suspension system proposed.
- B. Informational Submittals: Submit the following:
1. Manufacturer's Instructions:
 - a. Instructions and recommendations for handling, storing, and protecting the equipment.
 - b. Installation instructions for the equipment, including setting drawings, templates, and directions and tolerances for installing anchorage devices.
- C. Maintenance Material Submittals: Submit the following:
1. Spare Parts and Extra Stock Materials: Furnish spare parts for each type of unit required as indicated in Part 2 of this Section.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

- A. Delivery:
1. Upon delivery, inspect equipment for evidence of water that may have entered equipment during transit.
- B. Storage:
1. Store lighting fixtures, controls, related materials and equipment in clean, dry location with controls for uniform temperature and humidity. Protect materials and equipment with coverings and maintain environmental controls.
 2. Store materials and equipment for easy access for inspection and identification. Keep materials and equipment off ground, using pallets, platforms, or other supports. Protect materials and equipment from corrosion and deterioration.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Type: Lighting fixtures required shall be in accordance with the Lighting Fixture Schedule on the Contract Drawings. Fixtures shall be complete with supports, ballasts, lamps, and incidentals, as required.
- B. Fixtures in hazardous locations shall be listed in accordance with UL 1598 and UL 844. Materials shall be suitable for the area classification(s) shown or indicated on the Contract Drawings, and specified in Section 16050, General Provisions for Electrical Systems.
- C. Lamps:
 - 1. Fluorescent: Fluorescent lamps shall be Toxic Characteristic Leaching Procedure (TCLP) compliant for low mercury content. Linear fluorescent lamps shall be T8, energy-efficient, extended life type. Compact fluorescent lamps shall be long-life, energy-efficient type.
 - 2. LED fixtures shall be modular and allow for separate replacement of LED lamps and drivers. User serviceable LED lamps and drivers shall be replaceable from the room side. Dimmable LED fixtures shall have either a 0-10 volt, 3-wire dimming driver, or a two-step (50%-100%) line voltage, two switch controlled dimming driver, as shown on the drawings.
 - a. LED lamps shall have a color temperature of 3500 degrees K, a CRI of 80 minimum, and a lumen maintenance L70 rating of 50,000 hours minimum.
 - 3. High Pressure Sodium: Shall be TCLP-compliant for low mercury content. Lamps shall be clear with high-efficacy and lumen maintenance.
 - 4. Metal Halide: Shall be fabricated for low mercury content and be TCLP-compliant when available. Lamps shall be clear-pulse, start type with high-efficacy and lumen maintenance.
 - 5. Incandescent: Inside-frosted.
 - 6. Spare Parts and Extra Stock Materials: Ten percent spare lamps of each type and wattage.
- D. Ballasts:
 - 1. Fluorescent: UL 935 listed, high power factor, energy-efficient type, equipped with thermal protectors (Type "P" ballast), compatible with lamps installed. Indoor two-lamp fluorescent ballasts shall be electronic type with total harmonic distortion of less than 20 percent. Ballast factor shall be 0.85 minimum with total of less than 61 watts input. Provide cold weather type ballast where indicated in the Lighting Fixture Schedule.
 - 2. High Intensity Discharge: UL 1029 listed, high power factor, constant wattage, stabilized autotransformer with line starting current the same or less than operating current.
 - 3. Ballasts sound level shall be 30 decibels or less, sound rating "A".
 - 4. Ballasts shall be INTERTEK (ETL) listed and Certified Ballast Manufacturer Association, CMB-certified.

5. For fixtures utilizing double-ended lamps, provide fixture disconnecting means within the fixture.
 6. LED drivers shall be electronic-type, labeled as compliant with radio frequency interference (RFI) requirements of FCC Title 47 Part 15, and comply with NEMA SSL 1 "Electronic Drivers for LED Devices, Arrays, or Systems". LED drivers shall have a sound rating of "A", have a minimum efficiency of 85%, and be rated for a THD of less than 20 percent at all input voltages.
 7. Spare Parts and Extra Stock Materials: Ten percent spare ballasts of each type and quantity, but not less than one.
- E. Fixtures located in area identified as hazardous in Section 16050, General Provisions for Electrical Systems, shall each be approved as a complete assembly, shall be clearly marked to indicate maximum wattage of lamps for which they are approved, and be protected against physical damage by suitable guards.
- F. Hardware: Provide necessary hangers, supports, conduit adaptors, reducers, hooks, brackets, and other hardware required for safe fixture mounting. Hardware shall have protective, non-corrosive finish.
- G. Outdoor Fixtures: Provide each fixture to be installed outdoors with cut-off lens to reduce the fixture's light pollution emissions.
- H. Time Switch:
1. Type: Astronomic dial time switch with day-omitting device.
 2. Products and Manufacturers: Provide of one of the following:
 - a. 7000Z Series by Tork Time Controls, Inc.
 - b. Or equal.
 3. Timing Motor: Heavy-duty, synchronous, self-starting, high torque, 120-volt or 277-volt, 60 Hertz, as shown on the Contract Drawings.
 4. Capacity: 40 amps per pole at 277 volts.
 5. Dial: 24-hour rotation, with gear to provide one revolution per year that automatically raises the "ON" and "OFF" settings each day according to seasonal changes of sunset and sunrise.
 6. Reserve Power: Spring driven reserve sufficient to operate time switch contacts for not less than 30 hours after power failure. On restoration of power, time switch shall transfer to synchronous motor drive and automatically rewind reserve.
- I. Lighting Contactor and Controls:
1. Provide a lighting contactor and control system for control of each area where shown on the Drawings.
 2. Product and Manufacturer: Provide products of one of the following:
 - a. Type SM03 by Square D Company.
 - b. Or Approved equal.

3. System shall include:
 - a. Enclosure sized as required, complete with input control fuse and screw type terminal blocks rated 300-volt, 20-amp quantity for all circuits, unless indicated otherwise on the Drawings.
 - b. Single coil, electrically-operated, mechanically-held contactor. Contactor shall be rated 30-amp, 600-volt, with 120-volt operating coil, unless indicated otherwise on the Contract Drawings. Number of poles shall be as shown on the Contract Drawings. Provide multiple contactors when necessary.
 - c. Where lighting contactors are controlled by photocell, provide a 120-volt, two-pole control relay, enclosure mounted to convert the two-wire photocell control to three-wire control required by contactor. Control shall include a cover mounted on-off-auto selector switch for "manual" or "auto" selection of operation. In "auto" position, contactor shall respond to photocell.
 - d. Enclosure: As required for area classification per Section 16050, General Provisions for Electrical Systems.
 - e. Identify panel in compliance with Section 16075, Identification for Electrical Systems.

J. Photocell:

1. Products and Manufacturers: Provide one of the following:
 - a. 2100 Series by Tork Time Controls, Inc.
 - b. Or equal.
2. Cadmium sulfide hermetically-sealed cell, fully temperature compensated, with time delay of not less than 15 seconds to prevent false switching.
3. Built-in fail safe light level selector, adjustable within limits of two to 50 foot-candles and factory set at 25 foot-candles.

K. Fixture-Lowering Hanger System:

1. General:
 - a. Provide corrosion-resistant system that lowers fixtures to ground level to allow maintenance on fixtures. Provide lowering hanger system for each fixture as shown on the Contract Drawings.
2. Products and Manufacturers: Provide one of the following:
 - a. Thompson Hangers, by Joslyn Hi-Voltage Corp.
 - b. Or equal.
3. System:
 - a. Upper or fixed housing of lowering devices shall contain:
 - 1) Attached pulley.
 - 2) Single point latching mechanism.

- 3) Guide.
 - 4) Upper or socket electrical contacts.
- b. Lower or moveable housing of lowering devices shall contain:
- 1) Operating line termination.
 - 2) Positioning stem and lower half of latch assembly.
 - 3) Lower electrical contacts.
 - 4) Fixture adapter.
- c. Fixtures shall be lowered on a guide line to allow operation of system in adverse weather and with structural clearance. Angles of the guide line to the structure shall be in accordance with to lowering device manufacturer's instructions.
- d. Operating line shall be high-strength/high-flexibility stainless steel and supplied by the lowering device manufacturer.
- e. Each operating line shall be encased in conduit where lower than eight feet above finished floor.
- f. Non-hanger termination shall be of enclosed and surface mounted design.
- g. Pulleys shall be supplied by hanger manufacturer as required to prevent excessive cable sag and allow lateral offsets between fixture location and cable termination.
- h. Provide portable manual winch.

4. Electrical:

- a. Contact material shall be silver-impregnated/silver-plated plate copper. Contacts shall use ball and socket design for ease of alignment and to allow for residual building vibration and movement.
- b. Contact pressure shall be supplied by springs remote from current conductors and shall not be part of current-carrying path.
- c. Termination of wiring shall be to crimp connectors.
- d. Provide electrical insulation of contacts by porcelain standoffs.
- e. Lowering device shall be make-and-break rated, UL-approved, as follows:
 - 1) 250 vac: 30 amps
 - 2) 600 vac: 15 amps
 - 3) 250 vdc: 10 amps
- f. Lowering device shall have eight contacts rated at 120 vac, 15 amps.

5. Mechanical:

- a. System loading capacity: 200 pounds.
- b. Manual or power winch operation.
- c. Housing manufactured with copper-free or low copper content cast aluminum.
- d. Operation shall be slow pull/quick release method.

- e. Maintenance-free design.
- f. Latching means shall be single point centered design to facilitate even wear over life of hangar.
- g. Provide a tag line to facilitate lateral movement over inaccessible spaces. Tag line shall consist of the following parts by hanger manufacturer:
 - 1) Termination kit for wall.
 - 2) Manual winch.
 - 3) Operating cable.
 - 4) Pulley for upper mounting.

L. Motion/Occupancy Sensor:

- 1. Products and Manufacturers: Provide one of the following:
 - a. Leviton, Motion Sensor Field-of-View PR 150-1LW
 - b. Or equal.
- 2. Adjustable time delay interval of 15 seconds to 15 minutes.
- 3. Equipped with passive infrared (PIR) sensing technology.

2.02 LIGHT EMITTING DIODE (LED) LIGHTING

The LED Fixture shall consist of a LED Luminaire Assembly, LED Driver and mounting hardware.

A. LED Lighting Fixture. LED Fixture requirements are as described below:

- 1. The input to the LED Lighting Fixture shall be 120 to 277VAC ($\pm 10\%$), 60HZ or as indicated in the Contract Document.
- 2. Correlated Color Temperature (CCT) shall be minimum 4000K or as indicated in the Contract Document.
- 3. Color Rendering Index (CRI) shall be ≥ 70 .
- 4. A minimum of 50,000 operating hours before reaching the L70 lumen output degradations point without catastrophic failure, or as indicated in the Contract Document.
- 5. Conform with UL 8750.
- 6. Compliance to FCC CFR Section 15.

B. LED Luminaire Assembly Luminaire Assembly requirements as described below:

- 1. Definition: Luminaire Assembly is the LED assembly without LED driver.
- 2. Input voltage shall be 24VDC, 36VDC or as indicated in the Contract Document.
- 3. CCT, CRI, Minimum life and UL conformity requirements are as defined in above article LED Lighting Fixture.

C. LED Driver LED: Driver requirements are as described below:

- 1. Must operate input voltage between 120VAC to 277VAC ($\pm 10\%$).
- 2. Operating frequency must be 60Hz.

3. Must be rated to operate between -40°C to +50°C.
4. Must have a minimum efficiency of 85%.
5. Self protected including short circuit protection.
6. Compliance to FCC CFR Section 15

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

A. General:

1. Fixture mounting heights and locations indicated on the Drawings are approximate and are subject to revision in the field where necessary to clear conflicts and obstructions.
2. Mounting Heights: Mounting heights or elevations are to bottom of fixture or to centerline of device.
3. Install fixtures in accordance with Laws and Regulations, the Contract Documents, and manufacturer instructions and recommendations.
4. Mount fixtures so that sufficient access is available for ready and safe maintenance.
5. Securely fasten equipment to walls or other surfaces on which equipment is mounted.

B. Suspended Fixtures:

1. Pendant-mount using 1/2-inch diameter conduit stems.
2. Ground to outlet box.
3. Attach mounting to building structure with expansion anchors.
4. Fixtures shall not be dependent on the outlet box cover screws for support.

C. Surface Mounted Fixtures:

1. Attach to appropriate outlet box.
2. Attach to surface using fasteners and sealing washers when mounting fixture in damp or wet locations.

D. Boxes and Fixtures:

1. For units mounted against masonry or concrete walls, provide suitable 1/4-inch spacers to prevent mounting back of box directly against wall.
2. Bolt units rigidly to building with expansion anchors, toggle bolts, hangers, or Unistrut.
3. Do not install boxes with open conduit holes.
4. Cable each circuit and identify with tag.

- E. Re-lamp all fluorescent fixtures provided under this Contract with new lamps following Substantial Completion.
- F. Mount photocells as shown and adjust foot-candle setting for proper dusk and dawn photo-control. Provide wiring in conduit from photocell to controls.
- G. Fixture Lowering System:
 - 1. Hangers shall be plumb.
 - 2. Provide adequate clearance between operating line and structural members, pipes, ducts, and other equipment and devices to avoid interference.
 - 3. Conduit runs enclosing operating lines shall be straight with no offset bends.

3.03 SCHEDULES

- A. See Drawings for Lighting Schedule

END OF SECTION

SECTION 16505 HANGERS AND SUPPORTS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install hangers and supports for electrical systems.
2. Area Classifications: Materials shall be suitable for the area classification(s) shown or indicated on the Contract Drawings, and specified in Section 16050, General Provisions for Electrical Systems.

B. Related Sections:

1. Section 16050, Electrical - General Provisions
2. Section 16110, Conduits and Fittings

1.02 REFERENCES

A. Standards referenced in this section are:

1. ASTM A123/A123M, Specification for Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products.
2. ASTM A1011/A1011M, Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy, High-Strength Low-Alloy with Improved Formability, and Ultra-High Strength.
3. ASTM E84, Test Method For Surface Burning Characteristics of Building Materials

1.03 QUALITY ASSURANCE

- A. CONTRACTOR shall have a minimum of five years in support systems and have installed system based on vibration, seismic and wind load calculations. If required, prepare a listing of such installations in the past five years.

1.04 SUBMITTALS

- A. Shop drawings and product data as described in Division 1.
- B. Operation and maintenance data as described in Division 1.
- C. In addition, submit the following:
- D. Action Submittals: Submit the following:
1. Shop Drawings:
 - a. Detailed installation drawings showing dimensions and compatibility with proposed layout.

2. Product Data:
 - a. Manufacturer's name, product designation, and catalog number of each material item proposed for use.
 - b. Manufacturer's specifications including material, dimensional and weight data, and load capacity for each supporting system component proposed for use.
 - c. Pictorial views and corresponding identifying text of each component proposed for installation.
 - d. Documentation that confirms product compatibility with Laws and Regulations.

E. Informational Submittals: Submit the following:

1. Certifications:
 - a. Submit certifications required under this Section.
2. Manufacturer's Instructions:
 - a. Manufacturer's installation instructions, including but not limited to recommended torque values for all fasteners and hardware.

PART 2 PRODUCTS

2.01 MANUFACTURERS

A. Manufacturers: Provide products of one of the following:

1. B-Line.
2. Kindorf.
3. Unistrut
4. Or equal.

2.02 MATERIALS

A. Strut, Fittings, and Accessories:

1. General
 - a. Unless otherwise shown or indicated, strut shall be 1-5/8 inches by 1-5/8 inches. Double struts shall be two pieces of the same strut, welded back-to-back at the factory.
 - b. Attachment holes, when required, shall be factory-punched on hole centers approximately equal to the cross-sectional width and shall be 9/16-inch diameter.
 - c. Fittings, braces, brackets, hardware, and accessories shall be Type 316 stainless steel.
 - d. Strut nuts shall be spring captured Type 316 stainless steel.
 - e. Square and round washers shall be Type 316 stainless steel.

2. Strut materials shall be suitable for area classifications indicated in Section 16050, General Provisions for Electrical Systems, and shown or indicated on the Contract Drawings.
 - a. Dusty Locations:
 - 1) Strut shall be 12-gage carbon steel, hot-dip galvanized after fabrication, complying with ASTM A123/A123M.
 - b. Wet Locations:
 - 1) Strut shall be 12-gage Type 316 stainless steel.
 - c. Corrosive Locations:
 - 1) Strut shall be 12-gage Type 316 stainless steel.
 - a. Chlorine or Sulfuric Areas:
 - 1) Strut shall be fiberglass-reinforced plastic (FRP) complying with ASTM E84.
 - 2) Fabricate materials either by pultrusion or extrusion process.
 - 3) Strut, fasteners and fittings shall have a surface veil over 100 percent of the surface to protect against UV degradation.
 - 4) Manufacture fasteners and fittings from long glass fiber-reinforced polyurethane or vinyl-ester resins.
 - 5) Thread rods shall be made from fiber-reinforced vinyl-ester resin.

B. Hanger Rods:

1. Material:
 - a. Dry Locations: All-thread, zinc-coated
 - b. Wet, Corrosive, or Hazardous Areas: Stainless steel.
2. Size: Not less than 3/8-inch diameter, unless otherwise shown on the Contract Drawings or specified.

C. Beam Clamps for Attaching Threaded Rods or Bolts to Beam Flanges for Hanging Struts or Conduit Hangers:

1. Beam clamps shall be stainless steel equipped with stainless steel square-head set screw, and shall include threaded hole sized for attaching the all-thread rod or threaded bolt.

- D. Miscellaneous Hardware:
 - 1. Bolts, screws, and washers shall be stainless steel.
 - 2. Hex Nuts: Shall be stainless steel and include nylon inserts.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work will be installed and notify ENGINEER in writing of conditions detrimental to the proper and timely completion of the Work. Do not proceed with the Work until unsatisfactory conditions are corrected.

3.02 INSTALLATION

- A. Provide hangers and supports for electrical systems with necessary channels, fittings, brackets, and related hardware for mounting and supporting materials and equipment. Provide anchor systems, concrete inserts, and associated hardware for proper support of electrical systems.
- B. Install equipment and devices on hangers and supports as shown on the Contract Drawings, as specified, and as required.
- C. Install hangers and supports level, true, free of rack, and parallel and perpendicular to building walls and floors, so that the hangers and supports are installed in a neat, professional, workmanlike manner. Per NECA/NEIS installation standards
- D. Holes in suspended ceilings for rods for hangers and supports and other equipment shall be provided adjacent to bars, where possible, to facilitate removal of ceiling panels.
- E. Coordinate installation of hangers and supports with equipment, cabinets, consoles, panels, enclosures, boxes, conduit, cable tray, wireway, busway, cablebus, piping, ductwork, lighting fixtures, and other systems and equipment. Locate hangers and supports clear of interferences and access ways.
- F. Anchor Bolts, Expansion Anchors, and Concrete Inserts: Shall be in accordance with Section 05500, Miscellaneous Metals, and requirements of this Section.
- G. Mounting of Conduit:
 - 1. Provide space of not less than 1/4-inch between conduit surfaces and abutting or near surfaces except struts, cable trays, steel beams, and columns.
 - 2. Fasten conduit to struts, cable trays, steel beams, and columns using specified clamps and straps as shown, specified, and required.
 - 3. Devices shall be compatible with size of conduit and type of support. Following installation, size identification shall be visible and legible.
 - 4. Install conduit supports and fasteners in accordance with Section, 16110, Conduits and Fittings.

- H. Supports for Cabinets, Consoles, Panels, Enclosures, and Boxes:
1. Freestanding: Unless otherwise specified or shown on the Contract Drawings, provide supports for floor-mounted equipment, cabinets, consoles, panels, enclosures, and boxes. Such supports shall be 3.5-inch high concrete equipment base with a 45 degree chamfered edge. Base shall extend 2-inches beyond outside dimensions of equipment on all sides.
 2. Wall-Mounted:
 - a. Provide space not less than 1/4-inch between cabinets, consoles, panels, enclosures, and boxes and the surface on which each is mounted. Provide non-metallic or stainless steel spacers as required.
 - b. Do not mount equipment, enclosures, panels, and boxes directly to beams or columns. Mount struts to beams or columns using beam clamps, and mount equipment, enclosures, panels, and boxes to the struts.
 3. Floor Stand Rack:
 - a. Where equipment, cabinets, consoles, panels, enclosures, and boxes cannot be wall-mounted, provide an independent floor stand rack.
 - b. Floor stand rack shall consist of struts, plates, brackets, connection fittings, braces, accessories, and hardware assembled in a rigid framework suitable for mounting of intended materials and equipment.
 - c. Equip floor stand racks with brackets and bases for rigidly-mounting the framework to the ceiling or floor, as applicable; or equip floor stand racks with beam clamps, angle plates, washers, and bolts for fastening to beam flanges, as applicable.
 - d. When equipment, cabinets, consoles, panels, enclosures, and boxes weigh more than 100 pounds:
 - 1) Main vertical supports of floor stand rack assemblies shall be back-to-back struts.
 - 2) Bracing, clamping and anchoring of each floor stand rack shall be sufficient to ensure rigidity of the floor stand rack with the intended equipment, enclosures, conduit, cable tray, busway, cablebus, and wireway installed. Floor stand racks shall not be deflected more than 1/8-inch by a 100-pound force applied at any point on the floor stand rack in any direction.
- I. Drilling into beams or columns is not allowed unless authorized by ENGINEER.
- J. Tighten nuts and bolts to the manufacturer's recommended torque values.
- K. Field Cutting:

1. Cut edges of strut and hanger rod shall have rounded corners, edges beveled, and burrs removed. If field cutting the strut is required, use clean, sharp, dedicated tools. Remove oil, shavings, and other residue of cuttings prior to installation.
2. Coatings: To prevent corrosion:
 - a. Coat cut edges with zinc-rich paint for galvanized steel.

END OF SECTION

APPENDIX A
GEOTECHNICAL ENGINEERING REPORT - TERRACON - MAY 26, 2021



Geotechnical Engineering Report

**Missionary Village Lift Station Rehab
Bradenton, Manatee County, Florida**

May 26, 2021

Terracon Project No. HC205091

Prepared for:

McKim & Creed
Sarasota, FL

Prepared by:

Terracon Consultants, Inc.
Sarasota, Florida



May 26, 2021

McKim & Creed
551 North Cattlemen Road, Suite 106
Sarasota, FL 34232



Attn: Mr. Blake Peters, P.E.
P: (941) 379-3404
E: bpeters@mckimcreed.com

Re: Geotechnical Engineering Report
Missionary Village Lift Station Rehab
Northeast Corner of SR-64 and 117th Street East
Bradenton, Manatee County, Florida
Terracon Project No. HC205091

Dear Mr. Peters:

We have completed the Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PHC205091 dated November 12, 2020. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning the design and construction of a new sanitary lift station.

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

Sincerely,
Terracon Consultants, Inc.

James M. Jackson, P.E.
Department Manager
FL License No. 77733

Douglas S. Dunkelberger, P.E.
Principal
FL License No. 33317

This item has been digitally signed and sealed by James M. Jackson, P.E. on the date adjacent to the seal.
Printed copies of this document are not considered signed and sealed and the signature must be verified on any electronic copies.

REPORT TOPICS

INTRODUCTION.....	1
SITE CONDITIONS.....	1
PROJECT DESCRIPTION.....	2
GEOTECHNICAL CHARACTERIZATION.....	3
GEOTECHNICAL OVERVIEW	3
SHALLOW FOUNDATIONS.....	4
BELOW-GRADE STRUCTURES	6
LATERAL EARTH PRESSURES	7
GENERAL COMMENTS.....	8
FIGURES	10

Note: This report was originally delivered in a web-based format. **Orange Bold** text in the report indicates a referenced section heading. The PDF version also includes hyperlinks which direct the reader to that section and clicking on the **GeoReport** logo will bring you back to this page. For more interactive features, please view your project online at client.terracon.com.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES
SITE LOCATION AND EXPLORATION PLANS
EXPLORATION RESULTS
SUPPORTING INFORMATION

Note: Refer to each individual Attachment for a listing of contents.

REPORT SUMMARY

Topic ¹	Overview Statement ²
Project Description	A new, below-grade sanitary lift station with associated pump and equipment slabs, at grade, is planned for the site. The depth of the lift station is to be about 25 to 30 feet below the existing ground surface (bgs).
Geotechnical Characterization	In general, the boring found very loose to medium dense poorly graded fine sand with silt from the surface to a depth of about 18 feet bgs followed medium dense clayey sand to a depth of about 22 feet and underlain by soft to hard limestone to the maximum borehole termination depth of 46 feet bgs. The depth to groundwater was about 4 feet bgs during drilling.
Shallow Foundations	Shallow, slab-type foundations will be sufficient for support of the planned equipment and electrical buildings. Allowable bearing pressure = 2,000 lbs/sq ft Expected settlements: 1 inch total; ¾ inch differential
Below Grade Structures	Recommendations for support of the below-grade, lift station structure are provided in this section of the report.
Lateral Earth Pressures	This section provides our recommended soil parameters to be used by others to design the planned lift station.
General Comments	This section contains important information about the limitations of this geotechnical engineering report.

1. If the reader is reviewing this report as a pdf, the topics above can be used to access the appropriate section of the report by simply clicking on the topic itself.
2. This summary is for convenience only. It should be used in conjunction with the entire report for design purposes.

Geotechnical Engineering Report
Missionary Village Lift Station Rehab
Northeast Corner of SR-64 and 117th Street East
Bradenton, Manatee County, Florida
Terracon Project No. HC205091
May 26, 2021

INTRODUCTION

This report presents the results of our subsurface exploration and geotechnical engineering services performed for the proposed new lift station to be located at the northeast corner of SR-64 and 117th Street East in Bradenton, Manatee County, Florida. The purpose of these services is to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil (and rock) conditions
- Groundwater conditions
- Site preparation and earthwork
- Excavation considerations
- Foundation design and construction
- Slab design and construction
- Lateral earth pressures

The geotechnical engineering Scope of Services for this project included the advancement of one test boring to a depth of approximately 46 feet below existing site grades.

Maps showing the site and boring location are shown in the **Site Location** and **Exploration Plan** sections, respectively. The results of the laboratory testing performed on soil samples obtained from the site during the field exploration are included on the boring log in the **Exploration Results** section.

SITE CONDITIONS

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project is located at the northeast corner of State Road 64 and 117 th Street East in Manatee County, Florida. See Site Location
Existing Improvements	An existing sanitary lift station that is approximately 32 years old.
Current Ground Cover	Based on review of aerial photographs, the site appears to be covered with gravel.

Item	Description
Existing Topography	The USGS topographic map for Lorraine, Florida (1987) indicates the site is at an elevation of about +25 feet-NGVD and suggests that the site is developed with a structure (assumed to be existing lift station).
Prior Land Use	Review of aerial photographs (ref. Google Earth) indicate the site had been developed with the existing lift station from at least 1995 to the present day.
Surficial Soil Conditions	Review of the Web Soil Survey indicates the site is mapped with Soil Unit 20, EauGallie fine sands. The typical soil profile consists of fine sand to a depth of about 42 inches followed by loamy fine sand to a depth of 65 inches or more. Under natural (pre-development) conditions, the seasonal high groundwater level (SHGWL) is reported to be within 10 inches of the ground surface.

Additionally, our experience near the vicinity of the proposed site indicates that subsurface conditions will likely consist of sands with varying amounts of silt from the surface to a depth of about 20 feet followed by soft to hard limestone to a depth of about 30 feet. Groundwater is expected to be within 5 feet of the ground surface.

PROJECT DESCRIPTION

Our final understanding of the project conditions is as follows:

Item	Description
Information Provided	The following information was provided by you via e-mail on November 8, 2020.
Project Description	The project includes the design of a new sanitary lift station with associated pump and equipment slabs.
Building Construction	The wet-well is to be a below-grade, pre-cast concrete structure likely supported on a cast-in-place (CIP) concrete slab. The new pumps and electrical building are to be supported, at grade, on CIP concrete structural slabs. We have assumed the maximum slab dimensions will be about 10' x 20' based on the <i>Preliminary Site Plan</i> .
Finished Floor Elevation	Not provided
Maximum Loads (assumed)	Slab Loads: 2,500 pounds per square foot (psf)
Grading/Slopes	We anticipate existing site grades to be maintained.
Below-Grade Structures	The depth of the wet well is anticipated to be 25 to 30 feet below the existing ground surface (bgs).

GEOTECHNICAL CHARACTERIZATION

We have developed a general characterization of the subsurface conditions based upon our review of the subsurface exploration, laboratory data, geologic setting and our understanding of the project. This characterization, termed GeoModel, forms the basis of our geotechnical calculations and evaluation of site preparation and foundation options. Conditions encountered at the exploration point are indicated on the individual log. The individual log can be found in the **Exploration Results** section and the GeoModel can be found in the **Figures** section of this report.

As part of our analyses, we identified the following model layers within the subsurface profile. For a more detailed view of the model layer depths at the boring location, refer to the GeoModel.

Model Layer	Layer Name	General Description
1	Sand	Poorly graded sand with silt (SP-SM), very loose to medium dense
2	Clayey Sand	Clayey sand (SC), medium dense
3	Limestone	Limestone formation, soft to hard ¹

1. Soft limestone refers to material containing limestone or limerock fragments with SPT N-values less than or equal to 50 blows per foot (ref. Florida Department of Transportation Soils and Foundations Handbook, 2020). Hard limestone corresponds to N-values > 50 blows per foot. The description of “relative hardness” should not be applied to constructability items such as excavating, pile driving and/or pile augering.

It should be noted that the “soft Limestone” designation does not necessarily mean that the limestone will be easy to excavate and/or drill as part of the construction activities. Difficult excavation/drilling should be anticipated throughout the limestone layer as indicated by the multiple N-values in excess of 50 blows per foot .

Groundwater

Groundwater was found at a depth of about 4 feet bgs while sampling. Our boring was completed during a relatively dry time of the year and we would expect groundwater to rise about 2 ½ to 3 feet during the typical wet season (June through October). Therefore, we recommend assuming a Seasonal High Groundwater Level (SHGWL) of about 1 ½ feet below the ground surface with an accuracy of about ½ foot.

If more accurate groundwater data is desired, we recommend the installation of piezometers that could be monitored over a period of time.

GEOTECHNICAL OVERVIEW

In general, the boring found very loose to medium dense poorly graded fine sand with silt from the surface to a depth of about 18 feet bgs followed medium dense clayey sand to a depth of

about 22 feet and underlain by soft to hard limestone to the maximum borehole termination depth of 46 feet bgs. The surficial sandy soils should provide suitable support for at-grade equipment slabs and the limestone should provide suitable support for the new lift station structure. The **Shallow Foundations** and **Below Grade Structures** sections provide recommendations for equipment slabs and the lift station structure, respectively.

The **Lateral Earth Pressures** section provides our recommended soil parameters to be used by others to design the planned lift station.

The **General Comments** section provides an understanding of the report limitations.

SHALLOW FOUNDATIONS

Site Preparation

We understand grade supported structural slabs are planned to support new pumps and an electrical building. The slab subgrade should consist of relatively clean sand containing no more than 12 percent fines, maximum particle size of 2 inches, and organic content less than 2 percent. The slab subgrade should be compacted to at least 95 percent of the maximum dry density as determined from the modified Proctor test (ASTM D1557).

Design Parameters – Compressive Loads

Item	Description
Maximum Net Allowable Bearing pressure ^{1, 2}	2,000 psf
Required Bearing Stratum ³	Compacted in-situ soil
Ultimate Coefficient of Sliding Friction ⁴	0.35
Minimum Embedment below Finished Grade ⁵	12 inches
Estimated Total Settlement from Structural Loads ²	1 inch
Estimated Differential Settlement ^{2, 6}	¾ inch

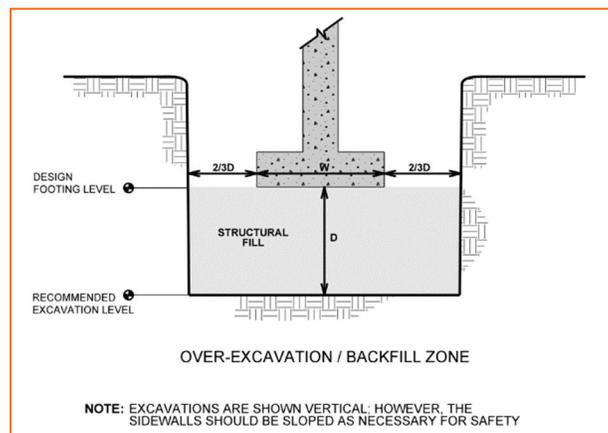
Geotechnical Engineering Report

Missionary Village Lift Station Rehab ■ Bradenton, Manatee County, Florida
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Item	Description
1.	The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation. An appropriate factor of safety has been applied. It may be increased by 33% for transient loads, including wind.
2.	Values provided are for maximum loads noted in Project Description .
3.	Unsuitable or soft soils should be over-excavated and replaced under observation by the Geotechnical Engineer.
4.	Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Should be neglected for foundations subject to net uplift conditions.
5.	Embedment necessary to minimize the effects of seasonal water content variations.
6.	Differential settlements are as measured over a span of 30 feet.

Foundation Construction Considerations

The slab subgrade should be evaluated under the direction of the Geotechnical Engineer. The base of all slabs should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after subgrade preparation to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material should be removed/reconditioned before foundation concrete is placed.



If unsuitable bearing soils are encountered at the base of the planned slabs, the unsuitable soils should be removed and replaced. Over- excavation for structural fill placement below footings should be conducted as shown above. The over-excavation should be backfilled up to the slab base elevation with engineered fill (as described in **Site Preparation**) that is compacted to at least 95 percent of the modified Proctor maximum dry density. Alternatively, FDOT No. 57 that is wrapped on all sides with a filter fabric and tamped could also be utilized.

BELOW-GRADE STRUCTURES

Lift Station Foundation

The foundation materials at the planned depth of the proposed lift station bottom should consist of limestone which has adequate strength and bearing capacity to support the lift station structure. The base slab of the structure should be designed using an allowable bearing pressure of 2,500 pounds per square foot (psf). The slab should be well reinforced to resist the forces created by unbalanced hydrostatic pressures. Uplift forces can be resisted by the self-weight of the lift station and frictional resistance at the lift station-backfill interface. Frictional resistance for the backfill may be calculated using at-rest lateral earth criteria described later in this report and a coefficient of friction of 0.35.

Total settlement of the lift station that results from compression of the underlying soils is estimated to be approximately less than ½ inch which should be acceptable.

Excavation and Excavation Support

Excavation work should be done in accordance with the applicable federal and state laws and regulations, including OSHA. The contractor should develop an excavation plan, including temporary excavation support systems (if necessary), designed by a Professional Engineer registered in the State of Florida.

It is anticipated that excavation of the sandy overburden soils can be accomplished using conventional earth moving equipment. However, the limestone formation, which was found at a depth of about 22 feet, will be very hard to excavate. Longer excavation times and additional wear and tear on equipment should be expected once the limestone formation is encountered. The excavation could be accomplished by open-cut methods provided that the sides are appropriately sloped, and dewatered, for stability. An open cut may not be feasible due to lack of work area and the proximity of existing construction. The use of a temporary excavation support system will reduce the amount of soil removed and protect adjacent construction. The type of excavation method should be selected by the contractor based on actual subsurface conditions, proximity to existing construction, surcharge loading, and construction sequence.

The excavation should be adequately dewatered to allow for inspection and compaction of the subsoils exposed at the bottom. As a guideline, the groundwater level should be controlled by dewatering at a minimum depth of 2 feet below the excavation bottom. The bottom of the excavation should be mechanically tamped to achieve a density of 95% of the Modified Proctor maximum dry density (ASTM D-1557) for a minimum depth of 12 inches. Should the excavation bottom remain loose or otherwise unstable due to persistent moisture, then it should be over-excavated a minimum of 12 inches (deep) and replaced with clean gravel (FDOT No. 57 Stone) in a filter fabric envelope.

Backfill

Soils used to fill around the completed lift station should consist of relatively clean sands or gravels, with a maximum of 15% passing the U.S. No. 200 sieve and no particle size larger than 1 inch in any dimension. The fill should be placed in the dry in lifts that do not exceed 12 inches in vertical measure. Lift thicknesses may need to be reduced in order to achieve the specified density. Each lift should be compacted to at least 95% of the Modified Proctor maximum dry density (ASTM D-1557).

The GeoModel Layer 1 soils found from the surface to about 18 feet bgs should generally meet the backfill gradation requirements described above. The GeoModel Layer 2 (clayey sand) and Layer 3 (limestone) soils do not meet the gradation requirements and therefore the use of import fill should be expected.

We recommend the use of only relatively light, hand-held compaction equipment to limit the potential for damage to the lift station structure.

Construction Observation and Testing

Each lift of compacted fill should be tested, evaluated, and reworked as necessary until approved by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content.

In areas of foundation excavations, the bearing subgrade should be evaluated under the direction of the Geotechnical Engineer. In the event that unanticipated conditions are encountered, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

LATERAL EARTH PRESSURES

Design Parameters

The recommended design lateral earth pressures do not include a factor of safety and do not provide for possible hydrostatic pressure on the walls (unless stated). The lateral earth pressures assume the backfill material will be placed as recommended in the **Below Grade Structures** section.

Lateral Earth Pressure Design Parameters					
Soil Unit Weight (pcf) ¹		Friction Angle	Earth Pressure Coefficients ³		
Unsaturated	Submerged		K _a ¹	K _o	K _p
115	53	30	0.33	0.5	3.0

1. To achieve “Unsaturated” conditions, a permanent drainage system should be installed to prevent development of hydrostatic pressures. “Submerged” conditions are recommended when drainage behind walls is not incorporated into the design.
2. For active earth pressure, wall must rotate about base, with top lateral movements 0.002 H to 0.004 H, where H is wall height. For passive earth pressure, wall must move horizontally to mobilize resistance.
3. No safety factor is included in these values.

Backfill placed against structures should consist of granular soils. For the granular values to be valid, the granular backfill must extend out and up from the base of the wall at an angle of at least 45 and 60 degrees from vertical for the active and passive cases, respectively. Additionally, only walk-behind compacting equipment (weighing less than 1,000 pounds) should be used within 3 feet of the back of the walls.

GENERAL COMMENTS

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Natural variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

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

Our services and any correspondence or collaboration through this system are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client, and is not intended for

Geotechnical Engineering Report

Missionary Village Lift Station Rehab ■ Bradenton, Manatee County, Florida
May 26, 2021 ■ Terracon Project No. HC205091



third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly impact excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety, and cost estimating including, excavation support, and dewatering requirements/design are the responsibility of others. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

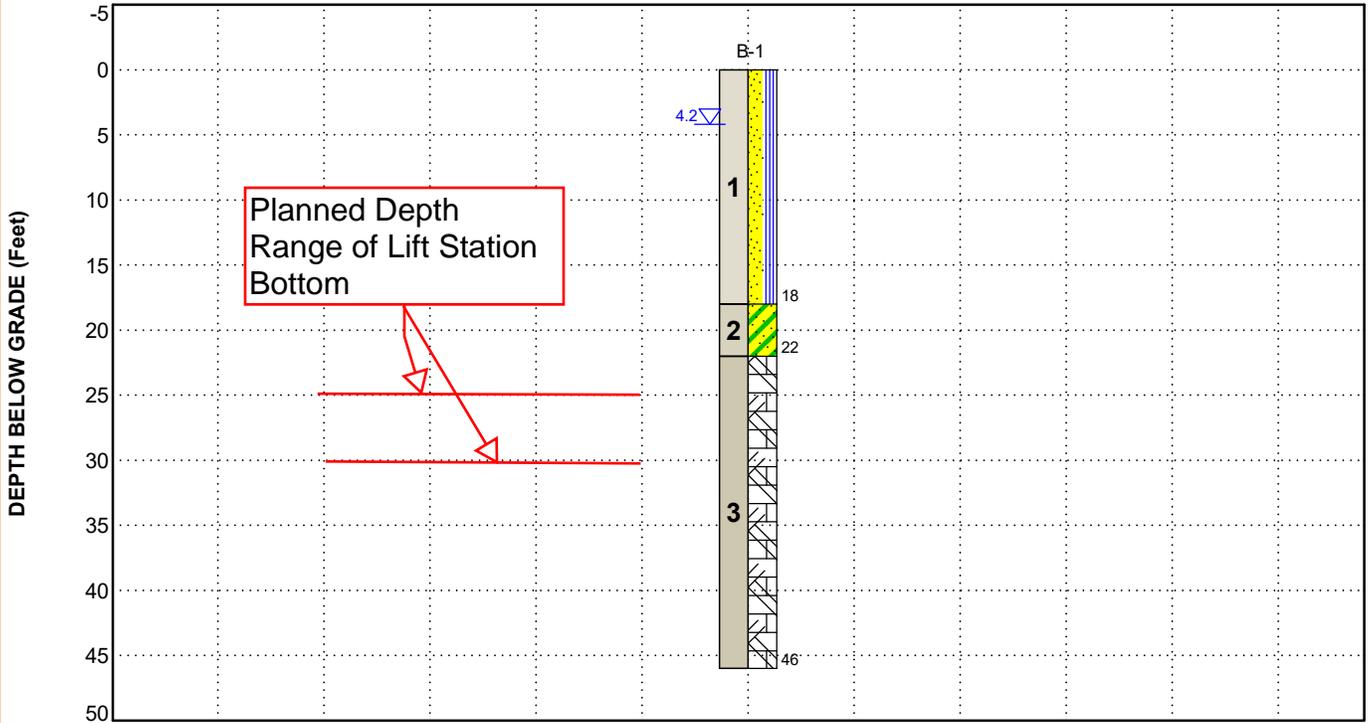
FIGURES

Contents:

GeoModel

GEOMODEL

Missionary Village LS ■ Bradenton, FL
 Terracon Project No. HC205091



This is not a cross section. This is intended to display the Geotechnical Model only. See individual logs for more detailed conditions.

Model Layer	Layer Name	General Description
1	Sand	Poorly graded sand with silt (SP-SM), very loose to medium dense
2	Clayey Sand	Clayey sand (SC), medium dense
3	Limestone	Limestone formation, soft to hard

LEGEND

- Poorly-graded Sand with Silt
- Clayey Sand
- Weathered Limestone

First Water Observation

NOTES:

Layering shown on this figure has been developed by the geotechnical engineer for purposes of modeling the subsurface conditions as required for the subsequent geotechnical engineering for this project. Numbers adjacent to soil column indicate depth below ground surface.

Groundwater levels are temporal. The levels shown are representative of the date and time of our exploration. Significant changes are possible over time. Water levels shown are as measured during and/or after drilling. In some cases, boring advancement methods mask the presence/absence of groundwater. See individual logs for details.

ATTACHMENTS

EXPLORATION AND TESTING PROCEDURES

Field Exploration

Number of Borings	Boring Depth (feet)	Location
1	46	Planned lift station location

Boring Layout and Elevations: Unless otherwise noted, Terracon personnel provided the boring layout. Coordinates were obtained with a handheld GPS unit (estimated horizontal accuracy of about ± 10 feet). If elevations and a more precise boring layout are desired, we recommend borings be surveyed following completion of fieldwork.

Subsurface Exploration Procedures: We advanced the boring with a track-mounted rotary drill rig using mud rotary procedures. Samples were obtained continuously at 2-foot intervals throughout the depth of the boring. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration or the middle 12 inches of a 24-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring log at the test depths. A split-barrel sampling spoon was used for sampling. We observed and recorded the groundwater level during drilling. The boring was backfilled with cement grout at its completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring log. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared a field boring log as part of the drilling operations. The field log included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. The final boring log was prepared from the field log. The final boring log represents the Geotechnical Engineer's interpretation of the field log and includes modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests to understand the engineering properties of the various soil strata, as necessary, for this project. Procedural standards noted below are for reference to methodology in general. In some cases, variations to methods were applied because of local practice or professional judgment. Standards noted below include reference to other, related standards. Such references are not necessarily applicable to describe the specific test performed.

Geotechnical Engineering Report

Missionary Village Lift Station Rehab ■ Bradenton, Manatee County, Florida

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- ASTM D2216 Standard Test Methods for Laboratory Determination of Water (Moisture) Content of Soil and Rock by Mass
- ASTM D1140-17 Standard Test Method for Amount of Material in Soils Finer than No. 200 (75- μ m) Sieve)

Our laboratory testing program also included examination of soil samples by an engineer. Based on observation and test data, the engineer classified the soil samples in accordance with the Unified Soil Classification System (ASTM D2487).

SITE LOCATION AND EXPLORATION PLANS

Contents:

Site Location Plan

Exploration Plan

SITE LOCATION

Missionary Village Lift Station Rehab ■ Bradenton, Manatee County, Florida
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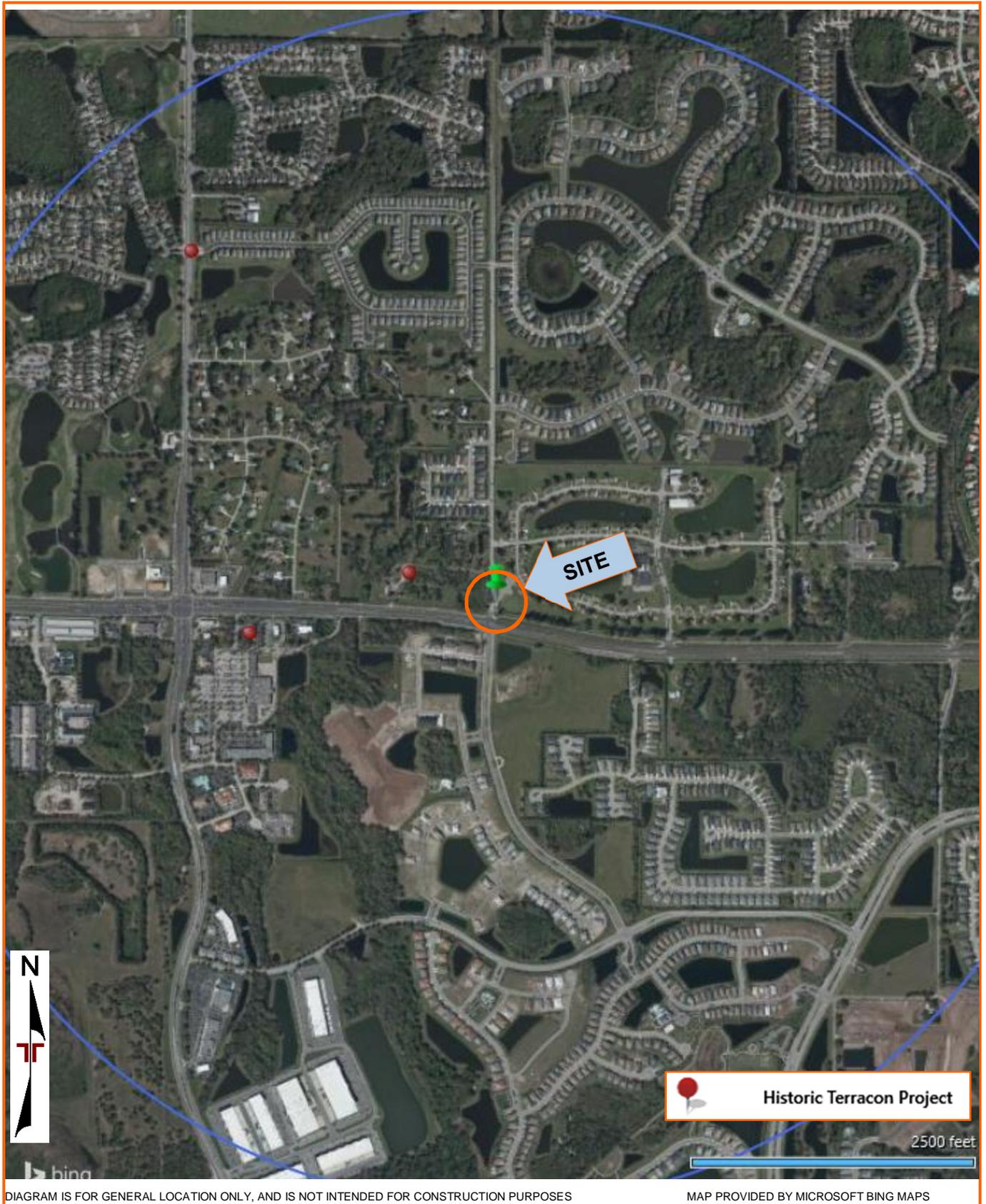
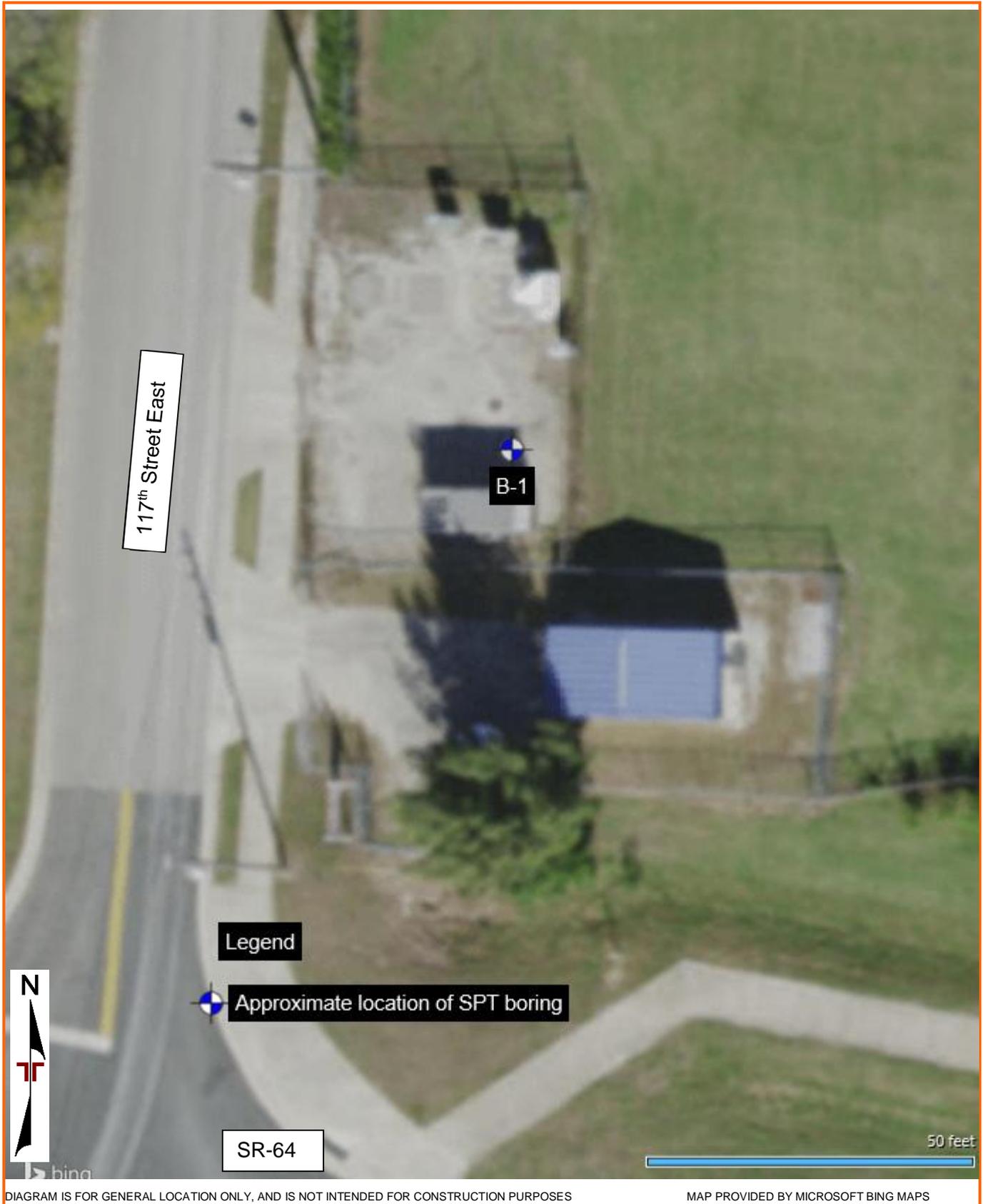


DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

EXPLORATION PLAN

Missionary Village Lift Station Rehab ■ Bradenton, Manatee County, Florida
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EXPLORATION RESULTS

Contents:

Boring Log (B-1)

BORING LOG NO. B-1

PROJECT: Missionary Village LS

**CLIENT: McKim & Creed
Sarasota, FL**

**SITE: 117th Street East
Bradenton, FL**

THIS BORING LOG IS NOT VALID IF SEPARATED FROM ORIGINAL REPORT. GEO SMART LOG-NO WELL - HC205091 MISSIONARY VILLAG.GPJ TERRACON_DATATEMPLATE.GDT 5/21/21

MODEL LAYER	GRAPHIC LOG	LOCATION See Exploration Plan Latitude: 27.4853° Longitude: -82.4252°	DEPTH (Ft.)	WATER LEVEL OBSERVATIONS	SAMPLE TYPE	FIELD TEST RESULTS	WATER CONTENT (%)	PERCENT FINES
		DEPTH						
1		POORLY GRADED SAND WITH SILT (SP-SM) , with gravel-sized shell and rock fragments, fine grained, brown to light brown, very loose to medium dense	5	▽		1-1-WH/6"-2 N=1		
			10			2-3-2-3 N=5		
			15			3-4-5-5 N=9		
			18.0			1-3-5-7 N=8		
2		CLAYEY SAND (SC) , fine grained, bluish gray to gray, medium dense	20			5-6-6-5 N=12		
			22.0			6-6-4-5 N=10		
			25			3-4-3-2 N=7		
			30			WH/6"-4-4-7 N=8		
			35			4-6-14-13 N=20		
3		LIMESTONE FORMATION , light brown to gray, soft to hard, recovered as calcareous silt	40			3-5-5-50/5" N=10		
			45			28-30-38-50/6" N=68		
			46.0			18-50/4"		
			46.0			8-5-7-37 N=12		
			46.0			14-10-8-6 N=18		
			46.0			50/6"		
			46.0			6-18-50/6"		
			46.0			50/2"		
			46.0			6-50/3"		
			46.0			4-8-5-7 N=13		
			46.0			4-7-7-9 N=14		
			46.0			5-6-7-29 N=13		
		Boring Terminated at 46 Feet						

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

Hammer Type: Automatic

Advancement Method:
Mud rotary
Continuous sampling for entire depth

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).

Notes:
Begin mud rotary at 10 feet

Abandonment Method:
Boring backfilled with grout upon completion

See [Supporting Information](#) for explanation of symbols and abbreviations.

WH/6" = The sampling spoon advanced 6 inches due to the weight of the SPT hammer.

WATER LEVEL OBSERVATIONS

▽ At 4.2' while sampling



8260 Vico Ct, Unit B
Sarasota, FL

Boring Started: 05-18-2021

Boring Completed: 05-18-2021

Drill Rig: Track

Driller: J.C.

Project No.: HC205091

SUPPORTING INFORMATION

Contents:

General Notes

Unified Soil Classification System

GENERAL NOTES

DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING	 Auger Cuttings  Grab Sample  Shelby Tube	 Rock Core  No Recovery  Standard Penetration Test	WATER LEVEL	 Water Initially Encountered  Water Level After a Specified Period of Time  Water Level After a Specified Period of Time Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.	FIELD TESTS	(HP) Hand Penetrometer (T) Torvane (DCP) Dynamic Cone Penetrometer (PID) Photo-Ionization Detector (OVA) Organic Vapor Analyzer
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DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS <small>(More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance</small>		CONSISTENCY OF FINE-GRAINED SOILS <small>(50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance</small>		
	Descriptive Term (Density)	Automatic Hammer SPT N-Value (Blows/Ft.)	Descriptive Term (Consistency)	Unconfined Compressive Strength Qu, (psf)	Automatic Hammer SPT N-Value (Blows/Ft.)
	Very Loose	< 3	Very Soft	less than 500	< 1
	Loose	3 - 8	Soft	500 to 1,000	1 - 3
	Medium Dense	8 - 24	Medium Stiff	1,000 to 2,000	3 - 6
	Dense	24 - 40	Stiff	2,000 to 4,000	6 - 12
	Very Dense	> 40	Very Stiff	4,000 to 8,000	12 - 24
			Hard	> 8,000	> 24

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification		
				Group Symbol	Group Name ^B	
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F	
			$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F	
		Gravels with Fines: More than 12% fines ^C	Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}	
			Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}	
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I	
			$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I	
		Sands with Fines: More than 12% fines ^D	Fines classify as ML or MH	SM	Silty sand ^{G, H, I}	
			Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}	
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	$PI > 7$ and plots on or above "A" line	CL	Lean clay ^{K, L, M}	
			$PI < 4$ or plots below "A" line ^J	ML	Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OL	Organic clay ^{K, L, M, N}
			Liquid limit - not dried			Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}	
			PI plots below "A" line	MH	Elastic Silt ^{K, L, M}	
		Organic:	Liquid limit - oven dried	< 0.75	OH	Organic clay ^{K, L, M, P}
			Liquid limit - not dried			Organic silt ^{K, L, M, Q}
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat	

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$E \quad Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains ³ 15% sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains ³ 15% gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains ³ 30% plus No. 200 predominantly sand, add "sandy" to group name.

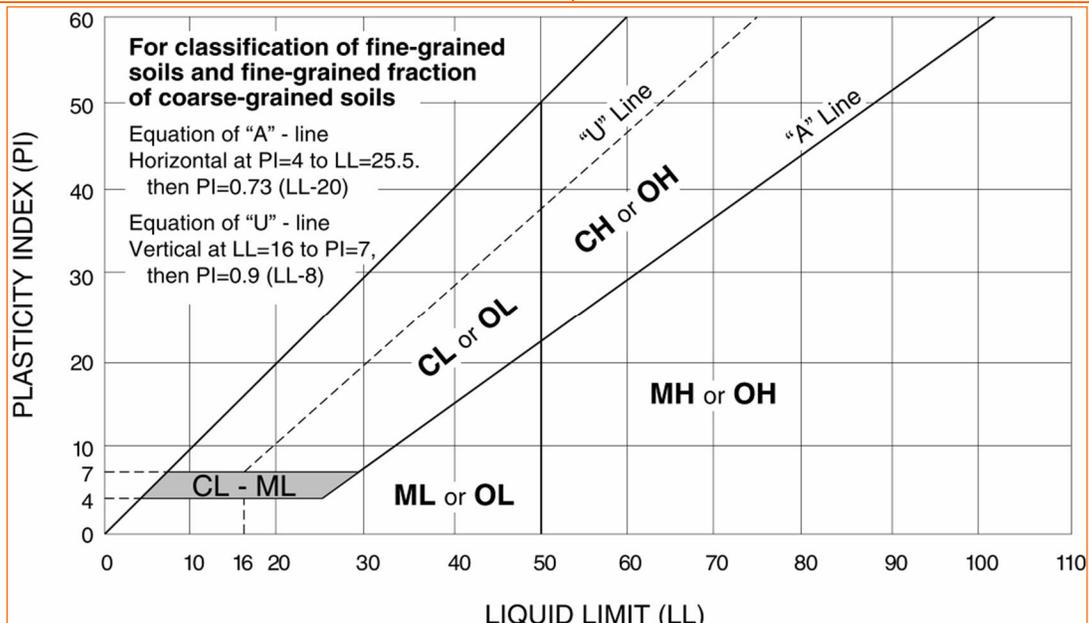
^M If soil contains ³ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.



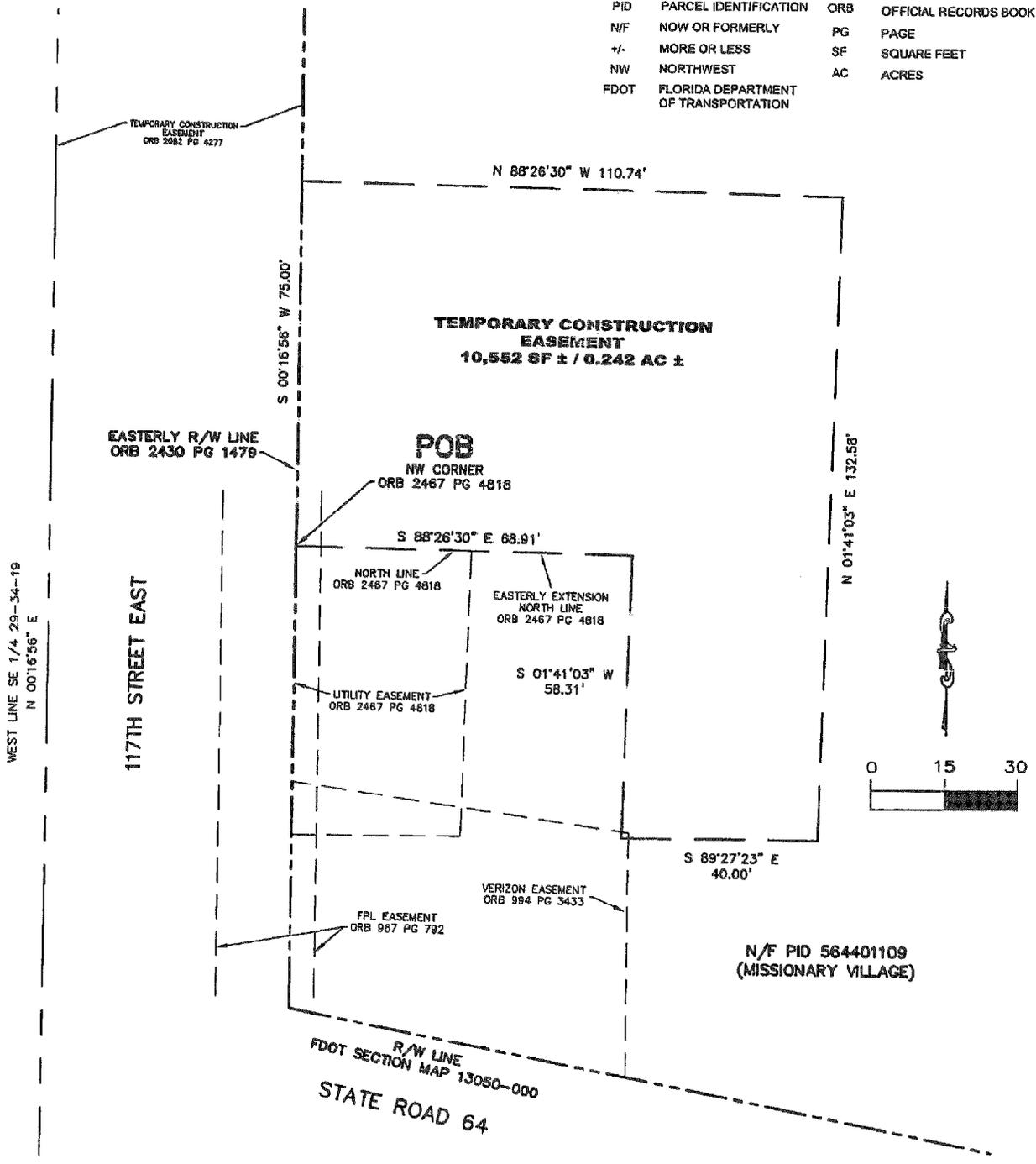
APPENDIX B
TEMPORARY EASEMENT - HYATT SURVEY SERVICES, INC - 08/2021

"EXHIBIT "A"

SKETCH

LEGEND

POB	POINT OF BEGINNING	R/W	RIGHT-OF-WAY
PID	PARCEL IDENTIFICATION	ORB	OFFICIAL RECORDS BOOK
N/F	NOW OR FORMERLY	PG	PAGE
+/-	MORE OR LESS	SF	SQUARE FEET
NW	NORTHWEST	AC	ACRES
FDOT	FLORIDA DEPARTMENT OF TRANSPORTATION		



SKETCH
 TEMPORARY CONSTRUCTION EASEMENT
 MISSIONARY VILLAGE
 N/F PID 564401109
 MANATEE COUNTY, FLORIDA

Hyatt Survey Services, Inc.
 LB No.: 7203 Geographic Data Specialists
 2012 Lena Road Bradenton, Florida 34211
 Phone (941) 748-4693

JOB NUMBER 21-2595	SECTION 29, TOWNSHIP 34 SOUTH, RANGE 19 EAST	SCALE 1"=30'	DATE 08/2021	DRAWN BY JM	FILE NAME TCE	SHEET 2 OF 2
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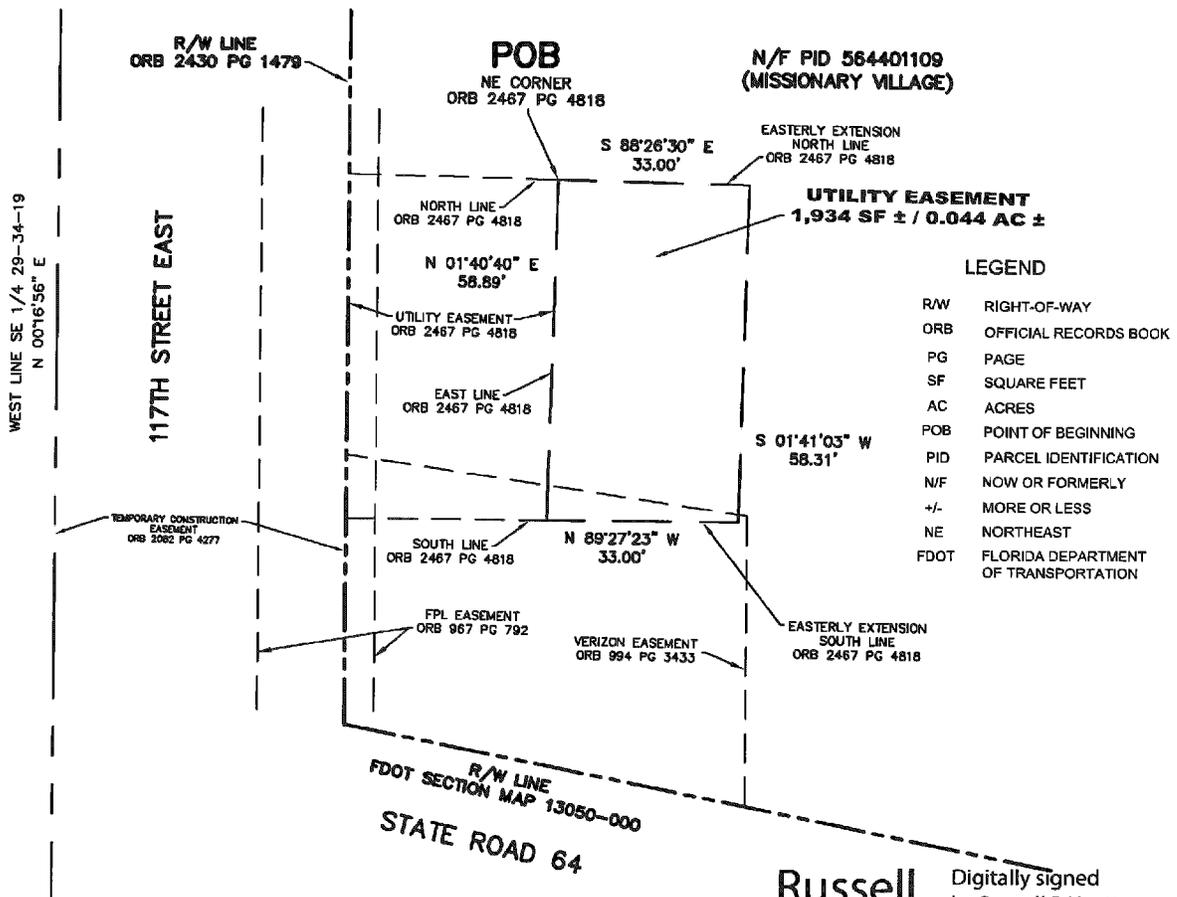
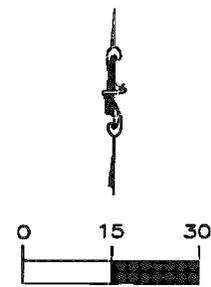
APPENDIX C
UTILITY EASEMENT - HYATT SURVEY SERVICES, INC - 08/2021

"EXHIBIT "A"

SKETCH & DESCRIPTION

BEGIN AT THE NORTHEAST CORNER OF THAT CERTAIN UTILITY EASEMENT DESCRIBED IN OFFICIAL RECORDS BOOK 2467 PAGE 4818 OF THE PUBLIC RECORDS OF MANATEE COUNTY, FLORIDA; THENCE S 88°26'30" E ALONG AN EASTERLY EXTENSION OF THE NORTH LINE OF SAID UTILITY EASEMENT, A DISTANCE OF 33.00 FEET; THENCE S 01°41'03" W, A DISTANCE OF 58.31 FEET; THENCE N 89°27'23" W ALONG AN EASTERLY EXTENSION OF THE SOUTH LINE OF SAID UTILITY EASEMENT, A DISTANCE OF 33.00 FEET TO THE SOUTHEAST CORNER OF SAID UTILITY EASEMENT; THENCE N 01°40'40" E ALONG THE EAST LINE OF SAID UTILITY EASEMENT, A DISTANCE OF 58.89 FEET TO THE POINT OF BEGINNING.

CONTAINING A DESCRIBED AREA OF 1,934 SQUARE FEET OR 0.044 ACRES MORE OR LESS.



LEGEND

- R/W RIGHT-OF-WAY
- ORB OFFICIAL RECORDS BOOK
- PG PAGE
- SF SQUARE FEET
- AC ACRES
- POB POINT OF BEGINNING
- PID PARCEL IDENTIFICATION
- N/F NOW OR FORMERLY
- +/- MORE OR LESS
- NE NORTHEAST
- FDOT FLORIDA DEPARTMENT OF TRANSPORTATION

Russell P Hyatt Digitally signed by Russell P Hyatt
 Date: 2021.10.19 08:08:32 -04'00'

RUSSELL P. HYATT, P.S.M.

NOTES:

1. THIS IS NOT A BOUNDARY SURVEY.
2. BEARINGS ARE BASED ON THE WEST LINE OF THE SOUTHEAST QUARTER OF SECTION 29-34-19 BEING N 00°16'56" E PER FDOT R/W MAP 13050-000.
3. A SPECIFIC PURPOSE REPORT NUMBERED 31158 WAS PROVIDED BY AMERICAN GOVERNMENT SERVICES CORPORATION FOR THE SUBJECT PROPERTY.

Florida Surveyor's Registration, No. LS 5303
 NOT VALID WITHOUT THE ORIGINAL SIGNATURE AND THE RAISED SEAL OR DIGITAL SIGNATURE OF A FLORIDA LICENSED SURVEYOR AND MAPPER.

SKETCH & DESCRIPTION
 UTILITY EASEMENT
 MISSIONARY VILLAGE
 N/F PID 564401109
 MANATEE COUNTY, FLORIDA

Hyatt Survey Services, Inc.

LB No.: 7203 Geographic Data Specialists
 2012 Lena Road Bradenton, Florida 34211
 Phone (941) 748-4693

JOB NUMBER 21-2595	SECTION 29, TOWNSHIP 34 SOUTH, RANGE 19 EAST	SCALE 1"=30'	DATE 08/2021	DRAWN BY JM	FILE NAME UTILITY	SHEET 1 OF 1
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BID ATTACHMENT 3, PLAN SET / DRAWINGS

NOTE - This attachment is uploaded as a separate document on the Procurement page of the County website with the solicitation document and available for download.

**SECTION D, SAMPLE CONSTRUCTION AGREEMENT WITH GENERAL
CONDITIONS OF THE CONSTRUCTION AGREEMENT AND AGREEMENT
EXHIBITS**

CONSTRUCTION AGREEMENT

for

STIPULATED SUM

between

MANATEE COUNTY (AS OWNER)

and

_____ (AS CONTRACTOR)

AGREEMENT NO.

**CONSTRUCTION AGREEMENT FOR
STIPULATED SUM
[PROJECT NAME]**

THIS AGREEMENT (“Agreement”) is made and entered into by and between Manatee County, a political subdivision of the State of Florida, referred to herein as “Owner”, and the firm of _____, incorporated in the State of _____ and registered and licensed to do business in the State of Florida (license # _____), referred to herein as “Contractor.”

WHEREAS, the Owner intends to construct [PROJECT DESCRIPTION], the aforementioned improvements being hereinafter referred to and defined as the “Project”; and

WHEREAS, in response to Owner’s Invitation for Bid Construction No. _____ (the “IFBC”), Contractor has submitted its Bid (the “Contractor’s Bid”) to provide the aforementioned construction services.

NOW THEREFORE, the Owner and the Contractor, in consideration of the mutual covenants hereinafter set forth, the sufficiency of which is hereby acknowledged, agree as follows:

1. Contract Documents. The Contract Documents consist of this Agreement and attached Exhibits, the attached General Conditions of the Construction Agreement, Supplementary Conditions (if any), Special Conditions (if any), Drawings (the titles of which are attached hereto as Exhibit A), Specifications (the titles of which are attached hereto as Exhibit B), Addenda issued prior to execution of this Agreement, the Invitation for Bid (including any Instructions to Bidders, Scope of Work, Bid Summary, Supplements, and Technical Specifications), any interpretations issued pursuant to the Invitation for Bid, the Contractor’s Bid, permits, notice of intent to award, Notice to Proceed, purchase order(s), any other documents listed in this Agreement, and Modifications [to include written Amendment(s), Change Order(s), Work Directive Change(s) and Field Directive(s)] issued after execution of this Agreement. These form the Agreement, and are as fully a part of the Agreement as if attached or repeated herein. This Agreement represents the entire and integrated agreement between the parties hereto and supersedes prior negotiations, representations or agreements, either written or oral. No other documents shall be considered Contract Documents.

2. Work. The Contractor shall fully execute the Work described in the Contract Documents, except to the extent specifically indicated in the Contract Documents to be the responsibility of others.

3. Date of Commencement and Substantial Completion.

A. Date of Commencement. The date of commencement of the Work shall be the date fixed in a Notice to Proceed issued by the Owner.

B. Contract Time. The Contract Time shall be measured from the date of commencement.

C. Substantial Completion. The Contractor shall achieve Substantial Completion of the entire Work not later than ___ days from the date of commencement, or as follows:

Portion of Work	Substantial Completion Date
------------------------	------------------------------------

subject to adjustments of this Contract Time as provided in the Contract Documents.

Time is of the essence in the Contract Documents and all obligations thereunder. If the Contractor fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents (to include not only the entire Work but any portion of the Work as set forth above), the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of \$_____ per calendar day, commencing upon the first day following expiration of the Contract Time and continuing until the actual date of Substantial Completion. Such liquidated damages are hereby agreed to be a reasonable estimate of damages the Owner will incur because of delayed completion of the Work. The Owner may deduct liquidated damages as described in this paragraph from any unpaid amounts then or thereafter due the Contractor under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at the maximum allowable rate.

4. Contract Sum.

A. Payment. The Owner shall pay the Contractor the Contract Sum in current funds for the Contractor's performance of the Contract. The Contract Sum shall be _____ Dollars and Zero Cents (\$_____), subject to additions and deductions as provided in the Contract Documents.

B. Alternates. The Contract Sum is based upon the following alternates, if any, which are described in the Contract Documents and are hereby accepted by the Owner. *(State the numbers or other identification of accepted alternates. If decisions on other alternates are to be made by the Owner subsequent to the execution of this Agreement, attach a schedule of such other alternates showing the amount for each and the date when that amount expires.)*

C. Unit Prices. Unit prices, if any, are reflected in the Contractor's Bid.

5. Payments.

A. Progress Payments.

(1) Based upon Applications for Payment submitted to the Architect/Engineer by the Contractor and Certificates for Payment issued by the Architect/Engineer, the Owner shall make progress payments on account of the Contract Sum to the Contractor as provided below and elsewhere in the Contract Documents.

(2) The period covered by each Application for Payment shall be one calendar month ending on the last day of the month.

- (3) Payments shall be made by Owner in accordance with the requirements of Section 218.735, Florida Statutes.
- (4) Each Application for Payment shall be based on the most recent schedule of values submitted by the Contractor in accordance with the Contract Documents. The schedule of values shall allocate the entire Contract Sum among the various portions of the Work. The schedule of values shall be prepared in such form and supported by such data to substantiate its accuracy as the Architect/Engineer may require. This schedule, unless objected to by the Owner or Architect/Engineer, shall be used as a basis for reviewing the Contractor's Applications for Payment.
- (5) Applications for Payment shall indicate the percentage of completion of each portion of the Work as of the end of the period covered by the Application for Payment.
- (6) Subject to other provisions of the Contract Documents, the amount of each progress payment shall be computed as follows:
 - i. Take that portion of the Contract Sum properly allocable to completed Work as determined by multiplying the percentage completion of each portion of the Work by the share of the Contract Sum allocated to that portion of the Work in the schedule of values, less retainage of five percent (5.00%). Pending final determination of cost to the Owner of changes in the Work, amounts not in dispute shall be included as provided in Section 3.3.B. of the General Conditions;
 - ii. Add that portion of the Contract Sum properly allocable to materials and equipment delivered and suitably stored at the site for subsequent incorporation in the completed construction (or, if approved in advance by the Owner, suitably stored off the site at a location agreed upon in writing), supported by paid receipts, less retainage of five percent (5.00%);
 - iii. Subtract the aggregate of previous payments made by the Owner; and
 - iv. Subtract amounts, if any, for which the Architect/Engineer has withheld or nullified an Application for Payment, in whole or in part as provided in Section 3.3.C. of the General Conditions.
- (7) The progress payment amount determined in accordance with Section 5.A(6) shall be further modified under the following circumstances:
 - i. Add, upon Substantial Completion of the Work, a sum sufficient to increase the total payments to the full amount of the Contract Sum, less such amounts as the Architect/Engineer shall determine for

incomplete Work, retainage applicable to such work and unsettled claims.

- ii. Add, if final completion of the Work is thereafter materially delayed through no fault of the Contractor, any additional amounts payable in accordance with Section 3.2.B. of the General Conditions.

- (8) Reduction or limitation of retainage, if any, shall be as follows:

Notwithstanding the foregoing, upon completion of at least 50% of the Work, as determined by the Architect/Engineer and Owner, the Owner may, with the concurrence of the Architect/Engineer, reduce to two and one-half percent (2.5%) the amount of retainage withheld from each subsequent progress payment.

- (9) Except with the Owner's prior approval, the Contractor shall not make advance payments to suppliers for materials or equipment which have not been delivered and stored at the site.

B. Final Payment. Final Payment, constituting the entire unpaid balance of the Contract Sum, shall be made by the Owner to the Contractor when:

- (1) The Contractor has fully performed the Work except for the Contractor's responsibility to correct Work as provided in Section 2.4.C. of the General Conditions, and to satisfy other requirements, if any, which extend beyond final payment; and
- (2) A final Application for Payment has been approved by the Architect/Engineer.

6. Termination or Suspension.

A. Termination. The Agreement may be terminated by the Owner or the Contractor as provided in Article XIV of the General Conditions.

B. Suspension by Owner. The Work may be suspended by the Owner as provided in Article XIV of the General Conditions.

7. Other Provisions.

A. Substantial Completion Defined. Substantial Completion shall be defined as provided in Article I of the General Conditions. In the event a temporary certificate of occupancy or completion is issued establishing Substantial Completion, the Contractor shall diligently pursue the issuance of a permanent certificate of occupancy or completion.

B. Project Meetings. There shall be a project meeting, at the jobsite or other location acceptable to the parties, on a regularly scheduled basis. The meeting will be attended by a representative of the Contractor, Architect/Engineer and Owner. These representatives shall be authorized to make decisions that are not otherwise contrary to the requirements of this Agreement.

C. Weather. Any rainfall, temperatures below 32 degrees Fahrenheit or winds greater than 25 m.p.h. which actually prevents Work on a given day, shall be considered lost time and an additional day added to the Contract Time, provided no work could be done on site, and provided written notice has been submitted to the Owner by the Contractor documenting same.

D. Shop Drawings; Critical Submittals. In consideration of the impact of timely review of submittals and shop drawings on the overall progress of the Work, it is hereby agreed that the Owner shall cause his agents and design professionals to accomplish the review of any particular “critical” submittals and/or shop drawings and return same to the Contractor within fourteen (14) days.

E. Applications for Payment. Applications for Payment shall be submitted once monthly at regular intervals and shall include detailed documentation of all costs incurred.

F. Punch List. Within 30 days after obtainment of Substantial Completion, the Owner shall generate a “punch list” of all work items requiring remedial attention by the Contractor. Within 5 days thereafter the Architect/Engineer shall assign a fair value to the punch list items, which sum shall be deducted from the next scheduled progress payment to the Contractor. Upon satisfactory completion of the punch list items, as certified by the Architect/Engineer, the previously deducted sum shall be paid to the Contractor.

G. Closeout documentation. Within 30 days after obtainment of Substantial Completion and before final payment, Contractor shall gather and deliver to Owner all warranty documentation, all manufacturer’s product and warranty literature, all manuals (including parts and technical manuals), all schematics and handbooks, and all as-built drawings.

H. Governing Provisions; Conflicts. In the event of a conflict between this Agreement and the Specifications or as between the General Conditions and the Specifications, the Specifications shall govern.

I. E-Verify. The Contractor’s employment of unauthorized aliens is a violation of Section 274(e) of the Federal Immigration and Employment Act. The Contractor shall utilize the U.S. Department of Homeland Security E-Verify system to verify the employment eligibility of all new employees hired during the term of this Agreement, and shall require the same verification procedure of all Subcontractors.

8. Insurance and Bonding. If and to the extent required by the Invitation for Bid documents, the Contractor shall furnish insurance coverage for (but not necessarily limited to) workers’ compensation, commercial general liability, auto liability, excess liability, and builder’s risk. The Contractor shall furnish to the Owner all appropriate policies and Certificate(s) of Insurance. The Contractor shall also post a Payment and Performance Bond for the Contract Sum, within ten (10) days following notification of intent to award, and otherwise in accordance with the Invitation for Bid documents.

9. Independent Contractor. The Contractor acknowledges that it is functioning as an independent contractor in performing under the terms of this Agreement, and it is not acting as an employee of the Owner.

10. Entire Agreement. This Agreement (inclusive of the Contract Documents incorporated herein by reference) represents the full agreement of the parties.

11. Amendments; Waivers; Assignment.

A. Amendments. This Agreement may be amended only pursuant to an instrument in writing that has been jointly executed by authorized representatives of the parties hereto.

B. Waivers. Neither this Agreement nor any portion of it may be modified or waived orally. However, each party (through its governing body or properly authorized officer) shall have the right, but not the obligation, to waive, on a case-by-case basis, any right or condition herein reserved or intended for the benefit or protection of such party without being deemed or considered to have waived such right or condition for any other case, situation, or circumstance and without being deemed or considered to have waived any other right or condition. No such waiver shall be effective unless made in writing with an express and specific statement of the intent of such governing body or officer to provide such waiver.

C. Assignment. The rights and obligations of either party to this Agreement may be assigned to a third party only pursuant to a written amendment hereto.

12. Validity. Each of the Owner and Contractor represents and warrants to the other its respective authority to enter into this Agreement.

13. Covenant to Defend. Neither the validity of this Agreement nor the validity of any portion hereof may be challenged by any party hereto, and each party hereto hereby waives any right to initiate any such challenge. Furthermore, if this Agreement or any portion hereof is challenged by a third party in any judicial, administrative, or appellate proceeding (each party hereby covenanting with the other party not to initiate, encourage, foster, promote, cooperate with, or acquiesce to such challenge), the parties hereto collectively and individually agree, at their individual sole cost and expense, to defend in good faith its validity through a final judicial determination or other resolution, unless all parties mutually agree in writing not to defend such challenge or not to appeal any decision invalidating this Agreement or any portion thereof.

14. Disclaimer of Third-Party Beneficiaries; Successors and Assigns. This Agreement is solely for the benefit of the parties hereto, and no right, privilege, or cause of action shall by reason hereof accrue upon, to, or for the benefit of any third party. Nothing in this Agreement is intended or shall be construed to confer upon or give any person, corporation, partnership, trust, private entity, agency, or other governmental entity any right, privilege, remedy, or claim under or by reason of this Agreement or any provisions or conditions hereof. This Agreement shall be binding upon, and its benefits and advantages shall inure to, the successors and assigns of the parties hereto.

15. Construction.

A. Headings and Captions. The headings and captions of articles, sections, and paragraphs used in this Agreement are for convenience of reference only and are not intended to define or limit their contents, nor are they to affect the construction of or be taken into consideration in interpreting this Agreement.

B. Legal References. All references to statutory sections or chapters shall be construed to include subsequent amendments to such provisions, and to refer to the successor provision of any such provision. References to “applicable law” and “general law” shall be construed to include provisions of local, state and federal law, whether established by legislative action, administrative rule or regulation, or judicial decision.

16. Severability. The provisions of this Agreement are declared by the parties hereto to be severable. In the event any term or provision of this Agreement shall be held invalid by a court of competent jurisdiction, such invalid term or provision should not affect the validity of any other term or provision hereof; and all such terms and provisions hereof shall be enforceable to the fullest extent permitted by law as if such invalid term or provision had never been part of this Agreement; provided, however, if any term or provision of this Agreement is held to be invalid due to the scope or extent thereof, then, to the extent permitted by law, such term or provision shall be automatically deemed modified in order that it may be enforced to the maximum scope and extent permitted by law.

17. Governing Law; Venue. This Agreement shall be governed by the laws of the State of Florida. Venue for any petition for writ of certiorari or other court action allowed by this Agreement shall be in the Circuit Court of the Twelfth Judicial Circuit in and for Manatee County, Florida.

18. Attorney’s Fees and Costs. In any claim dispute procedure or litigation arising from this Agreement, each party hereto shall be solely responsible for paying its attorney’s fees and costs.

19. Notices. All notices, comments, consents, objections, approvals, waivers, and elections under this Agreement shall be in writing and shall be given only by hand delivery for which a receipt is obtained, or certified mail, prepaid with confirmation of delivery requested, or by electronic mail with delivery confirmation. All such communications shall be addressed to the applicable addressees set forth below or as any party may otherwise designate in the manner prescribed herein.

To the Owner:

Email: _____

To the Contractor:

Email: _____

Notices, comments, consents, objections, approvals, waivers, and elections shall be deemed given when received by the party for whom such communication is intended at such party's address herein specified, or such other physical address or email address as such party may have substituted by notice to the other.

20. Public Records Law. The Contractor shall comply with the Florida Public Records Act (Chapter 119, Florida Statutes), and shall:

- A. Keep and maintain public records required by the Owner to perform the services called for in this Agreement.
- B. Upon request from the Owner's custodian of public records, provide the Owner with a copy of the requested records or allow the records to be inspected or copied within a reasonable time at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes or as otherwise provided by law.
- C. Ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed except as authorized by law for the duration of this Agreement and following completion of this Agreement if the Contractor does not transfer the records to the Owner.
- D. Upon completion of this Agreement, transfer, at no cost, to the Owner all public records in possession of the Contractor or keep and maintain such public records. If the Contractor transfers all public records to the Owner upon completion of the Agreement, the Contractor shall destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. If the Contractor keeps and maintains public records upon completion of the Agreement, the Contractor shall meet all applicable requirements for retaining public records. All records stored electronically must be provided to the Owner, upon request from the Owner's custodian of public records, in a format that is compatible with the information technology systems of the Owner.

IF THE CONTRACTOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE CONTRACTOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THIS AGREEMENT, CONTACT THE OWNER'S CUSTODIAN OF PUBLIC RECORDS AT 941-748-4501, EXT. 5845; DEBBIE.SCACCIANOCE@MYMANATEE.ORG; POST OFFICE BOX 1000, BRADENTON, FLORIDA 34206.

21. Exhibits. Exhibits to this Agreement are as follows:

Exhibit A—Title(s) of Drawings

Exhibit B—Title(s) of Specifications

Exhibit C—Affidavit of No Conflict

Exhibit D—Certificate(s) of Insurance

Exhibit E—Payment and Performance Bond

Exhibit F—Standard Forms

- 1—Application for Payment
- 2—Certificate of Substantial Completion
- 3—Final Reconciliation / Warranty / Affidavit
- 4—Change Order

(Remainder of this page intentionally left blank)

SAMPLE

WHEREFORE, the parties hereto have executed this Agreement as of the date last executed below.

Name of Contractor

By: _____

Printed Name: _____

Title: _____

Date: _____

MANATEE COUNTY, a political subdivision
of the State of Florida

By: _____

Printed Name: _____

Title: _____

Date: _____

SAMPLE

GENERAL CONDITIONS
of the
CONSTRUCTION AGREEMENT

SAMPLE

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GENERAL CONDITIONS
ARTICLE I
DEFINITIONS

1.1 Definitions. For purposes of the Contract Documents, the following terms shall have the following meanings.

A. Acceptance: The acceptance of the Project into the Owner's operating public infrastructure.

B. Application for Payment: The form approved and accepted by the Owner, which is to be used by Contractor in requesting progress payments or final payment and which is to include such supporting documentation as is required by the Contract Documents.

C. Architect/Engineer: McKim & Creed, Inc, a North Carolina corporation, registered and licensed to do business in the State of Florida.

D. Change Order: A written order signed by the Owner, the Architect/Engineer and the Contractor authorizing a change in the Project Plans and/or Specifications and, if necessary, a corresponding adjustment in the Contract Sum and/or Contract Time, pursuant to Article V.

E. Construction Services: The Construction Services to be provided by Contractor pursuant to Section 2.4, in accordance with the terms and provisions of the Contract Documents.

F. Construction Team: The working team established pursuant to Section 2.1.1.B.

G. Contract Sum: The total compensation to be paid to the Contractor for Construction Services rendered pursuant to the Contract Documents, as set forth in Contractor's Bid (or Guaranteed Maximum Price Addendum), unless adjusted in accordance with the terms of the Contract Documents

H. Contract Time: The time period during which all Construction Services are to be completed pursuant to the Contract Documents, to be set forth in the Project Schedule.

I. Contractor's Personnel: The Contractor's key personnel designated by Contractor.

J. Days: Calendar days except when specified differently. When time is referred to in the Contract Documents by days, it will be computed to exclude the first and include the last day of such period. If the last day of any such period falls on a Saturday or Sunday or legal holiday, such day will be omitted from the computation.

K. Defective: When modifying the term "Work", referring to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or that does

not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or that has been damaged prior to Owner's approval of final payment (unless responsibility for the protection thereof has been assumed by Owner).

L. Field Directive: A written order issued by Owner which orders minor changes in the Work not involving a change in Contract Time, to be paid from the Owner's contingency funds.

M. Final Completion Date: The date upon which the Project is fully constructed and all Work required on the Project and Project Site is fully performed as verified in writing by the Owner.

N. Float Time: The time available in the Project Schedule during which an unexpected activity can be completed without delaying Substantial Completion of the Work.

O. Force Majeure: Those conditions constituting excuse from performance as described in and subject to the conditions described in Article XII.

P. Notice to Proceed: Written notice by Owner (after execution of Contract) to Contractor fixing the date on which the Contract Time will commence to run and on which Contractor shall start to perform the Work.

Q. Owner: Manatee County, a political subdivision of the State of Florida.

R. Owner's Project Representative: The individual designated by Owner to perform those functions set forth in Section 7.8.

S. Payment and Performance Bond: The Payment and Performance Bond security posted pursuant to Section 2.4.Y to guarantee payment and performance by the Contractor of its obligations hereunder.

T. Permitting Authority: Any applicable governmental authority acting in its governmental and regulatory capacity which is required to issue or grant any permit, certificate, license or other approval which is required as a condition precedent to the commencement or approved of the Work, or any part thereof, including the building permit.

U. Procurement Ordinance: The Manatee County Procurement Code, Chapter 2-26 of the Manatee County Code of Laws, as amended from time to time.

V. Progress Report: A report to Owner that includes all information required pursuant to the Contract Documents and submitted in accordance with Section 2.4.EE, hereof.

W. Project: The total construction of which the Work performed under the Contract Documents may be the whole or a part and which may include construction by Owner and by separate contractors. For the purposes of the Contract Documents, the term Project shall include all areas of proposed improvements and all areas which may reasonably be judged to have an impact on the Project.

X. Project Costs: The costs incurred by the Contractor to plan, construct and equip the Project and included within, and paid as a component of, the Contract Sum.

Y. Project Manager: Subject to the prior written consent of Owner, the individual designated to receive notices on behalf of the Contractor, or such other individual designated by the Contractor, from time to time, pursuant to written notice in accordance with the Contract Documents.

Z. Project Plans and Specifications: The one hundred percent (100%) construction drawings and specifications prepared by the Architect/Engineer, and any changes, supplements, amendments or additions thereto approved by the Owner, which shall also include any construction drawings and final specifications required for the repair or construction of the Project, as provided herein.

AA. Project Schedule: The schedule and sequence of events for the commencement, progression and completion of the Project, developed pursuant to Section 2.3., as such schedule may be amended as provided herein.

BB. Project Site: The site depicted in the Project Plans and Specifications, inclusive of all rights of way, temporary construction easements or licensed or leased sovereign lands.

CC. Subcontractor: Any individual (other than a direct employee of the Contractor) or organization retained by Contractor to plan, construct or equip the Project pursuant to Article IV.

DD. Substantial Completion and Substantially Complete: The stage in the progress of the Work when the Work or designated portion thereof is sufficiently complete in accordance with the Contract Documents so that the Owner can occupy or utilize the Work for its intended use; provided, however, that as a condition precedent to Substantial Completion, the Owner has received all certificates of occupancy or completion and other permits, approvals, licenses, and other documents from any governmental authority which are necessary for the beneficial occupancy of the Project or any designated portion thereof.

EE. Substantial Completion Date: The date on which the Project or designated portion thereof is deemed to be Substantially Complete, as evidenced by receipt of (i) the Architect/Engineer's certificate of Substantial Completion, (ii) written Acceptance of the Project by the Owner, and (iii) approvals of any other authority as may be necessary or otherwise required.

FF. Substitute: Materials or equipment offered by the Contractor as an alternative to that set forth in the Project Plans and Specifications, where (i) the Project Plans and Specifications do not authorize an "approved equal", or (ii) the Owner, in its reasonable discretion, determines that a pre-authorized "approved equal" will result in a substantial change to the Work because of cost, quality or other difference in comparison to the materials or equipment specified.

GG. Unit Price Work: Work to be paid for on the basis of unit prices.

HH. Work: The term “Work” means the construction and services required by the Contract Documents, whether completed or partially completed, and includes all labor, materials, equipment and services provided or to be provided by the Contractor to fulfill the Contractor’s obligations. The Work may constitute the whole or a part of the Project.

II. Work Directive Change: A written directive to Contractor, issued on or after the effective date of the Agreement pursuant to Section 5.8 and signed by Owner’s Project Representative, ordering an addition, deletion or revision in the Work, or responding to differing or unforeseen physical conditions under which the Work is to be performed or responding to emergencies.

ARTICLE II RELATIONSHIP AND RESPONSIBILITIES

2.1 Relationship between Contractor and Owner. The Contractor accepts the relationship of trust and confidence established with Owner pursuant to the Contract Documents. The Contractor shall furnish its best skill and judgment and cooperate with Owner and Owner’s Project Representative in furthering the interests of the Owner. The Contractor agrees to provide the professional services required to complete the Project consistent with the Owner’s direction and the terms of the Contract Documents. All services provided hereunder by Contractor, either directly or through Subcontractors, shall be provided in accordance with sound construction practices and applicable professional construction standards.

A. Purpose. The purpose of the Contract Documents is to provide for the provision of construction services for the Project on the Project Site by the Contractor, and construction of the Project by the Contractor in accordance with the Project Plans and Specifications. The further purpose of the Contract Documents is to define and delineate the responsibilities and obligations of the parties to the Contract Documents and to express the desire of all such parties to cooperate to accomplish the purposes and expectations of the Contract Documents.

B. Construction Team. The Contractor, Owner and Architect/Engineer shall be called the “Construction Team” and shall work together as a team commencing upon full execution of the Contract Documents through Substantial Completion. As provided in Section 2.2, the Contractor and Architect/Engineer shall work jointly through completion and shall be available thereafter should additional services be required. The Contractor shall provide leadership to the Construction Team on all matters relating to construction. The Contractor understands, acknowledges and agrees that the Architect/Engineer shall provide leadership to the Construction Team on all matters relating to design.

C. Owner’s Reliance on Bid (or Guaranteed Maximum Price Addendum). The Contractor acknowledges that the representations, statements, information and pricing contained in its Bid (or Guaranteed Maximum Price Addendum) have been relied upon by the Owner and have resulted in the award of this Project to the Contractor.

2.2 General Contractor Responsibilities. In addition to the other responsibilities set forth herein, the Contractor shall have the following responsibilities pursuant to the Contract Documents:

A. Personnel. The Contractor represents that it has secured, or shall secure, all personnel necessary to perform the Work, none of whom shall be employees of the Owner. Primary liaison between the Contractor and the Owner shall be through the Owner's Project Representative and Contractor's Project Manager. All of the services required herein shall be performed by the Contractor or under the Contractor's supervision, and all personnel engaged in the Work shall be fully qualified and shall be authorized or permitted under law to perform such services.

B. Cooperation with Architect/Engineer. The Contractor's services shall be provided in conjunction with the services of the Architect/Engineer. In the performance of professional services, the Contractor acknowledges that time is critical for Project delivery. The Contractor acknowledges that timely construction utilizing the services of an Architect/Engineer and a Contractor requires maximum cooperation between all parties.

C. Timely Performance. The Contractor shall perform all services as expeditiously as is consistent with professional skill and care and the orderly progress of the Work, in accordance with the Project Schedule. Verification of estimated Project Schedule goals will be made as requested by the Owner.

D. Duty to Defend Work. In the event of any dispute between the Owner and any Permitting Authority that relates to the quality, completeness or professional workmanship of the Contractor's services or Work, the Contractor shall, at its sole cost and expense, cooperate with the Owner to defend the quality and workmanship of the Contractor's services and Work.

E. Trade and Industry Terminology. It is the intent of the Contract Documents to describe a functionally complete Project (or part thereof) to be constructed in accordance with the Contract Documents. Any Work, materials or equipment that may reasonably be inferred from the Contract Documents as being required to produce the intended result will be supplied whether or not specifically called for. When words which have a well-known technical or trade meaning are used to describe Work, materials, or equipment, such words shall be interpreted in accordance with that meaning. Reference to standard specifications, manuals or codes of any technical society, organization or association, or to the laws or regulations of any governmental authority, whether such reference be specific or by implication, shall mean the latest standard specification, manual, code or laws or regulations in effect at the time of opening of Bids (or at the time of execution of the Guaranteed Maximum Price Addendum), except as may be otherwise specifically stated. However, no provision of any referenced standard specification, manual or code (whether or not specifically incorporated by reference in the Contract Documents) shall be effective to change the duties and responsibilities of Owner or Contractor, or any of their agents or employees from those set forth in the Contract Documents. Computed dimensions shall govern over scaled dimensions.

2.3 Project Schedule. The Contractor, within ten (10) days after being awarded the Agreement, shall prepare and submit for the Owner's and Architect/Engineer's information a Contractor's construction schedule for the Work. The schedule shall not exceed time limits current under the Contract Documents, shall be revised at appropriate intervals as required by the conditions of the Work and Project, shall be related to the entire Project to the extent required by the Contract Documents, and shall provide for expeditious and practicable execution of Work.

- A. The Project Schedule shall show a breakdown of all tasks to be performed, and their relationship in achieving the completion of each phase of Work, subject to review of Owner and Architect/Engineer and approval or rejection by Owner. The Project Schedule shall show, at a minimum, the approximate dates on which each segment of the Work is expected to be started and finished, the proposed traffic flows during each month, the anticipated earnings by the Contractor for each month and the approximate number of crews and equipment to be used. The Project Schedule shall include all phases of procurement, approval of shop drawings, proposed Change Orders in progress, schedules for Change Orders, and performance testing requirements. The Project Schedule shall include a construction commencement date and Project Substantial Completion Date, which dates shall accommodate known or reasonably anticipated geographic, atmospheric and weather conditions.
- B. The Project Schedule shall serve as the framework for the subsequent development of all detailed schedules. The Project Schedule shall be used to verify Contractor performance and to allow the Owner's Project Representative to monitor the Contractor's efforts.
- C. The Project Schedule may be adjusted by the Contractor pursuant to Article V. The Owner shall have the right to reschedule Work provided such rescheduling is in accord with the remainder of terms of the Contract Documents.
- D. The Contractor shall prepare a submittal schedule, promptly after being awarded the Agreement and thereafter as necessary to maintain a current submittal schedule, and shall submit the schedule(s) for the Architect/Engineer's approval. The Architect/Engineer's approval shall not be unreasonably delayed or withheld. The submittal schedule shall (1) be coordinated with the Contractor's construction schedule, and (2) allow the Architect/Engineer reasonable time to review submittals. If the Contractor fails to submit a submittal schedule, the Contractor shall not be entitled to any increase in Contract Sum or extension of Contract Time based on the time required for review of submittals.
- E. The Contractor shall perform the Work in general accordance with the most recent schedules submitted to the Owner and Architect/Engineer.

2.4 Construction Services. The Contractor shall provide the following Construction Services:

A. Construction of Project. The Contractor shall work from the receipt of a Notice to Proceed through the Substantial Completion of the Project in accordance with the terms of the Contract Documents to manage the construction of the Project. The Construction Services provided by the Contractor to construct the Project shall include without limitation (1) all services necessary and commensurate with established construction standards, and (2) all services described in the Invitation for Bid (or Request for Proposal) and the Bid (or Guaranteed Maximum Price Addendum).

B. Notice to Proceed. A Notice to Proceed may be given at any time within thirty (30) days after the effective date of the Agreement. Contractor shall start to perform the Work on the date specified in the Notice to Proceed, but no Work shall be done at the site prior to the issuance of the Notice to Proceed.

C. Quality of Work. If at any time the labor used or to be used appears to the Owner as insufficient or improper for securing the quality of Work required or the required rate of progress, the Owner may order the Contractor to increase its efficiency or to improve the character of its Work, and the Contractor shall conform to such an order. Any such order shall not entitle Contractor to any additional compensation or any increase in Contract Time. The failure of the Owner to demand any increase of such efficiency or any improvement shall not release the Contractor from its obligation to secure the quality of Work or the rate of progress necessary to complete the Work within the limits imposed by the Contract Documents. The Owner may require the Contractor to remove such personnel as the Owner deems incompetent, careless, insubordinate or otherwise objectionable, or whose continued employment on the Project is deemed to be contrary to the Owner's interest. The Contractor shall provide good quality workmanship and shall promptly correct construction defects without additional compensation. Acceptance of the Work by the Owner shall not relieve the Contractor of the responsibility for subsequent correction of any construction defects.

D. Materials. All materials and equipment shall be of good quality and new, except as otherwise provided in the Contract Documents. If required by Architect/Engineer, Contractor shall furnish satisfactory evidence (including reports of required tests) as to the kind and quality of materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instruction of the applicable supplier except as otherwise provided in the Contract Documents.

E. Accountability for Work. The Contractor shall be solely accountable for its Work, including plans review and complete submittals. The Contractor shall be solely responsible for means, methods, techniques, sequences and procedures of construction. If a specific means, method, technique, sequence or procedure of construction is required by the Contract Documents, the Contractor may utilize an alternative means, method, technique, sequence or procedure acceptable to the Architect/Engineer if the Contractor submits sufficient information to allow the Architect/Engineer to determine that the alternative is equivalent to that required by the Contract Documents.

F. Contract Sum. The Contractor shall construct the Project so that the Project can be built for a cost not to exceed the Contract Sum.

G. Governing Specifications. In the absence of specified Owner design standards or guidelines, the Architect/Engineer shall use, and the Contractor shall comply with, the most recent version of the applicable FDOT or AASHTO design standards. In general, the Project shall be constructed by the Contractor in accordance with applicable industry standards. The Contractor shall be responsible for utilizing and maintaining current knowledge of any laws, ordinances, codes, rules, regulations, standards, guidelines, special conditions, specifications or other mandates relevant to the Project or the services to be performed.

H. Adherence to Project Schedule. The development and equipping of the Project shall be undertaken and completed in accordance with the Project Schedule, and within the Contract Time described therein.

I. Superintendent. The Contractor shall employ a competent superintendent and necessary assistants who shall be in attendance at the Project Site during performance of the Work. The superintendent shall represent the Contractor, and communications given to the superintendent shall be as binding as if given to the Contractor.

(1) The Contractor, as soon as practicable after award of the Agreement, shall furnish in writing to the Owner through the Architect/Engineer the name and qualifications of the proposed superintendent. The Architect/Engineer may reply within 14 days to the Contractor in writing stating (1) whether the Owner or the Architect/Engineer has reasonable objection to the proposed superintendent or (2) that the Architect/Engineer requires additional time to review. Failure of the Architect/Engineer to reply within 14 days shall constitute notice of no reasonable objection.

(2) The Contractor shall not employ a proposed superintendent to whom the Owner or Architect/Engineer has made reasonable and timely objection. The Contractor shall not change the superintendent without the Owner's consent, which shall not be unreasonably withheld or delayed.

J. Work Hours. Contractor shall provide competent, suitable qualified personnel to survey and lay out the Work and perform construction as required by the Contract Documents. Contractor shall at all times maintain good discipline and order at the site. Except in connection with the safety or protection of persons or the Work or property at the site or adjacent thereto and except as otherwise indicated in the Contract Documents, all Work at the site shall be performed during regular working hours, and Contractor shall not permit overtime work or the performance of Work on a Saturday, Sunday or legal holiday without Owner's written consent given after prior notice to Architect/Engineer (at least seventy-two (72) hours in advance).

K. Overtime-Related Costs. Contractor shall pay for all additional Architect/Engineer charges, inspection costs and Owner staff time for any overtime work which may be authorized. Such additional charges shall be an obligation of Contractor and no extra payment shall be made by Owner because such overtime work. At Owner's option, such overtime costs may be deducted from Contractor's monthly payment request or Contractor's retainage prior to release of final payment. Contractor's obligation to pay all overtime-related costs shall not apply if Contractor is directed by Owner to work overtime solely for Owner's convenience.

L. Insurance, Overhead and Utilities. Unless otherwise specified, Contractor shall furnish and assume full responsibility for all bonds, insurance, materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, light, heat, telephone, water, sanitary facilities, temporary facilities and all other facilities and incidentals necessary for the furnishing, performance, testing, start-up and completion of the Work.

M. Cleanliness. The Contractor shall keep the premises and surrounding area free from accumulation of waste materials or rubbish caused by operations under the Contract. At completion of the Work, the Contractor shall remove waste materials, rubbish, the Contractor's tools, construction equipment, machinery and surplus materials from and about the Project Site.

Contractor shall restore to original conditions all property not designated for alteration by the Contract Documents. If the Contractor fails to clean up as provided in the Contract Documents, the Owner may do so and Owner shall be entitled to reimbursement from Contractor.

N. Loading. Contractor shall not load nor permit any part of any structure to be loaded in any manner that will endanger the structure, nor shall Contractor subject any part of the Work or adjacent property to stresses or pressures that will endanger it.

O. Safety and Protection. Contractor shall comply with all applicable federal, state and local safety regulations. Contractor shall be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. Contractor shall take all necessary precautions for the safety of and shall provide the necessary protection to prevent damage, injury or loss to:

- (1) All employees on the Work and other persons and organizations who may be affected thereby;
- (2) All the Work and materials and equipment to be incorporated therein, whether in storage on or off the Project Site; and
- (3) Other property at the Project Site or adjacent thereto, including trees, shrubs, lawns, walks, pavements, roadways, structures, utilities and underground facilities not designated for removal, relocation or replacement during construction.

Contractor shall comply with all applicable laws and regulations of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss, and shall erect and maintain all necessary safeguards for such safety and protection. Contractor shall provide and maintain all passageways, guard fences, lights and other facilities for the protection required by public authority or local conditions. Contractor shall provide reasonable maintenance of traffic for the public and preservation of the Owner's business, taking into full consideration all local conditions. Contractor's duties and responsibilities for safety and protection with regard to the Work shall continue until such time as all the Work is completed.

P. Emergencies. In emergencies affecting the safety or protection of persons or the Work or property at the Project Site or adjacent thereto, Contractor, without special instruction or authorization from Architect/Engineer or Owner, shall act to prevent threatened damage, injury or loss. Contractor shall give Owner prompt written notice if Contractor believes that any significant changes in the Work or variations from the Contract Documents have been caused thereby. If Owner determines that a change in the Project is required because of the action taken in response to an emergency, a Work Directive Change or Change Order will be issued to document the consequences of the changes or variation.

Q. Substitutes. For Substitutes not included with the Bid (or Guaranteed Maximum Price Addendum), but submitted after the effective date of the Agreement (or Guaranteed Maximum Price Addendum), Contractor shall make written application to Architect/Engineer for acceptance thereof, certifying that the proposed Substitute will perform adequately the functions and achieve the results called for by the general design, be similar and of equal substance to that specified and be suited to the same use as that specified. The application

will also contain an itemized estimate of all costs and delays or schedule impacts that will result directly or indirectly from review, acceptance and provision of such Substitute, including costs of redesign and claims of other contractors affected by the resulting change, all of which will be considered by the Architect/Engineer in evaluating the proposed Substitute. Architect/Engineer may require Contractor to furnish at Contractor's expense, additional data about the proposed Substitute. In rendering a decision, Owner, Architect/Engineer and Contractor shall have access to any available Float Time in the Project Schedule. If Substitute materials or equipment not included as part of the Bid (or Guaranteed Maximum Price Addendum), but proposed after the effective date of the Agreement, are accepted and are less costly than the originally specified materials or equipment, then the net difference in cost shall be credited to the Owner and an appropriate Change Order executed to adjust the Contract Sum.

- (1) Architect/Engineer will be allowed a reasonable time within which to evaluate each proposed Substitute. Architect/Engineer will be the sole judge of acceptability and no Substitute will be ordered, installed or utilized without Architect/Engineer's prior written acceptance which will be evidenced by either a Change Order or an approved shop drawing. Owner may require Contractor to furnish at Contractor's expense a special performance guarantee or other surety with respect to any Substitute.
- (2) Contractor shall reimburse Owner for the charges of Architect/Engineer and Architect/Engineer's Consultants for evaluating each proposed Substitute submitted after the effective date of the Agreement and all costs resulting from any delays in the Work while the Substitute was undergoing review.

R. Surveys and Stakes. The Contractor shall furnish, as part of the Contract Sum, all labor, stakes, surveys, batter boards for structures, grade lines and other materials and supplies and shall set construction stakes and batter boards for establishing lines, position of structures, slopes and other controlling points necessary for the proper prosecution of the Work. Where rights-of-way, easements, property lines or any other conditions which make the lay-out of the Project or parts of the Project critical are involved, the Contractor shall employ a competent surveyor who is registered in the State of Florida for lay-out and staking. These stakes and marks shall constitute the field control by and in accord with which the Contractor shall govern and execute the Work. The Contractor shall be held responsible for the preservation of all stakes and marks and if for any reason any of the stakes or marks or batter boards become destroyed or disturbed, they shall be immediately and accurately replaced by the Contractor.

S. Suitability of Project Site. The Contractor has, by careful examination, satisfied itself as to the nature and location of the Work and all other matters which can in any way affect the Work, including, but not limited to details pertaining to borings, as shown on the drawings. Such boring information is not guaranteed to be more than a general indication of the materials likely to be found adjacent to holes bored at the Project Site, approximately at the locations indicated. The Contractor has examined boring data, where available, made its own interpretation of the subsurface conditions and other preliminary data, and has based its Bid (or Guaranteed Maximum Price Addendum) on its own opinion of the conditions likely to be encountered. Except as specifically provided in Sections 2.4.U., 5.4 and 5.5, no extra compensation or extension of time will be considered for any Project Site conditions that existed at the time of bidding (or at the time of execution of the Guaranteed Maximum Price Addendum). No verbal agreement or conversation with any officer, agent or employee of the Owner, before or

after the execution of the Agreement, shall affect or modify any of the terms or obligations herein contained.

T. Project Specification Errors. If the Contractor, during the Work, finds that the drawings, specifications or other Contract Documents cannot be followed, the Contractor shall immediately inform the Owner in writing, and the Owner shall promptly check the accuracy of the information. Any Work done after such discovery, until any necessary changes are authorized, will be done at the Contractor's sole risk of non-payment and delay.

U. Remediation of Contamination. Owner and Contractor recognize that remediation of subsurface conditions may be necessary due to potential hazardous materials contamination. Because the presence or extent of any contamination is not known, Contractor shall include no cost in the Contract Sum, and no time in the Project Schedule, for cost or delays that might result from any necessary remediation. The Project Schedule will provide a period of time between demolition activities and the start of the next activity to commence any remediation if needed. Contractor shall use all reasonable efforts in scheduling the Project to minimize the likelihood that remediation delays construction. Any hazardous materials remediation Work which Contractor agrees to perform shall be done pursuant to a Change Order or amendment consistent with the following:

- (1) The dates of Substantial Completion shall be equitably adjusted based on delays, if any, incurred in connection with remediation efforts.
- (2) Contractor, and any Subcontractors which have mobilized on the Project Site, shall be paid for demonstrated costs of overhead operations at the Project Site during any period of delay of more than seven (7) days, except to the extent that Work proceeds concurrently with remediation. The categories of costs to be reimbursed are limited to those reasonably incurred at the jobsite during the delay period (such as trailers or offices, telephones, faxes, and the like); equipment dedicated to the Project and located at the Project Site; salaries and associated costs of personnel dedicated to the Project to the extent that they do not perform work on other projects; and other jobsite costs that are reasonable and which are incurred during the delay period. Subcontractors and suppliers which have not mobilized are limited to the costs set forth in Section 2.4.U(3).
- (3) Contractor and any Subcontractor or supplier on the Project who is eligible for compensation shall be paid any demonstrated costs of escalation in materials or labor, and reasonable costs of off-site storage of materials identified to the Project, arising because of any delay of more than seven (7) days. Such Contractor, Subcontractors and suppliers are obligated to take all reasonable steps to mitigate escalation costs, such as through early purchase of materials.
- (4) Contractor, for itself and all Subcontractors and suppliers on the Project, hereby agrees that the extension of time for delays under Section 2.4.U(1), and payment of the costs identified in Sections 2.4.U(2) and/or Section 2.4.U(3), are the sole remedies for costs and delays described in this Section, and waives all claims and demands for extended home office

overhead (including, but not limited to, "Eichleay" claims), lost profit or lost opportunities, and any special, indirect, or consequential damages arising as a result of delays described in this Section. The Contract Sum shall be adjusted to reflect payment of allowable costs.

- (5) If any delay described in this section causes the time or cost for the Project to exceed the Contract Time or the Contract Sum, then the Owner may terminate the Agreement pursuant to Section 14.2.
- (6) Contractor and any Subcontractor or supplier seeking additional costs under this Section 2.4.U. shall promptly submit estimates or any costs as requested by Owner, and detailed back-up for all costs when payment is sought or whenever reasonably requested by Owner. All costs are auditable, at Owner's discretion. Bid, estimate and pricing information reasonably related to any request for additional compensation will be provided promptly upon request.
- (7) Contractor shall include provisions in its subcontracts and purchase orders consistent with this Section.

V. Interfacing.

- (1) The Contractor shall take such measures as are necessary to ensure proper construction and delivery of the Project, including but not limited to providing that all procurement of long-lead items, the separate construction Subcontractors, and the general conditions items are performed without duplication or overlap to maintain completion of all Work on schedule. Particular attention shall be given to provide that each Subcontractor bid package clearly identifies the Work included in that particular separate subcontract, its scheduling for start and completion, and its relationship to other separate contractors.
- (2) Without assuming any design responsibilities of the Architect/Engineer, the Contractor shall include in the Progress Reports required under this Section 2.4 comments on overlap with any other separate subcontracts, omissions, lack of correlation between drawings, and any other deficiencies noted, in order that the Architect/Engineer may arrange for necessary corrections.

W. Job Site Facilities. The Contractor shall arrange for all job site facilities required and necessary to enable the Contractor and Architect/Engineer to perform their respective duties and to accommodate any representatives of the Owner which the Owner may choose to have present on the Project Site.

X. Weather Protection. The Contractor shall provide temporary enclosures of building areas to assure orderly progress of the Work during periods when extreme weather conditions are likely to be experienced. The Contractor shall also be responsible for providing weather protection for Work in progress and for materials stored on the Project Site. A contingency plan shall be prepared upon request of the Owner for weather conditions that may affect the construction.

Y. Payment and Performance Bond. Prior to the construction commencement date, the Contractor shall obtain, for the benefit of and directed to the Owner, a Payment and Performance Bond satisfying the requirements of Section 255.05, Florida Statutes, covering the faithful performance by the Contractor of its obligations under the Contract Documents, including but not limited to the construction of the Project on the Project Site and the payment of all obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the Contractor to provide the Payment and Performance Bond shall be approved by the Owner prior to the issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that the surety is rated A or better by Best's Key Guide, latest edition. For Changes in the Work that result in an increase in the Contract Sum, Owner reserves the right to require the Contractor to secure and deliver additive riders to the Payment and Performance Bond.

Z. Construction Phase; Building Permit; Code Inspections. Unless otherwise provided, Contractor shall obtain and pay for all construction permits and licenses. Owner shall assist Contractor, when necessary, in obtaining such permits and licenses. Contractor shall pay all governmental charges and inspection fees necessary for the prosecution of the Work.

- (1) Building Permit. The Owner and Architect/Engineer shall provide such information to any Permitting Authority as is necessary to obtain approval from the Permitting Authority to commence construction prior to beginning construction. The Contractor shall pull any required building permit, and shall be responsible for delivering and posting the building permit at the Project Site prior to the commencement of construction. The cost of the building permit is included in the Contract Sum. The Owner and Architect/Engineer shall fully cooperate with the Contractor when and where necessary.
- (2) Code Inspections. The Project requires detailed code compliance inspection during construction in disciplines determined by any Permitting Authority. These disciplines normally include, but are not necessarily limited to, structural, mechanical, electrical, plumbing, general building and fire. The Contractor shall notify the appropriate inspector(s) and the Architect/Engineer, no less than 24 hours in advance, when the Work is ready for inspection and before the Work is covered up. All inspections shall be made for conformance with the applicable ordinances and building codes. Costs for all re-inspections of Work found defective and subsequently repaired shall not be included as Project Costs and shall be borne by the Contractor or as provided in the contract between Contractor and Subcontractor.
- (3) Contractor's Personnel. The Contractor shall maintain sufficient off-site support staff and competent full-time staff at the Project Site authorized to act on behalf of the Contractor to coordinate, inspect, and provide general direction of the Work and progress of the Subcontractors. At all times during the performance of the Work, the Owner shall have the right to demand replacement of Contractor Personnel to whom the Owner has reasonable objection, without liability to the Contractor.

- (4) Lines of Authority. To provide general direction of the Work, the Contractor shall establish and maintain lines of authority for its personnel and shall provide this information to the Owner and all other affected parties, such as the code inspectors of any Permitting Authority, the Subcontractors, and the Architect/Engineer. The Owner and Architect/Engineer may attend meetings between the Contractor and his Subcontractors; however, such attendance is optional and shall not diminish either the authority or responsibility of the Contractor to administer the subcontracts.

AA. Quality Control. The Contractor shall develop and maintain a program, acceptable to the Owner and Architect/Engineer, to assure quality control of the construction. The Contractor shall be responsible for and supervise the Work of all Subcontractors, providing instructions to each when their Work does not conform to the requirements of the Project Plans and Specifications, and the Contractor shall continue to coordinate the Work of each Subcontractor to ensure that corrections are made in a timely manner so as to not affect the efficient progress of the Work. Should a disagreement occur between the Contractor and the Architect/Engineer over the acceptability of the Work, the Owner, at its sole discretion and in addition to any other remedies provided herein, shall have the right to determine the acceptability, provided that such determination is consistent with standards for construction projects of this type and generally accepted industry standards for workmanship in the State of Florida.

BB. Management of Subcontractors. All Subcontractors shall be compensated in accordance with Article IV. The Contractor shall solely control the Subcontractors. The Contractor shall negotiate all Change Orders and Field Orders with all affected Subcontractors and shall review the costs and advise the Owner and Architect/Engineer of their validity and reasonableness, acting in the Owner's best interest. When there is an imminent threat to health and safety, and Owner's Project Representative concurrence is impractical, the Contractor shall act immediately to remove the threats to health and safety and shall subsequently fully inform Owner of all such action taken. The Contractor shall also carefully review all shop drawings and then forward the same to the Architect/Engineer for review and actions. The Architect/Engineer will transmit them back to the Contractor, who will then issue the shop drawings to the affected Subcontractor for fabrication or revision. The Contractor shall maintain a suspense control system to promote expeditious handling. The Contractor shall request the Architect/Engineer to make interpretations of the drawings or specifications requested of him by the Subcontractors and shall maintain a business system to promote timely response. The Contractor shall inform the Architect/Engineer which shop drawings or requests for clarification have the greatest urgency, to enable the Architect/Engineer to prioritize requests coming from the Contractor. The Contractor shall advise the Owner and Architect/Engineer when timely response is not occurring on any of the above.

CC. Job Requirements.

- (1) The Contractor shall provide each of the following as a part of its services hereunder:
- (a) Maintain a log of daily activities, including manpower records, equipment on site, weather, delays, major decisions, etc;

- (b) Maintain a roster of companies on the Project with names and telephone numbers of key personnel;
- (c) Establish and enforce job rules governing parking, clean-up, use of facilities, and worker discipline;
- (d) Provide labor relations management and equal opportunity employment for a harmonious, productive Project;
- (e) Provide and administer a safety program for the Project and monitor for subcontractor compliance without relieving them of responsibilities to perform Work in accordance with best acceptable practice;
- (f) Provide a quality control program as provided under Section 2.4.C above;
- (g) Provide miscellaneous office supplies that support the construction efforts which are consumed by its own forces;
- (h) Provide for travel to and from its home office to the Project Site and to those other places within Manatee County as required by the Project;
- (i) Verify that tests, equipment, and system start-ups and operating and maintenance instructions are conducted as required and in the presence of the required personnel and provide adequate records of same to the Architect/Engineer;
- (j) Maintain at the job site orderly files for correspondence, reports of job conferences, shop drawings and sample submissions, reproductions of original Contract Documents including all addenda, change orders, field orders, additional drawings issued after execution of the Agreement, Owner/Architect/Engineer's clarifications and interpretations of the Contract Documents, Progress Reports, as-built drawings, and other project related documents;
- (k) Keep a diary or log book, recording hours on the job site, weather conditions, data relative to questions of extras or deductions; list of visiting officials and representatives or manufacturers, fabricators, suppliers and distributors; daily activities, decisions, observations in general and specific observations in more detail as in the case of observing test procedures, and provide copies of same to Owner/Architect/Engineer;
- (l) Record names, addresses and telephone numbers of all Contractors, Subcontractors and major suppliers of materials and equipment;

- (m) Furnish Owner/Architect/Engineer periodic reports, as required, of progress of the Work and Contractor's compliance with the approved progress schedule and schedule of shop drawing submissions;
 - (n) Consult with Owner/Architect/Engineer in advance of scheduling major tests, inspections or start of important phases of the Work;
 - (o) Verify, during the course of the Work, that certificates, maintenance and operations manuals and other data required to be assembled and furnished are applicable to the items actually installed, and deliver same to Owner/Architect/Engineer for review prior to final Acceptance of the Work; and
 - (p) Cooperate with Owner in the administration of grants.
- (2) The Contractor shall provide personnel and equipment, or shall arrange for separate Subcontractors to provide each of the following as a Project Cost:
- (a) Services of independent testing laboratories, and provide the necessary testing of materials to ensure conformance to contract requirements; and
 - (b) Printing and distribution of all required bidding documents and shop drawings, including the sets required by Permitting Authority inspectors.

DD. As-Built Drawings. The Contractor shall continuously review as-built drawings and mark up progress prints to provide as much accuracy as possible. Prior to, and as a requirement for authorizing final payment to the Contractor due hereunder, the Contractor shall provide to the Owner an original set of marked-up, as-built Project Plans and Specifications and an electronic format of those records showing the location and dimensions of the Project as constructed, which documents shall be certified as being correct by the Contractor and the Architect/Engineer. Final as-built drawings shall be signed and sealed by a registered Florida surveyor.

EE. Progress Reports. The Contractor shall forward to the Owner, as soon as practicable after the first day of each month, a summary report of the progress of the various parts of the Work, to include those parts of the Work in fabrication and in the field, stating the existing status, estimated time of completion and cause of delay, if any. Together with the summary report, the Contractor shall submit any necessary revisions to the original schedule for the Owner's review and approval. In addition, more detailed schedules may be required by the Owner for daily traffic control.

FF. Contractor's Warranty. The Contractor warrants to the Owner and Architect/Engineer that materials and equipment furnished under the Contract will be of good quality and new unless the Contract Documents require or permit otherwise. The Contractor further warrants that the Work will conform to the requirements of the Contract Documents and

will be free from defects, except for those inherent in the quality of the Work the Contract Documents require or permit. Work, materials, or equipment not conforming to these requirements will be considered defective. The Contractor's warranty excludes remedy for damage or defect caused by abuse, alterations to the Work not executed by the Contractor, improper or insufficient maintenance, improper operation, or normal wear and tear and normal usage. If required by the Architect/Engineer, the Contractor shall furnish satisfactory evidence as to the kind and quality of materials and equipment.

- (1) Contractor shall use its best efforts and due diligence to ensure that during the warranty period, those entities or individuals who have provided direct warranties to the Owner as required by the Contract Documents perform all required warranty Work in a timely manner and at the sole cost and expense of such warranty providers. Any such cost or expense not paid by the warranty providers shall be paid by the Contractor, to include any costs and attorney's fees incurred in warranty-related litigation between Contractor and any Subcontractors.
- (2) The Contractor shall secure guarantees and warranties of Subcontractors, equipment suppliers and materialmen, and assemble and deliver same to the Owner in a manner that will facilitate their maximum enforcement and assure their meaningful implementation. The Contractor shall collect and deliver to the Owner any specific written guaranties or warranties given by others as required by subcontracts.
- (3) At the Owner's request, the Contractor shall conduct, jointly with the Owner and the Architect/Engineer, no more than two (2) warranty inspections within three (3) years after the Substantial Completion Date.

GG. Apprentices. If Contractor employs apprentices, their performance of Work shall be governed by and shall comply with the provisions of Chapter 446, Florida Statutes.

HH. Schedule of Values. Unit prices shall be established for this Agreement by the submission of a schedule of values within ten (10) days of receipt of the Notice to Proceed. The schedule shall include quantities and prices of items equaling the Contract Sum and will subdivide the Work into components in sufficient detail to serve as the basis for progress payments during construction. Such prices shall include an appropriate amount of overhead and profit applicable to each item of Work. Upon request of the County, the Contractor shall support the values with data which will substantiate their correctness.

II. Other Contracts. The Owner reserves the right to let other contracts in connection with this Work. The Contractor shall afford other contractors reasonable opportunity for the introduction and storage of their materials and execution of their work, and promptly connect and coordinate the Work with theirs.

ARTICLE III COMPENSATION

3.1 Compensation. The Contract Sum constitutes the total compensation (subject to authorized adjustments) payable to Contractor for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by Contractor shall be at Contractor's expense without change in the Contract Sum.

A. Adjustments. The Contract Sum may only be changed by Change Order or by a written amendment. Any claim for an increase or decrease in the Contract Sum shall be based on written notice delivered by the party making the claim to the other party. Notice of the amount of the claim with supporting data shall be delivered within fifteen (15) days from the beginning of such occurrence and shall be accompanied by claimant's written statement that the amount claimed covers all amounts to which the claimant is entitled as a result of the occurrence of said event. Failure to deliver a claim within the requisite 15-day period shall constitute a waiver of the right to pursue said claim.

B. Valuation. The value of any Work covered by a Change Order or of any claim for an increase or decrease in the Contract Sum shall be determined in one of the following ways (at Owner's discretion):

- (1) In the case of Unit Price Work, in accordance with Section 3.1.C, below; or
- (2) By mutual acceptance of a lump sum; or
- (3) On the basis of the cost of the Work, plus a negotiated Contractor's fee for overhead and profit. Contractor shall submit an itemized cost breakdown together with supporting data.

C. Unit Price Work. The unit price of an item of Unit Price Work shall be subject to re-evaluation and adjustment pursuant to a requested Change Order under the following conditions:

- (1) If the total cost of a particular item of Unit Price Work amounts to 5% or more of the Contract Sum and the variation in the quantity of the particular item of Unit Price Work performed by Contractor differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and
- (2) If there is no corresponding adjustment with respect to any other item of Work; and
 - (i) If Contractor believes that it has incurred additional expense as a result thereof; or
 - (ii) If Owner believes that the quantity variation entitles it to an adjustment in the unit price; or
 - (iii) If the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

3.2 Schedule of Compensation. All payments for services and material under the Contract Documents shall be made in accordance with the following provisions.

A. Periodic Payments for Services. The Contractor shall be entitled to receive payment for Construction Services rendered pursuant to Section 2.4 in periodic payments which shall reflect a fair apportionment of cost and schedule of values of services furnished prior to payment, subject to the provisions of this Section.

B. Payment for Materials and Equipment. In addition to the periodic payments authorized hereunder, payments may be made for material and equipment not incorporated in the Work but delivered and suitably stored at the Project Site, or another location, subject to prior approval and acceptance by the Owner on each occasion.

C. Credit toward Contract Sum. All payments for Construction Services made hereunder shall be credited toward the payment of the Contract Sum as Contractor's sole compensation for the construction of the Project.

3.3 Invoice and Payment. All payments for services and materials under the Contract Documents shall be invoiced and paid in accordance with the following provisions.

A. Invoices. The Contractor shall submit to the Owner periodic invoices for payment, in a form acceptable to the Owner, which shall include a sworn statement certifying that, to the best of the Contractor's knowledge, information and belief, the construction has progressed to the point indicated, the quality and the Work covered by the invoice is in accord with the Project Plans and Specifications, and the Contractor is entitled to payment in the amount requested, along with the cost reports required pursuant to Article II, showing in detail all monies paid out, Project Costs accumulated, or Project Cost incurred during the previous period. This data shall be attached to the invoice.

B. Additional Information; Processing of Invoices. Should an invoiced amount appear to exceed the Work effort believed to be completed, the Owner may, prior to processing of the invoice for payment, require the Contractor to submit satisfactory evidence to support the invoice. All Progress Reports and invoices shall be delivered to the attention of the Owner's Project Representative. Invoices not properly prepared (mathematical errors, billing not reflecting actual Work done, no signature, etc.) shall be returned to the Contractor for correction.

C. Architect/Engineer's Approval. Payment for Work completed shall be subject to the Architect/Engineer approving the payment requested by the Contractor and certifying the amount thereof that has been properly incurred and is then due and payable to the Contractor, and identifying with specificity any amount that has not been properly incurred and that should not be paid.

D. Warrants of Contractor with Respect to Payments. The Contractor warrants that (1) upon payment of any retainage, materials and equipment covered by a partial payment request will pass to Owner either by incorporation in construction or upon receipt of payment by the Contractor, whichever occurs first; (2) Work, materials and equipment covered by previous partial payment requests shall be free and clear of liens, claims, security interests, or encumbrances; and (3) no Work, materials or equipment covered by a partial payment request which has been acquired by the Contractor or any other person performing Work at the Project Site, or furnishing materials or equipment for the Project, shall be subject to an agreement under

which an interest therein or an encumbrance thereon is retained by the seller or otherwise imposed by the Contractor or any other person.

E. All Compensation Included. Contractor's compensation includes full payment for services set forth in the Contract Documents, including but not limited to overhead, profit, salaries or other compensation of Contractor's officers, partners and/or employees, general operating expenses incurred by Contractor and relating to this Project, including the cost of management, supervision and data processing staff, job office equipment and supplies, and other similar items.

ARTICLE IV SUBCONTRACTORS

4.1 Subcontracts. At the Owner's request, the Contractor shall provide Owner's Project Representative with copies of all proposed and final subcontracts, including the general and supplementary conditions thereof.

A. Subcontracts Generally. All subcontracts shall: (1) require each Subcontractor to be bound to Contractor to the same extent Contractor is bound to Owner by the terms of the Contract Documents, as those terms may apply to the portion of the Work to be performed by the Subcontractor, (2) provide for the assignment of the subcontracts from Contractor to Owner at the election of Owner, upon termination of Contractor, (3) provide that Owner will be an additional indemnified party of the subcontract, (4) provide that Owner will be an additional insured on all insurance policies required to be provided by the Subcontractor, except workers' compensation, (5) assign all warranties directly to Owner, and (6) identify Owner as an intended third-party beneficiary of the subcontract.

(1) A Subcontractor is a person or entity who has a direct contract with Contractor to perform a portion of the Work at the site. The term "Subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Subcontractor or an authorized representative of the Subcontractor. The term "Subcontractor" does not include a separate contractor or subcontractors of a separate contractor.

(2) A Sub-subcontractor is a person or entity who has a direct or indirect contract with a Subcontractor to perform a portion of the Work at the site. The term "Sub-subcontractor" is referred to throughout the Contract Documents as if singular in number and means a Sub-subcontractor or an authorized representative of the Sub-subcontractor.

B. No Damages for Delay. Except when otherwise expressly agreed to by Owner in writing, all subcontracts shall provide:

"LIMITATION OF REMEDIES – NO DAMAGES FOR DELAY. The Subcontractor's exclusive remedy for delays in the performance of the contract caused by events beyond its control, including delays claimed to be caused by the Owner or Architect/Engineer or attributable to the Owner or Architect/Engineer and including claims based on breach of contract or negligence, shall be an extension of its contract time and shall in no way involve any monetary claim."

Each subcontract shall require that any claims by the Subcontractor for delay must be submitted to the Contractor within the time and in the manner in which the Contractor must submit such claims to the Owner, and that failure to comply with the conditions for giving notice and submitting claims shall result in the waiver of such claims.

C. Subcontractual Relations. The Contractor shall require each Subcontractor to assume all the obligations and responsibilities which the Contractor owes the Owner pursuant to the Contract Documents, by the parties to the extent of the Work to be performed by the Subcontractor. Said obligations shall be made in writing and shall preserve and protect the rights of the Owner and Architect/Engineer, with respect to the Work to be performed by the Subcontractor, so that the subcontracting thereof will not prejudice such rights. Where appropriate, the Contractor shall require each Subcontractor to enter into similar agreements with its sub-subcontractors.

D. Insurance; Acts and Omissions. Insurance requirements for Subcontractors shall be no more stringent than those requirements imposed on the Contractor by the Owner. The Contractor shall be responsible to the Owner for the acts and omissions of its employees, agents, Subcontractors, their agents and employees, and all other persons performing any of the Work or supplying materials under a contract to the Contractor.

4.2 Relationship and Responsibilities. Except as specifically set forth herein with respect to direct materials acquisitions by Owner, nothing contained in the Contract Documents or in any Contract Document does or shall create any contractual relation between the Owner or Architect/Engineer and any Subcontractor. Specifically, the Contractor is not acting as an agent of the Owner with respect to any Subcontractor. The utilization of any Subcontractor shall not relieve Contractor from any liability or responsibility to Owner, or obligate Owner to the payment of any compensation to the Subcontractor or additional compensation to the Contractor.

4.3 Payments to Subcontractors; Monthly Statements. The Contractor shall be responsible for paying all Subcontractors from the payments made by the Owner to Contractor pursuant to Article III, subject to the following provisions:

A. Payment. The Contractor shall, no later than ten (10) days after receipt of payment from the Owner, out of the amount paid to the Contractor on account of such Subcontractor's Work, pay to each Subcontractor the amount to which the Subcontractor is entitled in accordance with the terms of the Contractor's contract with such Subcontractor. The Contractor shall, by appropriate agreement with each Subcontractor, require each Subcontractor to make payments to sub-Subcontractors in a similar manner. After receipt of payment from Owner, if the need should arise to withhold payments to Subcontractors for any reason, as solely determined by Contractor, the Contractor shall promptly restore such monies to the Owner, adjusting subsequent pay requests and Project bookkeeping as required.

B. Final Payment of Subcontractors. The final payment of retainage to Subcontractors shall not be made until the Project has been inspected by the Architect/Engineer or other person designated by the Owner for that purpose, and until both the Architect/Engineer and the Contractor have issued a written certificate that the Project has been constructed in accordance with the Project Plans and Specifications and approved Change Orders. Before issuance of final payment to any Subcontractor without any retainage, the Subcontractor shall submit satisfactory evidence that all payrolls, material bills, and other indebtedness connected with the Project have

been paid or otherwise satisfied, warranty information is complete, as-built markups have been submitted, and instruction for the Owner's operating and maintenance personnel is complete. Final payment may be made to certain select Subcontractors whose Work is satisfactorily completed prior to the completion of the Project, but only upon approval of the Owner's Project Representative.

4.4 Responsibility for Subcontractors. As provided in Section 2.4.BB, Contractor shall be fully responsible to Owner for all acts and omissions of the Subcontractors, suppliers and other persons and organizations performing or furnishing any of the Work under a direct or indirect Contract with Contractor just as Contractor is responsible for Contractor's own acts and omissions.

4.5 Contingent Assignment of Subcontracts. Each subcontract agreement for a portion of the Work is assigned by the Contractor to the Owner, provided that:

- (1) assignment is effective only after termination of the Contract by the Owner for cause pursuant to Article XIV and only for those subcontract agreements that the Owner accepts by notifying the Subcontractor and Contractor in writing; and
- (2) assignment is subject to the prior rights of the surety, if any, obligated under bond relating to the Agreement.

When the Owner accepts the assignment of a subcontract agreement, the Owner assumes the Contractor's rights and obligations under the subcontract. Upon such assignment, if the Work has been suspended for more than thirty (30) days, the Subcontractor's compensation shall be equitably adjusted for increases in cost resulting from the suspension. Upon such assignment to the Owner, the Owner may further assign the subcontract to a successor contractor or other entity. If the Owner assigns the subcontract to a successor contractor or other entity, the Owner shall nevertheless remain legally responsible for all of the successor contractor's obligations under the subcontract.

ARTICLE V CHANGES IN WORK

5.1 General. Changes in the Work may be accomplished after execution of the Agreement, and without invalidating the Agreement, by Change Order, Work Directive Change or order for a minor change in the Work, subject to the limitations stated in this Article V and elsewhere in the Contract Documents. A Change Order shall be based upon agreement among the Owner, Contractor and Architect/Engineer; a Work Directive Change requires agreement by the Owner and Architect/Engineer and may or may not be agreed to by the Contractor; an order for a minor change in the Work may be issued by the Architect/Engineer alone. Changes in the Work shall be performed under applicable provisions of the Contract Documents, and the Contractor shall proceed promptly, unless otherwise provided in the Change Order, Work Directive Change or order for a minor change in the Work.

5.2 Minor Changes in the Work. The Owner or Architect/Engineer shall have authority to order minor changes in the Work not involving adjustment in the Contract Sum or extension of the Contract Time and not inconsistent with the intent of the Contract Documents. Such change will be effected by written order signed by the Architect/Engineer and shall be

binding on the Owner and Contractor. The Contractor shall abide by and perform such minor changes. Such changes shall be effected by a Field Directive or a Work Directive Change. Documentation of changes shall be determined by the Construction Team, and displayed monthly in the Progress Reports. Because such changes shall not affect the Contract Sum to be paid to the Contractor, they shall not require a Change Order pursuant to Section 5.6.

5.3 Emergencies. In any emergency affecting the safety of persons or property, the Contractor shall act at its discretion to prevent threatened damage, injury, or loss. Any increase in the Contract Sum or extension of time claimed by the Contractor because of emergency Work shall be determined as provided in Section 5.6. However, whenever practicable, the Contractor shall obtain verbal concurrence of the Owner's Project Representative and Architect/Engineer where the act will or may affect the Contract Sum or Contract Time.

5.4 Concealed Conditions. If the Contractor encounters conditions at the site that are (1) subsurface or otherwise concealed physical conditions that differ materially from those indicated in the Contract Documents or (2) unknown physical conditions of an unusual nature, that differ materially from those ordinarily found to exist and generally recognized as inherent in construction activities of the character provided for in the Contract Documents, the Contractor shall promptly provide notice to the Owner and the Architect/Engineer before conditions are disturbed and in no event later than ten (10) days after first observance of the conditions. The Architect/Engineer will promptly investigate such conditions and, if the Architect/Engineer determines that they differ materially and cause an increase or decrease in the Contractor's cost of, or time required for, performance of any part of the Work, will recommend an equitable adjustment in the Contract Sum or Contract Time, or both. If the Architect/Engineer determines that the conditions at the site are not materially different from those indicated in the Contract Documents and that no change in the terms of the Contract is justified, the Architect/Engineer shall promptly notify the Owner and Contractor in writing, stating the reasons. If the Contractor disputes the Architect/Engineer's determination or recommendation, the Contractor may proceed as provided in Article VIII. If the Owner disputes the Architect/Engineer's determination or recommendation, the Owner may appeal directly to the Purchasing Official and shall thereafter follow the process set forth in Section 8.5.

5.5 Hazardous Materials. In the event the Contractor encounters on the Project Site material reasonably believed to be hazardous, petroleum or petroleum related products, or other hazardous or toxic substances, except as provided in Section 2.4.U, the Contractor shall immediately stop Work in the area affected and report the condition to the Owner and the Architect/Engineer in writing. The Work in the affected area shall not thereafter be resumed except by Change Order or written amendment, if in fact the material or substance has not been rendered harmless. The Work in the affected area shall be resumed when the Project Site has been rendered harmless, in accordance with the final determination by the Architect/Engineer or other appropriate professional employed by Owner. The Contractor shall not be required to perform without its consent any Work relating to hazardous materials, petroleum or petroleum related products, or other hazardous or toxic substances. In the event the Contractor encounters on the Project Site materials believed in good faith to be hazardous or contaminated material, and the presence of such hazardous or contaminated material was not known and planned for at the time the Contractor submitted its Bid (or Guaranteed Maximum Price proposal), and it is necessary for the Contractor to stop Work in the area affected and delays Work for more than a seven (7) day period, adjustments to the Contract Sum and/or Contract Time shall be made in accordance with this Article V.

5.6 Change Orders; Adjustments to Contract Sum.

A. Change Orders Generally. The increase or decrease in the Contract Sum resulting from a change authorized pursuant to the Contract Documents shall be determined:

- (1) By mutual acceptance of a lump sum amount properly itemized and supported by sufficient substantiating data, to permit evaluation by the Architect/Engineer and Owner; or
- (2) By unit prices stated in the Agreement or subsequently agreed upon; or
- (3) By any other method mutually agreeable to Owner and Contractor.

If Owner and Contractor are unable to agree upon increases or decreases in the Contract Sum and the Architect/Engineer certifies that the work needs to be commenced prior to any such agreement, the Contractor, provided it receives a written Change Order signed by or on behalf of the Owner, shall promptly proceed with the Work involved. The cost of such Work shall then be determined on the basis of the reasonable expenditures of those performing the Work attributed to the change. However, in the event a Change Order is issued under these conditions, the Owner, through the Architect/Engineer, will establish an estimated cost of the Work and the Contractor shall not perform any Work whose cost exceeds that estimated without prior written approval by the Owner. In such case, the Contractor shall keep and present in such form as the Owner may prescribe an itemized accounting, together with appropriate supporting data of the increase in overall costs of the Project. The amount of any decrease in the Contract Sum to be allowed by the Contractor to the Owner for any deletion or change which results in a net decrease in costs will be the amount of the actual net decrease.

5.7 Owner-Initiated Changes. Without invalidating the Agreement and without notice to any Surety, Owner may, at any time, order additions, deletions or revisions in the Work. These will be authorized by a written amendment, a Field Directive, a Change Order, or a Work Directive Change, as the case may be. Upon receipt of any such document, Contractor shall promptly proceed with the Work involved which will be performed under the applicable conditions of the Contract Documents (except as otherwise specifically provided). A Work Directive Change may not change the Contract Sum or the Contract Time; but is evidence that the parties expect that the change directed or documented by a Work Directive Change will be incorporated in a subsequently issued Change Order following negotiations by the parties as to its effect, if any, on the Contract Sum or Contract Time.

5.8 Unauthorized Work. Contractor shall not be entitled to an increase in the Contract Sum or an extension of the Contract Time with respect to any Work performed that is not required by the Contract Documents.

5.9 Defective Work. Owner and Contractor shall execute appropriate Change Orders (or written amendments) covering changes in the Work which are ordered by Owner, or which may be required because of acceptance of defective Work, without adjustment to the Contract Sum.

5.10 Estimates for Changes. At any time Architect/Engineer may request a quotation from Contractor for a proposed change in the Work. Within twenty-one (21) calendar days after receipt, Contractor shall submit a written and detailed proposal for an increase or decrease in the Contract Sum or Contract Time for the proposed change. Architect/Engineer shall have twenty-one (21) calendar days after receipt of the detailed proposal to respond in writing. The proposal shall include an itemized estimate of all costs and time for performance that will result directly or indirectly from the proposed change. Unless otherwise directed, itemized estimates shall be in sufficient detail to reasonably permit an analysis by Architect/Engineer of all material, labor, equipment, subcontracts, overhead costs and fees, and shall cover all Work involved in the change, whether such Work was deleted, added, changed or impacted. Notwithstanding the request for quotation, Contractor shall carry on the Work and maintain the progress schedule. Delays in the submittal of the written and detailed proposal will be considered non-prejudicial.

5.11 Form of Proposed Changes. The form of all submittals, notices, Change Orders and other documents permitted or required to be used or transmitted under the Contract Documents shall be determined by the Owner. Standard Owner forms shall be utilized.

5.12 Changes to Contract Time. The Contract Time may only be changed pursuant to a Change Order or a written amendment to the Contract Documents. Any claim for an extension or shortening of the Contract Time shall be based on written notice delivered by the party making the claim to the other party. Notice of the extent of the claim with supporting data shall be delivered within fifteen (15) days from detection or beginning of such occurrence and shall be accompanied by the claimant's written statement that the adjustment claimed is the entire adjustment to which the claimant has reason to believe it is entitled to because of the occurrence of said event. The Contract time will be extended in an amount equal to time lost due to delays beyond the control of Contractor. Such delays shall include, but not be limited to, acts or neglect by Owner or others performing additional Work; or to fires, floods, epidemics, abnormal weather conditions or acts of God. Failure to deliver a written notice of claim within the requisite 15-day period shall constitute a waiver of the right to pursue said claim.

ARTICLE VI ROLE OF ARCHITECT/ENGINEER

6.1 General.

A. Retaining. The Owner shall retain an Architect/Engineer (whether an individual or an entity) lawfully licensed to practice in Florida. That person or entity is identified as the Architect/Engineer in the Agreement and is referred to throughout the Contract Documents as if singular in number.

B. Duties. Duties, responsibilities and limitations of authority of the Architect/Engineer as set forth in the Contract Documents shall not be restricted, modified or extended without written consent of the Owner and Architect/Engineer. Consent shall not be unreasonably withheld.

C. Termination. If the employment of the Architect/Engineer is terminated, the Owner shall employ a successor Architect/Engineer as to whom the Contractor has no reasonable objection and whose status under the Contract Documents shall be that of the Architect/Engineer.

6.2 Administration. The Architect/Engineer will provide administration of the Agreement as described in the Contract Documents and will be an Owner's representative during construction until the date the Architect/Engineer approves the final Application for Payment. The Architect/Engineer will have authority to act on behalf of the Owner only to the extent provided in the Contract Documents.

A. Site Visits. The Architect/Engineer will visit the site at intervals appropriate to the stage of construction, or as otherwise agreed with the Owner, to become generally familiar with the progress and quality of the portion of the Work complete, and to determine in general if the Work observed is being performed in a manner indicating that the Work, when fully completed, will be in accordance with the Contract Documents. Unless specifically instructed by Owner, the Architect/Engineer will not be required to make exhaustive or continuous on-site inspections to check the quality or quantity of the Work. The Architect/Engineer will not have control over, charge of, or responsibility for, the construction means, methods, techniques, sequences or procedures, or for the safety precautions and programs in connection with the Work, since these are solely the Contractor's rights and responsibilities under the Contract Documents.

B. Reporting. Based on the site visits, the Architect/Engineer will keep the Owner reasonably informed about the progress and quality of the portion of the Work completed, and report to the Owner (1) known deviations from the Contract Documents and from the most recent construction schedule submitted by the Contractor, and (2) defects and deficiencies observed in the Work. The Architect/Engineer will not be responsible for the Contractor's failure to perform the Work in accordance with the requirements of the Contract Documents. The Architect/Engineer will not have control over or charge of and will not be responsible for acts or omissions of the Contractor, Subcontractors, or their agents or employees, or any other persons or entities performing portions of the Work.

6.3 Interpretation of Project Plans and Specifications. The Architect/Engineer will be the interpreter of the requirements of the Project Plans and Specifications. Upon receipt of comments or objections by Contractor or Owner, the Architect/Engineer will make decisions on all claims, disputes, or other matters pertaining to the interpretation of the Project Plans and Specifications.

6.4 Rejection of Non-Conforming Work. Upon consultation with Owner, the Architect/Engineer shall have the authority to reject Work which does not conform to the Project Plans and Specifications.

6.5 Correction of Work. The Contractor shall promptly correct all Work rejected by the Architect/Engineer for being defective or as failing to conform to the Project Plans and Specifications, whether observed before or after the Substantial Completion Date and whether or not fabricated, installed, or completed. The Contractor shall bear all costs of correcting such rejected Work, including compensation for Architect/Engineer's additional services made necessary thereby.

6.6 Timely Performance of Architect/Engineer. The Contractor shall identify which requests for information or response from the Architect/Engineer have the greatest urgency and those items which require prioritizing in response by the Architect/Engineer. The Contractor shall also identify the preferred time period for response and shall request a response time which is

reasonably and demonstrably related to the needs of the Project and Contractor. If Architect/Engineer claims that Contractor's expectations for a response are unreasonable, Owner shall require Architect/Engineer to communicate such claim to Contractor in writing together with the specific time necessary to respond and the date upon which such response will be made. If Contractor believes that Architect/Engineer is not providing timely services or responses, Contractor shall notify Owner of same in writing not less than two (2) weeks before Contractor believes performance or response time from Architect/Engineer is required without risk of delaying the Project.

ARTICLE VII OWNER'S RIGHTS AND RESPONSIBILITIES

7.1 Project Site; Title. The Owner shall provide the lands upon which the Work under the Contract Documents is to be done, except that the Contractor shall provide all necessary additional land required for the erection of temporary construction facilities and storage of his materials, together with right of access to same. The Owner hereby represents to the Contractor that it currently has and will maintain up through and including the Substantial Completion Date, good title to all of the real property constituting the Project Site. Owner agrees to resolve, at its expense, any disputes relating to the ownership and use of the Project Site which might arise during construction.

7.2 Project Plans and Specifications; Architect/Engineer. The parties hereto acknowledge and agree that Owner has previously entered into an agreement with Architect/Engineer. Pursuant to the terms of such agreement, the Architect/Engineer, as an agent and representative of Owner, is responsible for the preparation of Project Plans and Specifications which consist of drawings, specifications, and other documents setting forth in detail the requirements for the construction of the Project. All such Project Plans and Specifications shall be provided either by Owner or the Architect/Engineer, and Contractor shall be under no obligation to provide same and shall be entitled to rely upon the accuracy and completeness of the Project Plans and Specifications provided by the Architect/Engineer and all preliminary drawings prepared in connection therewith. The Contractor will be furnished a reproducible set of all drawings and specifications reasonably necessary for the performance of Contractor's services hereunder and otherwise ready for printing. The Contractor shall be notified of any written modification in the agreement between Owner and Architect/Engineer.

7.3 Surveys; Soil Tests and Other Project Site Information. Owner shall be responsible for providing a legal description and certified land survey of the Project Site in a form and content and with such specificity as may be required by the Architect/Engineer and Contractor to perform their services. To the extent deemed necessary by Owner and Architect/Engineer, and solely at Owner's expense, Owner may engage the services of a geotechnical consultant to perform test borings and other underground soils testing as may be deemed necessary by the Architect/Engineer or the Contractor. Contractor shall not be obligated to provide such surveys or soil tests and shall be entitled to rely upon the accuracy and completeness of the information provided; subject, however, to the provisions of Section 2.4.S hereof. Owner shall provide Contractor, as soon as reasonably possible following the execution of the Contract Documents, all surveys or other survey information in its possession describing the physical characteristics of the Project Site, together with soils reports, subsurface investigations, utility locations, deed restrictions, easements, and legal descriptions then in its possession or control. Upon receipt of all surveys, soils tests, and other Project Site information, Contractor shall promptly advise Owner of

any inadequacies in such information and of the need for any additional surveys, soils or subsoil tests. In performing this Work, Contractor shall use the standard of care of experienced contractors and will use its best efforts timely to identify all problems or omissions. Owner shall not be responsible for any delay or damages to the Contractor for any visible or disclosed site conditions or disclosed deficiencies in the Project Site which should have been identified by Contractor and corrected by Owner prior to the execution of the Contract Documents.

7.4 Information; Communication; Coordination. The Owner's Project Representative shall examine any documents or requests for information submitted by the Contractor and shall advise Contractor of Owner's decisions pertaining thereto within a reasonable period of time to avoid unreasonable delay in the progress of the Contractor's services. Contractor shall indicate if any such documents or requests warrant priority consideration. However, decisions pertaining to approval of the Project Schedule as it relates to the date of Substantial Completion, the Project Cost, Contractor's compensation, approving or changing the Contract Sum shall only be effective when approved by Owner in the form of a written Change Order or amendment to the Contract Documents. Owner reserves the right to designate a different Owner's Project Representative provided Contractor is notified in writing of any such change. Owner and Architect/Engineer may communicate with Subcontractors, materialmen, laborers, or suppliers engaged to perform services on the Project, but only for informational purposes. Neither the Owner nor the Architect/Engineer shall attempt to direct the Work of or otherwise interfere with any Subcontractor, materialman, laborer, or supplier, or otherwise interfere with the Work of the Contractor. Owner shall furnish the data required of Owner under the Contract Documents promptly.

7.5 Governmental Body. The Contractor recognizes that the Owner is a governmental body with certain procedural requirements to be satisfied. The Contractor has and will make reasonable allowance in its performance of services for such additional time as may be required for approvals and decisions by the Owner and any other necessary government agency.

7.6 Pre-Completion Acceptance. The Owner shall have the right to take possession of and use any completed portions of the Work, although the time for completing the entire Work or such portions may not have expired, but such taking possession and use shall not be deemed an acceptance of any Work not completed in accordance with the Contract Documents.

7.7 Ownership and Use of Drawings, Specifications and Other Instruments of Service.

- (1) The Architect/Engineer and the Architect/Engineer's consultants shall be deemed the authors and owners of their respective instruments of service, including the Project Plans and Specifications, and will retain all common law, statutory and other reserved rights, including copyrights. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers shall not own or claim a copyright in the instruments of service. Submittal or distribution to meet official regulatory requirements or for other purposes in connection with this Project is not to be construed as publication in derogation of the Architect/Engineer's or Architect/Engineer's consultants' reserved rights.

- (2) The Contractor, Subcontractors, Sub-subcontractors and material or equipment suppliers are authorized to use and reproduce the drawings and specifications provided to them solely and exclusively for execution of the Work. All copies made under this authorization shall bear the copyright notice, if any, shown on the Project Plans and Specifications or other instruments of service. The Contractor, Subcontractors, Sub-subcontractors, and material or equipment suppliers may not use the drawings or specifications on other projects or for additions to this Project outside the scope of the Work without the specific written consent of the Owner, Architect/Engineer and the Architect/Engineer's consultants.

7.8 Owner's Project Representative. Owner's Project Representative is Owner's Agent, who will act as directed by and under the supervision of the Owner, and who will confer with Owner/Architect/Engineer regarding his actions. The Owner's Project Representative's dealings in matters pertaining to the on-site Work shall, in general, be only with the Owner/Architect/Engineer and Contractor and dealings with Subcontractors shall only be through or with the full knowledge of Contractor.

A. Responsibilities. Except as otherwise instructed in writing by Owner, the Owner's Project Representative will:

- (1) Attend preconstruction conferences; arrange a schedule of progress meetings and other job conferences as required in consultation with Owner/Architect/Engineer and notify those expected to attend in advance; and attend meetings and maintain and circulate copies of minutes thereof;
- (2) Serve as Owner/Architect/Engineer's liaison with Contractor, working principally through Contractor's superintendent, to assist in understanding the intent of the Contract Documents. As requested by Owner/Architect/Engineer, assist in obtaining additional details or information when required at the job site for proper execution of the Work;
- (3) Report to Owner/Architect/Engineer whenever he believes that any Work is unsatisfactory, faulty or defective or does not conform to the Contract Documents;
- (4) Accompany visiting inspectors representing public or other agencies having jurisdiction over the project; record the outcome of these inspections and report to Owner/Architect/Engineer;
- (5) Review applications for payment with Contractor for compliance with the established procedure for their submission and forward them with recommendations to Owner/Architect/Engineer; and
- (6) Perform those duties as set forth elsewhere within the Contract Documents.

B. Limitations. Except upon written instructions of Owner, Owner's Project Representative shall not:

- (1) Authorize any deviation from the Contract Documents or approve any substitute materials or equipment;
- (2) Exceed limitations on Owner/Architect/Engineer's authority as set forth in the Contract Documents;
- (3) Undertake any of the responsibilities of Contractor, Subcontractors or Contractor's superintendent, or expedite the Work;
- (4) Advise on or issue directions relative to any aspect of the means, methods, techniques, sequences or procedures of construction unless such is specifically called for in the Contract Documents;
- (5) Advise on or issue directions as to safety precautions and programs in connection with the Work;
- (6) Authorize Owner to occupy the project in whole or in part; or
- (7) Participate in specialized field or laboratory tests.

**ARTICLE VIII
RESOLUTION OF DISAGREEMENTS;
CLAIMS FOR COMPENSATION**

8.1 Owner to Decide Disputes. The Owner shall reasonably decide all questions and disputes (with the exception of matters pertaining to the interpretation of the Project Plans and Specifications which shall be resolved by the Architect/Engineer pursuant to Section 6.3) that may arise in the execution and fulfillment of the services provided for under the Contract Documents, in accordance with the Procurement Ordinance.

8.2 Finality. The decision of the Owner upon all claims, questions, disputes and conflicts shall be final and conclusive, and shall be binding upon all parties to the Contract Documents, subject to judicial review as provided in Section 8.5 below.

8.3 No Damages for Delay. If at any time Contractor is delayed in the performance of Contractor's responsibilities under the Contract Documents as the result of a default or failure to perform in a timely manner by Owner or Owner's agents or employees, Contractor shall not be entitled to any damages except for compensation specifically authorized in Article III. Contractor's sole remedy will be a right to extend the time for performance. Nothing herein shall preclude Contractor from any available remedy against any responsible party other than Owner. Contractor shall be responsible for liquidated damages for delay if otherwise provided for in the Contract Documents.

8.4 Permitted Claims Procedure. Where authorized or permitted under the Contract Documents, all claims for additional compensation by Contractor, extensions of time affecting the Substantial Completion Date, for payment by the Owner of costs, damages or losses due to casualty, Force Majeure, Project Site conditions or otherwise, shall be governed by the following:

- (1) All claims must be submitted as a request for Change Order in the manner as provided in Article V.
- (2) The Contractor must submit a notice of claim to Owner's Project Representative and to the Architect/Engineer within fifteen (15) days of the beginning of such occurrence. Failure to submit a claim within the requisite 15-day period shall constitute a waiver of the right to pursue said claim.
- (3) Within twenty (20) days of submitting its notice of claim, the Contractor shall submit to the Owner's Project Representative its request for Change Order, which shall include a written statement of all details of the claim, including a description of the Work affected.
- (4) After receipt of a request for Change Order, the Owner's Project Representative, in consultation with the Architect/Engineer, shall deliver to the Contractor, within twenty (20) days after receipt of request, its written response to the claim.
- (5) In the event the Owner and Contractor are unable to agree on the terms of a Change Order, the Owner shall have the option to instruct the Contractor to proceed with the Work. In that event, the Owner shall pay for those parts of the Work, the scope and price of which are not in dispute. The balance of the disputed items in the order to proceed will be resolved after completion of the Work, based upon completed actual cost.
- (6) The rendering of a decision by Owner with respect to any such claim, dispute or other matter (except any which have been waived by the making or acceptance of final payment) will be a condition precedent to any exercise by Owner or Contractor of such right or remedies as either may otherwise have under the Contract Documents or by laws or regulations in respect of any such claim, dispute or other matter.

8.5 Contract Claims and Disputes. After completion of the process set forth in Section 8.4 above, any unresolved dispute under this Agreement shall be decided by the Purchasing Official in accordance with Section 2-26-63 of the Manatee County Code of Laws, subject to an administrative hearing process as provided in Section 2-26-64. The decision of the hearing officer in accordance with Section 2-26-64 of the Manatee County Code of Laws shall be the final and conclusive decision subject to exclusive judicial review in circuit court by a petition for certiorari.

8.6 Claims for Consequential Damages. The Contractor and Owner waive claims against each other for consequential damages arising out of or relating to this Agreement. This mutual waiver includes:

- (1) damages incurred by the Owner for rental expenses, for losses of use, income, profit, financing, business and reputation, and for loss of management or employee productivity or of the services of such persons, unless any of such damages or losses are covered by insurance placed by the Contractor; and

- (2) damages incurred by the Contractor for principal office expenses including the compensation of personnel stationed there, for losses of financing, business and reputation, and for loss of profit except anticipated profit arising directly from the Work.

This mutual waiver is applicable, without limitation, to all consequential damages due to either party's termination in accordance with Article XIV. Nothing contained in this Section 8.6 shall be deemed to preclude assessment of liquidated direct damages, when applicable, in accordance with the requirements of the Contract Documents.

ARTICLE IX INDEMNITY

9.1 Indemnity.

A. Indemnification Generally. To the fullest extent permitted by law, the Contractor shall indemnify and hold harmless the Owner, Architect/Engineer, Architect/Engineer's consultants, and agents and employees of any of them from and against claims, damages, losses and expenses, including but not limited to attorney's fees, arising out of or resulting from performance of the Work, provided that such claim, damage, loss or expense is attributable to bodily injury, sickness, disease or death, or to injury to or destruction of tangible property, but only to the extent caused by the negligent acts or omissions of the Contractor, a Subcontractor or anyone directly or indirectly employed by them or anyone for whose acts they may be liable, regardless of whether such claim, damage, loss or expense is caused in part by a party indemnified hereunder. Such obligation shall not be construed to negate, abridge, or reduce other rights or obligations of indemnity which would otherwise exist as to a party or person described in this Section 9.1.

B. Indemnification; Enforcement Actions. The Contractor's duty to indemnify and hold harmless the Owner in Section 9.1 above shall extend to fines, penalties and costs incurred by the Owner as related to any enforcement action taken by local, state, regional or federal regulatory entities. The Owner may deduct any of such fines, penalties and costs as described in this Section from any unpaid amounts then or thereafter due the Contractor under the Contract Documents. Any of such fines, penalties and costs not so deducted from any unpaid amounts due the Contractor shall be payable to the Owner at the demand of the Owner, together with interest from the date of the demand at the maximum allowable rate.

C. Claims by Employees. In claims against any person or entity indemnified under this Section 9.1 by an employee of the Contractor, a Subcontractor, anyone directly or indirectly employed by them or anyone for whose acts they may be liable, the indemnification obligation under Section 9.1.A. shall not be limited by a limitation on amount or type of damages, compensation or benefits payable by or for the Contractor or a Subcontractor under workers' compensation acts, disability benefit acts or other employee benefit acts.

9.2 Duty to Defend. The Contractor shall defend the Owner in any action, lawsuit, mediation or arbitration arising from the alleged negligence, recklessness or intentionally wrongful conduct of the Contractor and other persons employed or utilized by the Contractor in

the performance of the Work. Notwithstanding any other provisions within this Article IX, so long as Contractor, through its own counsel, performs its obligation to defend the Owner pursuant to this Section, Contractor shall not be required to pay the Owner's costs associated with the Owner's participation in the defense.

ARTICLE X ACCOUNTING RECORDS; OWNERSHIP OF DOCUMENTS

10.1 Accounting Records. Records of expenses pertaining to all services performed shall be kept in accordance with generally accepted accounting principles and procedures.

10.2 Inspection and Audit. The Contractor's records shall be open to inspection and subject to examination, audit, and/or reproduction during normal working hours by the Owner's agent or authorized representative to the extent necessary to adequately permit evaluation and verification of any invoices, payments or claims submitted by the Contractor or any of its payees during the performance of the Work. These records shall include, but not be limited to, accounting records, written policies and procedures, Subcontractor files (including proposals of successful and unsuccessful bidders), original estimates, estimating worksheets, correspondence, Change Order files (including documentation covering negotiated settlements), and any other supporting evidence necessary to substantiate charges related to the Contract Documents. They shall also include, but not be limited to, those records necessary to evaluate and verify direct and indirect costs (including overhead allocations) as they may apply to costs associated with the Contract Documents. For such audits, inspections, examinations and evaluations, the Owner's agent or authorized representative shall have access to said records from the effective date of the Contract Documents, for the duration of Work, and until three (3) years after the date of final payment by the Owner to the Contractor pursuant to the Contract Documents.

10.3 Access. The Owner's agent or authorized representative shall have access to the Contractor's facilities and all necessary records to conduct audits in compliance with this Article. The Owner's agent or authorized representative shall give the Contractor reasonable advance notice of intended inspections, examinations, and/or audits.

10.4 Ownership of Documents. Upon obtainment of Substantial Completion or termination of the Agreement, all records, documents, tracings, plans, specifications, maps, evaluations, reports, transcripts and other technical data, other than working papers, prepared or developed by the Contractor shall be delivered to and become the property of the Owner. The Contractor at its own expense may retain copies for its files and internal use.

ARTICLE XI PUBLIC CONTRACT LAWS

11.1 Equal Opportunity Employment.

A. Employment. The Contractor shall not discriminate against any employee or applicant for employment because of race, creed, sex, color, national origin, disability or age, and will take affirmative action to ensure that all employees and applicants are afforded equal employment opportunities without discrimination because of race, creed, sex, color, national

origin, disability or age. Such action will be taken with reference to, but shall not be limited to, recruitment, employment, job assignment, promotion, upgrading, demotion, transfer, layoff or termination, rates of training or retraining, including apprenticeship and on-the-job training.

B. Participation. No person shall, on the grounds of race, creed, sex, color, national origin, disability or age, be excluded from participation in, be denied the proceeds of, or be subject to discrimination in the performance of the Agreement.

11.2 Immigration Reform and Control Act of 1986. Contractor acknowledges that it is responsible for complying with the provisions of the Immigration Reform and Control Act of 1986, located at 8 U.S.C. Section 1324, et seq., and regulations relating thereto. Failure to comply with the above statutory provisions shall be considered a material breach and shall be grounds for immediate termination of this Agreement.

11.3 No Conflict of Interest. The Contractor warrants that it has not employed or retained any company or person, other than a bona fide employee working solely for the Contractor to solicit or secure this Agreement, and that it has not paid or agreed to pay any person, company, corporation, individual, or firm other than a bona fide employee working solely for the Contractor, any fee, commission, percentage, gift or any other consideration, contingent upon or resulting from the award or making of this Agreement.

A. No Interest in Business Activity. By accepting award of this Agreement, the Contractor, which shall include its directors, officers and employees, represents that it presently has no interest in and shall acquire no interest in any business or activity which would conflict in any manner with the performance of services required hereunder, including without limitation as described in the Contractor's own professional ethical requirements. An interest in a business or activity which shall be deemed a conflict includes but is not limited to direct financial interest in any of the material and equipment manufacturers, suppliers, distributors, or contractors who will be eligible to supply material and equipment for the Project for which the Contractor is furnishing its services required hereunder.

B. No Appearance of Conflict. The Contractor shall not knowingly engage in any contractual or professional obligations that create an appearance of a conflict of interest with respect to the services provided pursuant to the Agreement. The Contractor has provided the Affidavit of No Conflict, incorporated into the Contract Documents as Exhibit "C", as a material inducement for Owner entering the Agreement. If, in the sole discretion of the County Administrator or designee, a conflict of interest is deemed to exist or arise during the term of this Agreement, the County Administrator or designee may cancel this Agreement, effective upon the date so stated in a written notice of cancellation, without penalty to the Owner.

11.4 Truth in Negotiations. By execution of the Contract Documents, the Contractor certifies to truth-in-negotiations and that wage rates and other factual unit costs supporting the compensation are accurate, complete and current at the time of contracting. Further, the original Contract Sum and any additions thereto shall be adjusted to exclude any significant sums where the Owner determines the Contract Sum was increased due to inaccurate, incomplete or non-current wage rates and other factual unit costs. Such adjustments must be made within one (1) year after final payment to the Contractor.

11.5 Public Entity Crimes. The Contractor is directed to the Florida Public Entity Crimes Act, Section 287.133, Florida Statutes, specifically section 2(a), and the Owner's requirement that the Contractor comply with it in all respects prior to and during the term of the Agreement.

ARTICLE XII FORCE MAJEURE, FIRE OR OTHER CASUALTY

12.1 Force Majeure.

A. Unavoidable Delays. Delays in any performance by any party contemplated or required hereunder due to fire, flood, sinkhole, earthquake or hurricane, acts of God, unavailability of materials, equipment or fuel, war, declaration of hostilities, revolt, civil strife, altercation or commotion, strike, labor dispute, or epidemic, archaeological excavation, lack of or failure of transportation facilities, or any law, order, proclamation, regulation, or ordinance of any government or any subdivision thereof, or for any other similar cause to those enumerated, beyond the reasonable control and which with due diligence could not have been reasonably anticipated, shall be deemed to be events of Force Majeure and any such delays shall be excused. In the event such party is delayed in the performance of any Work or obligation pursuant to the Contract Documents for any of the events of Force Majeure stated in this Section 12.1, the date for performance required or contemplated by the Contract Documents shall be extended by the number of calendar days such party is actually delayed.

B. Concurrent Contractor Delays. If a delay is caused for any reason provided in Section 12.1.A. and during the same time period a delay is caused by Contractor, the date for performance shall be extended as provided in 12.1.A. but only to the extent the time is or was concurrent.

C. Notice; Mitigation. The party seeking excuse for nonperformance based on Force Majeure shall give written notice to the Owner, if with respect to the Contractor, or to the Contractor if with respect to the Owner, specifying its actual or anticipated duration. Each party seeking excuse from nonperformance based on Force Majeure shall use its best efforts to rectify any condition causing a delay and will cooperate with the other party, except that neither party shall be obligated to incur any unreasonable additional costs and expenses to overcome any loss of time that has resulted.

12.2 Casualty; Actions by Owner and Contractor. During the construction period, if the Project or any part thereof shall have been damaged or destroyed, in whole or in part, the Contractor shall promptly make proof of loss; and Owner and Contractor shall proceed promptly to collect, or cause to be collected, all valid claims which may have arisen against insurers or others based upon such damage or destruction. The Contractor shall diligently assess the damages or destruction and shall prepare an estimate of the cost, expenses, and other charges, including normal and ordinary compensation to the Contractor, necessary for reconstruction of the Project substantially in accordance with the Project Plans and Specifications. Within fifteen (15) days following satisfaction of the express conditions described in subsections (1), (2) and (3) below, the Contractor covenants and agrees diligently to commence reconstruction and to complete the reconstruction or repair of any loss or damage by fire or other casualty to the Project to substantially the same size, floor area, cubic content, and general appearance as prior to such loss or damage:

- (1) Receipt by the Owner or the trustee of the proceeds derived from collection of all valid claims against insurers or others based upon such damage or destruction, and receipt of other sums from any source such that the funds necessary to pay the Project Cost and any additions to the Project Cost necessitated for repair or reconstruction are available;
- (2) Written agreement executed by the Contractor and the Owner, by amendment to the Contract Documents or otherwise, authorizing and approving the repair or reconstruction and any additions to the Project Cost necessitated thereby, including any required adjustment to the Contract Sum; and
- (3) Final approval by the Owner of the Project Plans and Specifications for such repair or reconstruction and issuance of any required building permit.

12.3 Approval of Plans and Specifications. The Owner agrees to approve the plans and specifications for such reconstruction or repair if the reconstruction or repair contemplated by such plans and specifications is economically feasible, and will restore the Project, or the damaged portion thereof, to substantially the same condition as prior to such loss or damage, and such plans and specifications conform to the applicable laws, ordinances, codes, and regulations. The Owner agrees that all proceeds of any applicable insurance or other proceeds received by the Owner or the Contractor as a result of such loss or damage shall be used for payment of the costs, expenses, and other charges of the reconstruction or repair of the Project.

12.4 Notice of Loss or Damage. The Contractor shall promptly give the Owner written notice of any significant damage or destruction to the Project, defined as loss or damage which it is contemplated by Contractor will increase the Contract Sum or extend the Substantial Completion Date, stating the date on which such damage or destruction occurred, the then expectations of Contractor as to the effect of such damage or destruction on the use of the Project, and the then proposed schedule, if any, for repair or reconstruction of the Project. Loss or damage which the Contractor determines will not affect the Contract Sum or Substantial Completion Date will be reported to Owner and Architect/Engineer immediately, and associated corrective actions will be undertaken without delay.

ARTICLE XIII REPRESENTATIONS, WARRANTIES AND COVENANTS

13.1 Representations and Warranties of Contractor. The Contractor represents and warrants to the Owner each of the following.

A. The Contractor is organized under the laws of the State of Georgia, authorized to transact business in the State of Florida. Contractor has all requisite power and authority to carry on its business as now conducted, to own or hold its properties, and to enter into and perform its obligations hereunder and under each instrument to which it is or will be a party and is in good standing in the State of Florida.

B. Each Contract Document to which the Contractor is or will be a party constitutes, or when entered into will constitute, a legal, valid, and binding obligation of the

Contractor enforceable against the Contractor in accordance with the terms thereof, except as such enforceability may be limited by applicable bankruptcy, insolvency, or similar laws from time to time in effect which affect creditors' rights generally and subject to usual equitable principles in the event that equitable remedies are involved.

C. There are no pending or, to the knowledge of the Contractor, threatened actions or proceedings before any court or administrative agency, within or without the State of Florida, against the Contractor or any partner, officer, or agent of the Contractor which question the validity of any document contemplated hereunder, or which are likely in any case, or in the aggregate, to materially adversely affect the consummation of the transactions contemplated hereunder, or materially adversely affect the financial condition of the Contractor.

D. The Contractor has filed or caused to be filed all federal, state, local, or foreign tax returns, if any, which were required to be filed by the Contractor, and has paid, or caused to be paid, all taxes shown to be due and payable on such returns or on any assessments levied against the Contractor.

E. Neither Contractor nor any agent or person employed or retained by Contractor has acted fraudulently or in bad faith or in violation of any statute or law in the procurement of this Agreement.

F. The Contractor shall timely fulfill or cause to be fulfilled all of the terms and conditions expressed herein which are within the control of the Contractor or which are the responsibility of the Contractor to fulfill. The Contractor shall be solely responsible for the means and methods of construction.

G. It is recognized that neither the Architect/Engineer, the Contractor, nor the Owner has control over the cost of labor, materials, or equipment, over a Subcontractor's methods of determining bid prices, or over competitive bidding, market, or negotiating conditions.

H. During the term of the Contract Documents, and the period of time that the obligations of the Contractor under the Contract Documents shall be in effect, the Contractor shall cause to occur and to continue to be in effect those instruments, documents, certificates, and events contemplated by the Contract Documents that are applicable to, and the responsibility of, the Contractor.

I. The Contractor shall assist and cooperate with the Owner and shall accomplish the construction of the Project in accordance with the Contract Documents and the Project Plans and Specifications, and will not knowingly violate any laws, ordinances, rules, regulations, or orders that are or will be applicable thereto.

J. Contractor warrants and guarantees to Owner that all Work will be in accordance with the Contract Documents and will not be defective, and that Owner, representatives of Owner, and governmental agencies with jurisdictional interests will have access to the Work at reasonable times for their observation, inspecting and testing. Contractor shall give Architect/Engineer timely notice of readiness of the Work for all required approvals and shall assume full responsibility, including costs, in obtaining required tests, inspections, and approval certifications and/or acceptance, unless otherwise stated by Owner.

K. If any Work (including Work of others) that is to be inspected, tested, or approved is covered without written concurrence of Architect/Engineer, it must, if requested by Architect/Engineer, be uncovered for observation. Such uncovering shall be at Contractor's expense unless Contractor has given Architect/Engineer timely notice of Contractor's intention to cover the same and Architect/Engineer has not acted with reasonable promptness in response to such notice. Neither observations by Architect/Engineer nor inspections, tests, or approvals by others shall relieve Contractor from Contractor's obligations to perform the Work in accordance with the Contract Documents.

L. If the Work is defective, or Contractor fails to supply sufficient skilled workers, or suitable materials or equipment, or fails to furnish or perform the Work in such a way that the completed Work will conform to the Contract Documents, Owner may order Contractor to stop the Work, or any portion thereof and terminate payments to the Contractor until the cause for such order has been eliminated. Contractor shall bear all direct, indirect and consequential costs for satisfactory reconstruction or removal and replacement with non-defective Work, including, but not limited to fees and charges of Architect/Engineers, attorneys and other professionals and any additional expenses experienced by Owner due to delays to other Contractors performing additional Work and an appropriate deductive change order shall be issued. Contractor shall further bear the responsibility for maintaining the schedule and shall not be entitled to an extension of the Contract Time or the recovery of delay damages due to correcting or removing defective Work.

M. If Contractor fails within seven (7) days after written notice to correct defective Work, or fails to perform the Work in accordance with the Contract Documents, or fails to comply with any other provision of the Contract Documents, Owner may correct and remedy any such deficiency to the extent necessary to complete corrective and remedial action. Owner may temporarily exclude Contractor from all or part of the site, temporarily take possession of all or part of the Work, Contractor's tools, construction equipment and machinery at the site or for which Owner has paid Contractor but which are stored elsewhere, all for such duration as is reasonably necessary to correct the deficiency. All direct and indirect costs of Owner in exercising such rights and remedies will be charged against Contractor in an amount approved as to reasonableness by Architect/Engineer and a Change Order will be issued incorporating the necessary revisions.

N. If within three (3) years after the Substantial Completion Date or such longer period of time as may be prescribed by laws or regulations or by the terms of any applicable special guarantee required by the Contract Documents, any Work is found to be defective, Contractor shall promptly, without cost to Owner and in accordance with Owner's written instructions, either correct such defective Work or if it has been rejected by Owner, remove it from the site and replace it with non-defective Work. If Contractor does not promptly comply with the terms of such instruction, Owner may have the defective Work corrected/removed and all direct, indirect and consequential costs of such removal and replacement will be paid by Contractor. Failing payment by the Contractor and notwithstanding any other provisions of the Contract Documents to the contrary, Owner shall have the right to bring a direct action in the Circuit Court to recover such costs.

13.2 Representations of the Owner. To the extent permitted by law, the Owner represents to the Contractor that each of the following statements is presently true and accurate:

- A. The Owner is a validly existing political subdivision of the State of Florida.
- B. The Owner has all requisite corporate or governmental power and authority to carry on its business as now conducted and to perform its obligations under the Contract Documents and each Contract Document contemplated hereunder to which it is or will be a party.
- C. The Contract Documents and each Contract Document contemplated hereby to which the Owner is or will be a party has been duly authorized by all necessary action on the part of, and has been or will be duly executed and delivered by, the Owner, and neither the execution and delivery thereof nor compliance with the terms and provisions thereof or hereof: (a) requires the approval and consent of any other person or party, except such as have been duly obtained or as are specifically noted herein; (b) contravenes any existing law, judgment, governmental rule, regulation or order applicable to or binding on the Owner; or (c) contravenes or results in any breach of, default under, or result in the creation of any lien or encumbrance upon the Owner under any indenture, mortgage, deed of trust, bank loan, or credit agreement, the charter, ordinances, resolutions, or any other agreement or instrument to which the Owner is a party, specifically including any covenants of any bonds, notes, or other forms of indebtedness of the Owner outstanding on the date of the Contract Documents.
- D. The Contract Documents and each document contemplated hereby to which the Owner is or will be a party constitutes, or when entered into will constitute, a legal, valid, and binding obligation of the Owner enforceable against the Owner in accordance with the terms thereof, except as such enforceability may be limited by applicable bankruptcy, insolvency, or similar laws from time to time in effect which affect creditors' rights generally, and subject to usual equitable principles in the event that equitable remedies are involved.
- E. There are no pending or, to the knowledge of the Owner, threatened actions or proceedings before any court or administrative agency against the Owner which question the validity of the Contract Documents or any document contemplated hereunder, or which are likely in any case or in the aggregate to materially adversely affect the consummation of the transactions contemplated hereunder or the financial or corporate condition of the Owner.
- F. The Owner shall use due diligence to timely fulfill or cause to be fulfilled all of the conditions expressed in the Contract Documents which are within the control of the Owner or which are the responsibility of the Owner to fulfill.
- G. During the pendency of the Work and while the obligations of the Owner under the Contract Documents shall be in effect, the Owner shall cause to occur and to continue to be in effect and take such action as may be necessary to enforce those instruments, documents, certificates and events contemplated by the Contract Documents that are applicable to and the responsibility of the Owner.
- H. The Owner shall assist and cooperate with the Contractor in accomplishing the construction of the Project in accordance with the Contract Documents and the Project Plans and Specifications, and will not knowingly violate any laws, ordinances, rules, regulations, orders, contracts, or agreements that are or will be applicable thereto or, to the extent permitted by law, enact or adopt any resolution, rule, regulation, or order, or approve or enter into any contract or agreement, including issuing any bonds, notes, or other forms of indebtedness, that will result in the Contract Documents or any part thereof, or any other instrument contemplated

by and material to the timely and effective performance of a party's obligations hereunder, to be in violation thereof.

ARTICLE XIV TERMINATION AND SUSPENSION

14.1 Termination for Cause by Owner. This Agreement may be terminated by Owner upon written notice to the Contractor should Contractor fail substantially to perform a material obligation in accordance with the terms of the Contract Documents through no fault of the Owner. In the event Owner terminates for cause and it is later determined by a court of competent jurisdiction that such termination for cause was not justified, then in such event such termination for cause shall automatically be converted to a termination without cause pursuant to Section 14.2.

A. Nonperformance. If the Contractor fails to timely perform any of its obligations under the Contract Documents, including any obligation the Contractor assumes to perform Work with its own forces, or if it persistently or repeatedly refuses or fails, except in case for which extension of time is provided, to supply enough properly skilled workmen or proper materials, or fails, without being excused, to maintain an established schedule (failure to maintain schedule shall be defined as any activity that falls thirty (30) days or more behind schedule) which has been adopted by the Construction Team, or it fails to make prompt payment to Subcontractors for materials or labor, or disregards laws, rules, ordinances, regulations, or orders of any public authority having jurisdiction, or otherwise is guilty of substantial violations of the Agreement the Owner may, after seven (7) days written notice, during which period the Contractor fails to perform such obligation, make good such deficiencies and perform such actions. The Contract Sum shall be reduced by the cost to the Owner of making good such deficiencies, and the Contractor's compensation shall be reduced by an amount required to manage the making good of such deficiencies. Provided, however, nothing contained herein shall limit or preclude Owner from pursuing additional damages from Contractor because of its breach.

B. Insolvency. If the Contractor is adjudged bankrupt, or if it makes a general assignment for the benefit of its creditors, or if a receiver is appointed because its insolvency, then the Owner may, without prejudice to any other right or remedy, and after giving the Contractor and its surety, if any, fourteen (14) days written notice, and during which period the Contractor fails to cure the violation, terminate the Agreement. In such case, the Contractor shall not be entitled to receive any further payment. Owner shall be entitled to recover all costs and damages arising because of failure of Contractor to perform as provided in the Contract Documents, as well as reasonable termination expenses, and costs and damages incurred by the Owner may be deducted from any payments left owing the Contractor.

C. Illegality. Owner may terminate the Agreement if Contractor disregards laws or regulations of any public body having jurisdiction.

D. Rights of Owner. The Owner may, after giving Contractor (and the surety, if there is one) seven (7) days written notice, terminate the services of Contractor for cause; exclude Contractor from the Project Site and take possession of the Work and of all Contractor's tools, construction equipment and machinery at the Project Site and use the same to the full extent they could be used (without liability to Contractor for trespass or conversion); incorporate in the Work all materials and equipment stored at the Project Site or for which Owner has paid Contractor

but which are stored elsewhere, and finish the Work as Owner may deem expedient. In such case, Contractor shall not be entitled to receive any further payment beyond an amount equal to the value of material and equipment not incorporated in the Work, but delivered and suitably stored, less the aggregate of payments previously made. If the direct and indirect costs of completing the Work exceed the unpaid balance of the Contract Sum, Contractor shall pay the difference to Owner. Such costs incurred by Owner shall be verified by Owner in writing; but in finishing the Work, Owner shall not be required to obtain the lowest quote for the Work performed. Contractor's obligations to pay the difference between such costs and such unpaid balance shall survive termination of the Agreement. In such event and notwithstanding any other provisions of the Contract Documents to the contrary, Owner shall be entitled to bring a direct action in the Circuit Court to recover such costs.

14.2 Termination without Cause by Owner. The Owner, through its County Administrator or designee, shall have the right to terminate the Agreement, in whole or in part, without cause upon sixty (60) calendar days' written notice to the Contractor. In the event of such termination for convenience, the Owner shall compensate Contractor for payments due through the date of termination, and one subsequent payment to cover costs of Work performed through the date of termination, subject to the terms and conditions of Section 3.1. The Contractor shall not be entitled to any other further recovery against the Owner, including, but not limited to, anticipated fees or profit on Work not required to be performed, or consequential damages or costs resulting from such termination.

A. Release of Contractor. As a condition of Owner's termination rights provided for in this subsection, Contractor shall be released and discharged from all obligations arising by, through, or under the terms of the Contract Documents, and the Payment and Performance Bond shall be released. Owner shall assume and become responsible for the reasonable value of Work performed by Subcontractors prior to termination plus reasonable direct close-out costs, but in no event shall Subcontractors be entitled to unabsorbed overhead, anticipatory profits, or damages for early termination.

B. Waiver of Protest. Contractor hereby waives any right to protest the exercise by Owner of its rights under this Section that may apply under the Procurement Ordinance.

14.3 Suspension without Cause. Owner may, at any time and without cause, suspend the Work or any portion thereof for a period of not more than ninety (90) days by written notice to Contractor, which will fix the date on which Work will be resumed. Contractor shall be allowed an increase in the Contract Sum or an extension of the Contract Time, or both, directly attributable to any suspension if Contractor makes an approved claim therefor.

14.4 Termination Based Upon Abandonment, Casualty or Force Majeure. If, after the construction commencement date (i) Contractor abandons the Project (which for purposes of this paragraph shall mean the cessation of all construction and other activities relating to the Project, excluding those which are necessary to wind down or otherwise terminate all outstanding obligations with respect to the Project, and no recommencement of same within one hundred twenty (120) days following the date of cessation), or (ii) the Project is stopped for a period of thirty (30) consecutive days due to an instance of Force Majeure or the result of a casualty resulting in a loss that cannot be corrected or restored within one hundred twenty (120) days (excluding the time required to assess the damage and complete the steps contemplated under Section 12.2), the

Owner shall have the right to terminate the Agreement and pay the Contractor its compensation earned or accrued to date.

14.5 Vacation of Project Site; Delivery of Documents. Upon termination by Owner pursuant to Section 14.2 or 14.4, Contractor shall withdraw its employees and its equipment, if any, from the Project Site on the effective date of the termination as specified in the notice of termination (which effective date shall not be less than two (2) working days after the date of delivery of the notice), regardless of any claim the Contractor may or may not have against the Owner. Upon termination, the Contractor shall deliver to the Owner all original papers, records, documents, drawings, models and other material set forth and described in the Contract Documents.

14.6 Termination by the Contractor. If, through no act or fault of Contractor, the Work is suspended for a period of more than ninety (90) consecutive days by Owner or under an order of court or other public authority, or Owner fails to act on any Application for Payment or fails to pay Contractor any sum finally determined to be due; then Contractor may, upon fourteen (14) days written notice to Owner terminate the Agreement and recover from Owner payment for all Work executed, any expense sustained plus reasonable termination expenses. In lieu of terminating the Agreement, if Owner has failed to act on any Application for Payment or Owner has failed to make any payment as aforesaid, Contractor may upon fourteen (14) days written notice to Owner stop the Work until payment of all amounts then due.

(Remainder of this page intentionally left blank)

Exhibit A
Title(s) of Drawings

SAMPLE

Exhibit B
Title(s) of Specifications

SAMPLE

Exhibit C
Affidavit of No Conflict

SAMPLE

Exhibit D
Contractor's Certificate(s) of Insurance

SAMPLE

Exhibit E
Contractor's Payment and Performance Bond

SAMPLE

Exhibit F
Standard Forms

SAMPLE

APPLICATION FOR PAYMENT

Request No.: _____ Project No.: _____
 Purchase Order No.: _____
 County Bid No.: _____
 Consultant: _____

Project: _____
 From: _____ To: _____

CONTRACT PAYMENT SUMMARY

Original Contract Amount:				\$	-
Change Order(s):				\$	-
Change order summary:					
Number	Date Approved	Additive	Deductive		
SUBTOTALS:		\$	-	\$	-
Net change order subtotal (Additive less Deductive):				\$	-
Current Contract Amount (CCA): (Original Amount + Change Order(s))				\$	-
		Previous Status	Total WIP		
Value of the Work in Place (WIP)	\$	-	\$	-	
Value of Stored Materials	\$	-	\$	-	
Total Earned (\$ and % of CCA)	\$	-	\$	-	
Retainage (\$ and % of CCA)	\$	-	\$	-	
Net Earned (Total earned minus retainage)				\$	-
TOTAL PREVIOUS PAYMENTS				\$	-
AMOUNT DUE THIS PAYMENT (Net Earned minus Previous Payments)				\$	-

CONTRACTOR'S AFFIDAVIT OF NOTICE

CERTIFICATE: The undersigned CONTRACTOR certifies that all items and amounts shown on this Application for Payment are on account of work performed, materials supplied and/or materials stored on site and paid for by Contractor in accordance with the Contract Documents with due consideration for previous Payment(s), if any, received by the Contractor from the County, and that the Amount Due this Payment shown is now due.

NOTARY:

CONTRACTOR:

State of Florida, County of _____

Sworn to (or affirmed) and subscribed before me this _____ day of _____ by _____

 (Name of person giving notice)

 (Signature of Notary Public - State of Florida)
 Print, Type or Stamp Commissioned Name of Notary Public: _____

Personally Known _____ or Produced Identification _____
 Type of Identification Produced: _____

 Name of person authorized to sign Affidavit of Notice

 TITLE

 Contractor name, address and telephone no.:

VERIFICATION, RECOMMENDATION, CONCURRENCES AND APPROVALS

(Signatures)

(Date)

Quantities verified by: _____

Consultant/Engineer: _____

Project Management: _____

Department Head: _____

Payment approved by the Board of County Commissioners: _____

Attested to by the Clerk of Circuit Court: _____

**FINAL RECONCILIATION, WARRANTY PERIOD DECLARATION
AND CONTRACTOR'S AFFIDAVIT**

Project Title:	Date Submitted:
----------------	-----------------

Contractor Data: Name: Address: City/State/Zip:	Project No:
	Warranty (months):

This Final Reconciliation is for the work performed for Manatee County by the above named contractor, hereinafter called CONTRACTOR, pursuant to the contract dated _____ as amended, and acts as an addendum thereto.

It is agreed that all quantities and prices in the attached Final Pay Estimate No. _____ are correct and that the amount of \$ _____ including retainage is due to the CONTRACTOR, that no claims are outstanding as between the parties, and that the above stated sum represents the entirety of monies owed the CONTRACTOR.

It is further agreed that the warranty period for CONTRACTOR'S work pursuant to the Contract is from _____ to _____

As (title) _____ for CONTRACTOR, I have authority to bind said CONTRACTOR, and as such make this final reconciliation, declaration and affidavit for the purpose of inducing Manatee County to make final payment to CONTRACTOR for work done at/upon _____ under said contract:

CONTRACTOR has paid all social security and withholding taxes accrued in connection with the construction project.

CONTRACTOR has paid all workers' compensation and other insurance premiums incurred in connection with this construction project.

CONTRACTOR has paid for all required permits in connection with this construction project.

All laborers, material, men, suppliers, subcontractors and service professionals who worked for and/or supplied materials, equipment and/or services to the CONTRACTOR under this construction contract have been paid in full.

(Affiant Signature)

NOTARY:
State of Florida, County of _____, Sworn to (or affirmed) and subscribed before me this _____ day of _____, _____, by _____ (person giving notice).

Signature of Notary Public - State of Florida: _____
Print, Type or Stamp Commissioned Name of Notary Public:

Personally Known or Produced Identification
Type of Identification Produced _____

CONTRACT CHANGE ORDER

(for Total Contract Adjusted Amount Greater than \$1,000,000)

PROJECT: _____

Change Order No.: _____

**Contract Amount
(Present Value)**

Project Number: _____

NO. OF ITEM	DESCRIPTION OF ITEM AND CHANGE	DECREASE	INCREASE

BY EXECUTION OF THIS CHANGE ORDER THE CONTRACTOR AGREES THAT ALL CLAIMS FOR ADDITIONAL CONTRACT TIME AND FEES FOR THE ITEMS IN THIS CHANGE ORDER HAVE BEEN SATISFIED.

TOTAL DECREASE: _____

TOTAL INCREASE: _____

Contractor: _____
Address: _____
City / State: _____

THE NET CHANGE OF
 ADJUSTS THE CURRENT CONTRACT AMOUNT FROM
 _____ TO

Contractor Signature: _____ **Date:** _____

____ CALENDAR DAYS ARE ADDED TO THE SCHEDULE
 WHICH CHANGES THE FINAL COMPLETION DATE TO
 MONTH DAY, YEAR

RECOMMENDATION, CONCURRENCES AND APPROVALS

SIGNATURES

DATE

Consultant / Engineer: _____

Project Manager: _____

Division Manager: _____

Project Management Division Manager

Manatee County Purchasing: _____

Purchasing Official

Authority to execute this contract per Manatee County Code, Chapter 2-26,
 and per the delegation by the County Administrator effective 1/26/2009

JUSTIFICATION FOR CHANGE

Change Order No :

Project Number:

1. NECESSITY FOR CHANGE:



2. Is change an alternate bid? (If yes, explain)

3. Does change substantially alter the physical size of the project? (If yes, explain)

4 Effect of this change on other "Prime" contractors?

5 Has the Surety and insurance company been notified, if applicable? **CONTRACTOR RESPONSIBILITY**