



**INVITATION FOR BID
IFB 16-1455OV,
Replacement of Two (2) Motor Control Centers at Lake Manatee Water
Treatment Plant
(Project No. 6025974 and 6025973)**

Manatee County, a political subdivision of the State of Florida, (hereinafter "Owner") will receive sealed bids from individuals, corporations, partnerships, and other legal entities organized under the laws of the State of Florida or authorized to conduct business in the State of Florida.

NON-MANDATORY INFORMATION CONFERENCE

In order to ensure all prospective bidders have sufficient information and understanding of Owner's needs, an Information Conference will be held at: **9:00 AM on May 25, 2016** at the **Manatee County Administration Building, 8th Floor, Staples Conference Room, Bradenton, FL 34205**. A **Site Inspection** shall take place at the **Lake Manatee Water Treatment Plant** immediately following the **Non-Mandatory Information Conference**. **Bidders shall be required to have a photo ID to present to the Security personnel at the Plant. Appropriate clothing and shoes should be worn .** Attendance is not mandatory, but is highly encouraged.

DEADLINE FOR CLARIFICATION REQUESTS: **5:00 PM on June 10, 2016**
Reference Bid Article A.06

BID OPENING TIME AND DATE DUE: **3:00 PM on July 13, 2016**

FOR INFORMATION CONTACT:
Olga Valcich, CPPB, Contract Specialist
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Manatee County Financial Management Department
Purchasing Division

AUTHORIZED FOR RELEASE: 

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SECTION A
INFORMATION TO BIDDERS

A.01 OPENING LOCATION

Sealed bids will be **publicly opened** at the **Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, Florida 34205** in the presence of Owner officials at the time and date stated, or soon thereafter. All bidders or their representatives are invited to attend the sealed bid opening.

Any bids received after the stated time and date will not be considered. It shall be the sole responsibility of the bidder to have their bid **delivered to the Manatee County Purchasing Division** for receipt on or before the stated time and date. Bidder shall be solely and strictly responsible for its timely delivery to the Purchasing Division. Bids delayed by mail, courier, or bids delayed for any other reason, shall not be considered, shall not be opened at the public opening, and arrangements shall be made for their return at the bidder's request and expense.

A.02 SEALED & MARKED

Bids shall be submitted in **duplicate, one original (marked Original) and one copy/copies (marked Copy)** of your **signed bid** shall be submitted in one **sealed** package, clearly marked on the outside "**Sealed Bid #16-1455OV, Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant (Project No. 6025974 and 6025973)**" along with your company name.

For your convenience, a mailing label is provided with this Invitation for Bid (IFB) package. Or, you may address the package as follows:

Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, Florida 34205

Sealed Bid #16-1455OV, Replacement of Two (2) Motor Control
Centers at Lake Manatee Water Treatment Plant (Project No. 6025974 and 6025973)

All blank spaces on the bid form must be filled in as noted with amounts extended and totaled and no changes shall be made in the wording of the forms or in the items thereupon. In the event a change is made in your submittal, the bidder shall write its initials by the change. Any bid may be rejected which contains any omissions, alterations, irregularities of any kind, or which shall in any manner fail to conform to the requirements of this IFB.

A bid made by an individual, either in his/her own or proper person or under a trade or firm name, shall be executed under the individual's signature. If made by a partnership, the bid shall be executed by two or more of the general partners. If made by a corporation, the bid shall be executed by its President or other legally authorized corporate officer or agent.

A.03 SECURING BID DOCUMENTS

IFB's and related documents are available on <http://www.mymanatee.org/purchasing> for download in a portable document format (.PDF) file by clicking on "Bids and Proposals" from the Purchasing Division's web page. You may view and print these files using Adobe Reader software. If necessary, you may download a free copy of Adobe Reader from the link provided on the "Bids and Proposals" page.

Additionally, Manatee County collaborates with the Manatee Chamber of Commerce by announcing solicitation opportunities to the Chamber which are then passed to its members.

Manatee County may also use DemandStar to distribute bids. On the DemandStar website, <http://www.DemandStar.com>, click on the tab titled "My DemandStar" for more information regarding this service. Participation in the DemandStar system is not a requirement for doing business with Manatee County.

Complete copies of the IFB and all related documents are available for public inspection at the Manatee County Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205, or by calling (941) 749-3014. Appointments are encouraged. Documents are available between the hours of 9:00 AM and 4:00 PM Monday through Friday, with the exception of holidays. A complete set of the IFB documents must be used in preparing bids. Owner assumes no responsibility for errors and misinterpretations resulting from the use of incomplete sets of bid documents.

A.04 EXAMINATION OF BID DOCUMENTS AND SITE(S)

It is the responsibility of each bidder before submitting a bid, to (a) examine the IFB 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 IFB documents; and (e) notify Owner of all conflicts, errors, or discrepancies in the IFB 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 IFB documents. Owner 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 IFB 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 Owner unless otherwise provided in the IFB 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.05 MODIFICATION OF BID DOCUMENTS

If a bidder wishes to recommend changes to the IFB documents, the bidder shall furnish, in writing, data and information necessary to aid Owner in evaluating the request to modify the IFB documents. Owner is not obligated to make any changes to the IFB documents. Unless an addendum is issued, the IFB documents shall remain unaltered. **Bidders must fully comply with the IFB documents in their entirety.**

A.06 CLARIFICATION & ADDENDA

Each bidder shall examine all IFB documents and shall judge all matters relating to their adequacy and accuracy. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to this IFB shall be made through the Manatee County Purchasing Division. Owner shall not be responsible for oral interpretations given by any Owner employee, representative, or others.

5:00 PM on June 10, 2016 shall be the deadline to submit to the Purchasing Division, in writing, all inquiries, suggestions, or requests concerning interpretation, clarification or additional information pertaining to this IFB.

This deadline has been established to maintain fair treatment of all potential bidders, while maintaining progression of the Work.

If any addenda are issued to this IFB, Owner will post the documents on the Purchasing Division's web page at <http://www.mymanatee.org/purchasing>, and then by clicking on "**Bids and Proposals**". If the original solicitation was broadcast via DemandStar, the addenda will also be broadcast on the DemandStar distribution system to "Planholders" on this web service.

The issuance of a written addendum is the only official method whereby interpretation, clarification or additional information can be given.

It shall be the **responsibility of each bidder, prior to submitting a bid**, to contact the Purchasing Division (see contact information on the cover page) to **determine if any addenda were issued** and to make such addenda a part of their bid.

A.07 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):

1. A Security System Plan or portion thereof for any property owned by or leased to the County or any privately owned or leased property held by the County.
2. 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 the County.
3. 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 the County.

(b) Contractor/Vendor agrees that it shall not, as a result of a public records request or for any 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 the County's Property Management Director or to comply with a court order requiring such release or disclosure. To the extent Contractor/Vendor receives a request for such records, it shall immediately contact the County's designated Contract Manager who shall coordinate the County's response to the request. Notwithstanding the foregoing, the Contractor/Vendor may

1. Disclose or release Security System Plans to:
 - (A) The property owner or leaseholder; or
 - (B) Another state or federal agency to prevent, detect, guard against, respond to, investigate, or manage the consequences of any attempted or actual act of terrorism, or to prosecute those persons who are responsible for such attempts or acts.
2. Disclose or release 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 the County:
 - (A) To another governmental entity if disclosure is necessary for the

receiving entity to perform its duties and responsibilities;

(B) To a licensed architect, engineer, or contractor who is performing work on or related to the building, arena, stadium, water treatment facility, or other structure owned or operated by the County and is contractually bound by the Contractor/Vendor to comply with this Article/Section; or

(C) Upon a showing of good cause before a court of competent jurisdiction.

(c) For purposes of this Article/Section, the term "Security System Plan" includes all:

1. Records, information, photographs, audio and visual presentations, schematic diagrams, surveys, recommendations, or consultations or portions thereof relating directly to the physical security of the facility or revealing security systems;
2. Threat assessments conducted by any agency or any private entity;
3. Threat response plans;
4. Emergency evacuation plans;
5. Sheltering arrangements; or
6. Manuals for security personnel, emergency equipment, or security training.

A.08 LOBBYING

After the issuance of any IFB, prospective 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 IFB with any officer, agent or employee of Manatee County other than the Purchasing Official or the contact identified in this IFB, 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 IFB and ends upon execution of the final Agreement or when the IFB has been cancelled. Violators of this prohibition shall be subject to sanctions as provided in the Manatee County Code of Laws.

A.09 UNBALANCED BIDDING PROHIBITED

Owner recognizes that large and/or complex projects will often result in a variety of methods, sources, and prices. However, where in the opinion of Owner 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 Owner 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, etc., which the bidder obtained and upon which the bidder relied upon to develop its bid. Owner reserves the right to reject as nonresponsive any presumptive unbalanced bids where the bidder is unable to demonstrate the validity and/or necessity of the unbalanced unit costs.

A.10 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 Owner 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, etc., which the bidder obtained and upon which the bidder relied upon to develop the pricing or acquisition timing for these bid items. Owner 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.11 WITHDRAWAL OF BIDS

Bidders may withdraw bids as follows:

- a. Mistakes discovered before the public bid opening may be withdrawn by written notice from the bidder submitting the bid. This request must be received in the Purchasing Division prior to the time set for delivery and opening of the bids. A copy of the request shall be retained and the unopened bid returned to the bidder; or
- b. After the bids are opened or a selection has been determined, but before an Agreement is signed, a bidder alleging a material mistake of fact may be permitted to withdraw their bid 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. Request to withdraw a bid must be in writing and approved by the Purchasing Official.

A.12 IRREVOCABLE OFFER

Any bid may be withdrawn up until the time and date set for opening of the bid. Any bid not so withdrawn shall, upon opening, constitute an irrevocable offer for a period of ninety (90) days to sell to Manatee County the goods or services set forth in the attached IFB until one or more of the bids have been duly accepted by Owner.

A.13 BID EXPENSES

All expenses for making bids to Owner are to be borne by the bidder.

A.14 RESERVED RIGHTS

Owner reserves the right to accept or reject any and/or all bids, to waive irregularities and technicalities, and to request resubmission. Also, Owner 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 Owner. Any sole response received by the first submission date may or may not be rejected by Owner depending on available competition and current needs of Owner. 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 IFB documents or otherwise required by Owner.

To be responsive, a bidder shall submit a bid which conforms in all material respects to the requirements set forth in the IFB.

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, Owner reserves the right to make such investigation as it deems necessary to determine the ability of any bidder to furnish the service requested. Information Owner 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.15 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 Purchasing Division shall be in accordance with the Manatee County Purchasing Ordinance as amended.

A.16 COLLUSION

By submitting a bid to this IFB, 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. Also, bidder certifies, and in the case of a joint bid each party thereto certifies as to their own organization, that in connection with this bid:

- a. any 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. any 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 the 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, principal or principals is/are named therein and that no person other than therein mentioned has any interest in this bid or in the resulting Agreement to be entered into; and
 - 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.17 CODE OF ETHICS

With respect to this bid, if any bidder violates, directly or indirectly, the ethics provisions of the Manatee County Procurement Ordinance and/or Florida criminal or civil laws related to public procurement, including but not limited to Chapter 112, Part III, Code of Ethics for Public Officers and Employees, Florida Statutes, such bidder will be disqualified from eligibility to perform the Work described in this IFB, and may also be disqualified from furnishing future goods or services to, and from submitting any future bids to supply goods or services to, Manatee County.

By submitting a bid, the bidder represents to Owner that all statements made and materials submitted are truthful, with no relevant facts withheld. If a bidder is determined to have been untruthful in their bid or any related presentation, such bidder will be disqualified from eligibility to perform the Work described in this IFB, and may also be disqualified from furnishing future goods or services to, and from submitting any future bids to supply goods or services to, Manatee County.

A.18 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 Owner 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 Owner. 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.19 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 **Attachment E Vendor Certification Regarding Scrutinized Companies Lists**.

A.20 BID FORMS

Bids must be submitted on the provided forms, although additional pages may be attached. **Bidders must fully complete all pages of the Bid Forms. Bid Forms must be executed by an authorized signatory who has the legal authority to make the bid and bind the company. Bidders must fully comply with all requirements of this IFB in its entirety.** Failure to comply shall result in bidder being deemed nonresponsive.

A.21 AGREEMENT FORMS

The Agreement resulting from the Acceptance of a bid shall be in the form of the Agreement stated in this IFB, which is attached herein.

A written notice confirming award or recommendation thereof will be forwarded to the successful bidder accompanied by the required number of unsigned counterparts of the Agreement. Within ten (10) days thereafter, successful bidder shall sign and deliver the required number of counterparts of the Agreement with any other required documents

to Owner. (Note: Agreement must be approved in accordance with Chapter 2-26 of the Manatee County Code of Laws and the Administrative Standards and Procedures Manual approved by the County Administrator).

A.22 LEGAL NAME

Bids shall clearly indicate the legal name, address and telephone number of the bidder on the Bid Form. Bid Forms shall be signed above the typed or printed name and title of the signer. The signer must 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 Owner.

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.23 DISCOUNTS

Any and all discounts must be incorporated in the prices contained in the bid and not shown separately. The prices indicated on the Bid Form shall be the prices used in determining award.

A.24 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 his bid for any sales or service taxes. Nothing herein shall affect the bidder's normal tax liability.

The Contractor shall be responsible for the payment of taxes of any kind and character, including, but not limited to sales, consumer, use, and other similar taxes payable on account of the work performed and materials furnished under the award in accordance with the laws and Regulations of the place of the project which are applicable during the performance of the work. Nothing herein shall affect the bidder's normal tax liability.

A.25 DESCRIPTIVE INFORMATION

Unless otherwise specifically provided in the IFB documents, all equipment, materials and articles provided shall be new and of the most suitable grade for the purpose intended. Unless otherwise specifically provided in the IFB 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.26 AUTHORIZED PRODUCT REPRESENTATION

The 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 perform accordingly may, in Owner's sole discretion, be deemed a material breach of the resulting Agreement, and shall constitute grounds for Owner's immediate termination of the resulting Agreement.

A.27 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 Owner harmless from loss on account thereof, including costs and attorney's fees.

A.28 AMERICANS WITH DISABILITIES ACT

Owner does not discriminate upon the basis of any individual's disability status. This non-discrimination policy involves every aspect of Owner'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 IFB document at least twenty-four (24) hours in advance of either activity.

A.29 EQUAL EMPLOYMENT OPPORTUNITY

In accordance with the provisions of Title VI of the Civil Rights Act of 1964 and Title 15, Part 8 of the Code of Federal Regulations, Owner hereby notifies all bidders that they will affirmatively ensure minority business enterprises will be afforded full opportunity to participate in response to this advertisement and will not be discriminated against on the grounds of race, color or national origin in consideration for bid award.

A.30 MBE/DBE

The State of Florida Office of Supplier Diversity provides the certification process and the database for identifying certified MBE/DBE firms. This service may be directly accessed at: <http://www.osd.dms.state.fl.us/iframe.htm>. If you have any questions regarding this State service, please contact their office at (850) 487-0915.

A.31 MATHEMATICAL ERRORS

Bid Forms without 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.

Bid Forms with mathematical formulas:

Interactive Bid Forms that contain mathematical formulas may be used for automating lengthy and complex bid forms. In the event these forms are used and a multiplication/extension error(s) is discovered, the unit price entered by the vendor shall

prevail. The vendor shall assume the responsibility and accuracy of the information input in the bid form and therefore shall verify that the calculations are correct before submitting their bid.

Regardless of which type of bid form is used, all bids shall be reviewed mathematically and corrected, if necessary, using these standards, prior to additional evaluation.

A.32 SUBCONTRACTORS

The successful bidder will obtain prior written approval from the County for any subcontractor(s) and the work they 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.

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 within the United States shall be employed under this contract.

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

If County has reasonable objection to any subcontractor, the County may request the successful bidder to submit an acceptable substitute without an increase in contract sum or contract time.

If successful bidder declines to make any such substitution, the County may award the resulting agreement to the next lowest qualified bidder that proposes to use acceptable subcontractors, who County does not make written objection to. In the event the successful bidder declines to make any such substitution post award, the County may exercise its right to terminate the agreement.

The successful bidder shall maintain sole responsibility for the actions of its employees and subcontractors. New employees brought in after contract award shall follow the same requirement stated above for the life of the contract.

A.33 DISCLOSURE

Upon receipt, all inquiries and responses to inquiries related to this IFB 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 bid shall be conducted at the public bid opening.

Based on the above, Owner 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 and any amount presented as a total offer without any verification of the mathematics or the completeness of the bid.

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

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 CONTRACT, CONTACT OWNER'S CUSTODIAN OF PUBLIC RECORDS AT: (941) 742-5845, debbie.scaccianoce@mymanatee.org, Attn: Records Manager, 1112 Manatee Ave W., Bradenton, FL 34205.

Pursuant to Florida Statutes 119.0701, to the extent CONTRACTOR is performing services on behalf of the COUNTY, contractor 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 contractor 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 contractor transfers all public records to the public agency upon completion of the contract, 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 contract, the contractor 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.

A.34 LOCAL PREFERENCE

Local business is defined as a business legally authorized to engage in the sale of the goods and/or services to be procured, and which certifies within its bid that for at least six (6) months prior to the announcement of the solicitation of bids 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:

1. Purchases or Agreements which are funded, in whole or in part, by a governmental or other funding entity, where the terms and conditions of receipt of the funds prohibit the preference.
2. Any bid announcement which specifically provides that the general local preference policies set forth in this section are 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.

To qualify for local preference under this section, **a local business must certify to Owner** 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 Purchasing Division, 1112 Manatee Avenue West, Suite 803, Bradenton, FL 34205.

It is the responsibility of the bidder to ensure accuracy of the Affidavit as to Local Business and notify Owner of any changes affecting same.

A.35 VENDOR REGISTRATION

Registering your business with Manatee County will enhance our opportunities to identify sources for goods and services, plus identify local businesses. This information is used for soliciting quotations up to \$250,000.00 and for competitive solicitations of larger purchases.

Our staff can assist you with your registration as needed. Our office hours are 8:00 A.M. to 5:00 P.M., Monday through Friday on regular business days. Please call (941) 749-3014 if you wish to have a Purchasing staff member assist you.

Quick steps to registration: **www.mymanatee.org/purchasing**

A link to Vendor Registration is listed on the Purchasing Division's web page under "Register as a Vendor". Click on "Vendor Registration Form" for on-line input.

Registration is not mandatory; however, by taking the time to register, you are helping Owner to provide timely notification of quotation, bid and proposal opportunities to your business.

A.36 ENVIRONMENTAL SUSTAINABILITY

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

Bidders shall acknowledge whether or not their organization has an environmental sustainability initiative by checking the appropriate box on the bid form. In addition, the bidder shall submit a summary of their environmental sustainability initiative along with their bid. This information will be used as a determining factor in the award decision when all other evaluative factors, including local preference policies are otherwise equal.

A.37 ePAYABLES

Manatee County and 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 will issue a unique credit card number to each vendor; the card has a zero balance until payments have been authorized.

After goods are delivered or services rendered, vendors submit invoices to the remit to address on the purchase order according to the current process. 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 you are interested in participating in this program, please complete the ePayables Application attached herein and return the completed form via email to Ms. Lori Bryan, Supervisor at lori.bryan@manateeclerk.com.

NOTE: ANY OR ALL STATEMENTS CONTAINED IN THE FOLLOWING SECTIONS: SCOPE OF WORK, BID SUMMARY, CONSTRUCTION AGREEMENT FOR STIPULATED SUM, AND GENERAL CONDITIONS OF THE CONSTRUCTION AGREEMENT, WHICH VARY FROM THE INFORMATION TO BIDDERS, SHALL HAVE PRECEDENCE.

END OF SECTION A

SECTION B
SCOPE OF WORK

B.01 SCOPE OF WORK

- A. The Work consists of the replacement of two separate Motor Control Centers (MCC) at the Lake Manatee Water Treatment Plant located at 17915 Waterline Service Road, Bradenton, FL., inclusive of all equipment, materials and work required for a complete, tested and fully operational system. Work shall be constructed under **one (1) prime Electrical Contractor**.

Contractor shall complete the attached Contractor's Questionnaire (Attachment "A") and provide a minimum of three (3) projects in excess of one million dollars. Contractor shall provide contact information, description of project, size of project, dollar value of project.

The Electrical Contractor may elect to subcontract out the site / civil, structural, or instrumentation and controls portion of this contract.

- B. A general description of the work is provided below solely to assist the Contractor in preparing his Bid and does not purport to include all of the equipment, materials and work required for the contract. The description includes, but is not limited to the following:

1. MCC Replacement - Raw Water #2, Pump Station (Phase A) – Provide all labor, equipment and materials needed to remove and replace the existing MCC including motor controllers, main and feeder breakers, concrete pads, conduit, wiring and replace with pre-fab electrical building (Spec. Section 0500 – Walk in Electrical Equipment Enclosure), hurricane rated, including new Motor Control Center (MCC) with main and feeder breakers, new solid state motor starters, replacement of all cable runs between main transformer, MCC and Motors. In addition, provide new NEMA 3R portable generator connection. All power and control wiring is to be traced, intercepted, replaced or removed as required to perform the work. All unused or unneeded wiring and conduit will be removed. Work shall include all necessary demolition equipment and staging to avoid unnecessary shutdowns and to limit unavailability of equipment. Provide temporary power as necessary.
2. MCC-A Replacement (Phase B) – Provide all labor, equipment and materials needed to remove and replace the existing Motor Control Center (MCC) including motor controllers, main and feeder breakers, concrete pads, conduit and wiring and replacing with a new MCC, with main and feeder breakers, new solid state motor starters, replacement of all cable runs between switchgear, MCC and motors. In addition, provide new NEMA 3R portable generator connection. Contractor to field research and verify all ancillary control requirements to insure motor starters have the correct relays and times for any equipment associated with them. All power and control wiring is to be traced, intercepted, replaced or removed as required

to perform the work. All unused or unneeded wiring and conduit will be removed. Work shall include all necessary demolition equipment and staging to avoid unnecessary shutdowns and to limit unavailability of equipment. Contractor shall be responsible to provide temporary power as necessary.

3. Provide all labor, equipment and materials needed to construct and install a prefabricated metal building as specified or shown on the Drawings.
 4. Furnish and install all instruments, controls, and instrumentation including, but not limited to: all equipment provided by equipment manufacturers, changes to the facility's existing programmable logic controller (PLC), radio telemetry system and HMI screens, associated above and below ground power and signal conduit, programming, all power and signal wiring needed for all instruments and instrumentation systems, antenna wiring, and all other associated components as specified or as shown on the Drawings for a complete, tested, and fully operational system. Contractor shall employ HSQ for any HMI screen modifications.
 5. The Contractor shall be responsible for startup, testing and training associated with all equipment provided, unless specifically stated in which case the Contractor shall be responsible for coordinating with, and assisting the equipment manufacturer/supplier to whatever extent is deemed necessary by the Owner, Engineer or equipment supplier.
- C. The Contractor shall furnish all shop drawings, working drawings, labor, materials, equipment, tools, services and incidentals necessary to complete all work required by this Scope of Work and as shown on the Contract Drawings.
- D. The Contractor shall perform the work complete, in place and ready for continuous service continuous service and shall include any repairs, replacements, and/or restoration required as a result of damages caused prior to acceptance by the Owner and Engineer.
- E. The Contractor shall furnish and install all materials, equipment and labor which is reasonable and properly inferable and necessary for the proper completion of the work, whether specifically indicated in the Contract Documents or not.

B.02 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. Only one project completion schedule based on **270 calendar days** shall be considered.

B.03 LIQUIDATED DAMAGES

If the successful bidder fails to achieve Substantial Completion of the Work within the Contract Time and as otherwise required by the Contract Documents, the Owner shall be entitled to retain or recover from the successful bidder, as liquidated damages and not as a penalty, the sum of **\$1,742.00** 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 Owner will incur as a result 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 successful bidder under this Agreement. Any liquidated damages not so deducted from any unpaid amounts due the successful bidder 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.

B.04 CONTRACT CONTINGENCY WORK

Contract contingency is a monetary allowance used solely at Owner's discretion to handle unexpected conditions as required to satisfactorily complete the Work in accordance with the IFB documents. A Field Directive must be issued by an authorized Owner 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 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.

END OF SECTION B

SECTION C
BID SUMMARY

C.01 **MINIMUM QUALIFICATIONS OF BIDDERS**

No person who is not certified or registered as an Electrical Contractor pursuant to Chapter 489, Florida Statutes, on the day the bid is submitted, and who has continuously held that certification or registration for a period of at least five (5) consecutive years immediately prior to the day the bid is submitted, may be qualified to bid on this Work. In the event that a bidder is a business organization, including a partnership, corporation, business trust or other legal entity as set forth in Section 489.119(2), Florida Statutes, then the bidder shall only be qualified to bid on this Work if: 1) the bidder (the business organization) is on the day the bid is submitted, and for at least five (5) consecutive years immediately prior to the day the bid is submitted has been, in continuous existence, properly licensed and registered as required by Florida law; and 2) the 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 the bidder for a period of at least five (5) consecutive years immediately prior to the day the bid is submitted.

Electric Contractor shall self-perform over 60 percent of the total labor work using his own workforce.

C.02 **BASIS OF AWARD**

Award shall be to the lowest, responsive, responsible bidder meeting specifications and having the lowest total offer based on a 270 calendar day construction time period as set forth in this IFB. Bid prices shall include costs for furnishing all labor, equipment and/or materials for the completion of the Work in accordance with and in the manner set forth and described in the IFB documents to Owner's satisfaction within the prescribed time.

One (1) Work Schedule for completion of Work shall be considered. Bid received for completion by the specified stated time shall be offered as a "total offer".

NOTE: Inspection of the site is a pre-requisite to be considered for award of this bid.

A site inspection is scheduled to immediately follow the Information Conference. Bidders who are unable to inspect the Project Site following the Information Conference shall contact Mr. Kirk Cameron, Utilities Water Maintenance Superintendent at 941-746-3020, Extension 5028 to make alternate arrangements. Site inspection is by appointment only. All Bidders shall be required to sign in at the Manatee County Water Treatment Plant.

Location: Manatee County Water Treatment Plant
17915 Waterline Service Road
Bradenton, FL 34212

In evaluating bids, Owner 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. Owner 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 bids are equal with respect to price, the bid received from a local business shall be given preference in award.

Whenever two or more bids are equal with respect to price, and all other evaluative factors are otherwise equal, including local preference policies, if the company provides documented environmentally preferable "green" products, materials, or supplies, they shall be given preference in award.

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

END OF SECTION C

BID FORM

For: IFB16-1455OV
Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant
17915 Waterline Service Road, Bradenton, FL
Project No.: (6025974 and 6025973)

Total Offer: \$ _____
Based on a completion time of <u>270</u> calendar days

We, the undersigned, hereby declare that we have carefully reviewed the IFB Documents in their entirety and with full knowledge and understanding of the aforementioned herewith submit this bid, meeting each and every specification, term, and condition contained therein.

One schedule for completion of the Work shall be considered. The bid for completion by the specified stated time shall be offered as a "total offer".

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

Communications concerning this bid shall be addressed as follows: **(Complete all fields)**

Bidder's Name: _____

Mailing Address: _____

Telephone: () _____ Fax: () _____

Email Address: _____

A bid bond, certified check, or cashier's check in the amount of 5% of the total bid offer is attached herein.

I, _____ on [date(s)] _____ attest that I have visited the project site(s) to familiarize myself with the full scope of work required for the bid.

Acknowledge Addendum No. _____ Dated: _____ Acknowledge Addendum No. _____ Dated: _____

Acknowledge Addendum No. _____ Dated: _____ Acknowledge Addendum No. _____ Dated: _____

Acknowledge Addendum No. _____ Dated: _____ Acknowledge Addendum No. _____ Dated: _____

Authorized Signature(s): _____

Name and Title of Above Signer(s): _____

Date: _____

BID FORM
(Submit in Duplicate)
IFB 16-1455OV

**Replacement of Two (2) Motor Control Centers at the Lake Manatee
Water Treatment Plant (Based on a completion time of 270 calendar
days)**

ITEM	DESCRIPTION	U/M	EST. QTY.	UNIT PRICE	EXTENDED PRICE
1	Mobilization / Demobilization for Raw Water MCC Replacement (Phase A) and MCC-A Replacement (Phase B)	LS	1	\$	\$
2	Raw Water #2 MCC Replacement (Phase A)				
2a.	Walk-in Electrical Equipment	LS	1	\$	\$
2b.	Demolition	LS	1	\$	\$
2c.	Instrumentation & Controls	LS	1	\$	\$
2d.	#2 Motor Control Center	LS	1	\$	\$
	SUB TOTAL BID ITEM 2a through 2d				\$
3	MCC-A Replacement (Phase B)				
3a.	Demolition	LS	1	\$	\$
3b.	Instrumentation & Controls	LS	1	\$	\$
3c.	Motor Control Center - A	LS	1	\$	\$
	SUB TOTAL BID ITEM 3a through 3c				\$

Bidder: _____

00300-2

IFB16-1455-OV

Authorized Signature: _____

BID FORM
 (Submit in Duplicate)
IFB 16-1455OV

Replacement of Two (2) Motor Control Centers at the Lake Manatee Water Treatment Plant (Based on a completion time of 270 calendar days)

ITEM	DESCRIPTION	U/M	EST. QTY.	UNIT PRICE	EXTENDED PRICE
4	Sole Source Programming Services Allowance (HSQ)	LS	1	\$5,000.00	\$5,000.00
	TOTAL BASE BID				\$
5	CONTRACT CONTINGENCY (Used only with County Approval)	%	10		\$
	TOTAL CONTRACT AWARD (Including Contract Contingency) Replacement of Two (2) Motor Control Centers at the Lake Manatee Water Treatment Plant) (Based on a completion time of 270 calendar days)				\$

Bidder: _____

Authorized Signature: _____

MAILING LABEL

Cut along the outside border and affix this label to your sealed bid envelope to identify it as a "Sealed Bid". Be sure to include the name of the company submitting the bid and the bid due date and time where requested.

MAILING LABEL TO AFFIX TO OUTSIDE OF SEALED BID PACKAGE:

BIDDER: _____

INVITATION FOR BID No.: IFB16-1455OV

**BID TITLE: Replacement of Two (2) Motor Control Centers at
Lake Manatee Water Treatment Plant, Bradenton, FL.**

**Bid Location: Manatee County Administration Building, 1112
Manatee Avenue West, Suite 803, Bradenton, FL**

Project No; Project No. 6025974 and 6025973)

DUE DATE/TIME: July 13, 2016 at 3:00 PM

SECTION D (IFB16-1455OV)

**Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant
(Project No. 6025974 and 6025973)**

INSURANCE AND BONDING REQUIREMENTS

The successful bidder will not commence Work under the resulting Agreement until all insurance under this section, and such insurance coverage as might be required by Owner, has been obtained. The successful bidder shall obtain, and submit to the Purchasing Division within ten (10) calendar days from the date of notice of intent to award, at his expense, the following minimum amounts of insurance (inclusive of any amounts provided by an umbrella or excess policy):

Insurance / Bond Type	Required Limits
1. <input checked="" type="checkbox"/> Automobile Liability:	Coverage for any owned, non-owned, hired or borrowed automobiles in the following minimum amounts: <u>\$1,000,000</u> (one million dollars) Bodily Injury (per person/per accident) <u>\$1,000,000</u> (one million dollars) Property Damage <u>\$2,000,000</u> (two million dollars) combined single limit (in lieu of above split limits) <u>\$10,000</u> (ten thousand dollars) Personal Injury Protection (no fault) <u>\$100,000</u> (one hundred thousand dollars) Hired-Non Owned Liability <u>\$10,000</u> (ten thousand dollars) Medical Payment <i>This policy shall contain severability of interests' provisions.</i>
2. <input checked="" type="checkbox"/> Commercial General Liability: (Occurrence Form - patterned after the current ISO form)	Bodily Injury and Property Damage \$ <u>2,000,000</u> single limit per occurrence; \$ <u>4,000,000</u> aggregate This shall include products/completed operations, products liability, contractual liability, personal and advertising injury, personal injury, bodily injury, death, and third-party property damage <i>This policy shall contain severability of interests' provisions.</i>
3. <input checked="" type="checkbox"/> Employer's Liability:	Coverage in the following minimum amounts: <u>\$100,000</u> (one hundred thousand dollars) Bodily Injury By Accident Each Employee Each Accident <u>\$100,000</u> (one hundred thousand dollars) Bodily Injury Each Employee By Disease <u>\$500,000</u> (five hundred thousand dollars) Bodily Injury Aggregate By Disease.
4. <input checked="" type="checkbox"/> Worker's Compensation:	Statutory Limits of Chapter 440, Florida Statutes, and all Federal Government Statutory Limits & Requirements
5. <input checked="" type="checkbox"/> Other Insurance, as noted:	a. <input type="checkbox"/> Aircraft Liability

Insurance / Bond Type	Required Limits
	<p>\$ _____ per occurrence</p> <p>Coverage shall be carried in limits of not less than \$5,000,000 each occurrence if applicable to the completion of the services under this Agreement.</p> <p>b. <input checked="" type="checkbox"/> Installation Floater</p> <p>If the resulting Agreement does not include construction of or additions to above ground building or structures, but does involve the installation of machinery or equipment, successful bidder shall provide an "Installation Floater" with the minimum amount of insurance to be <u>100% of the value</u> of such addition(s), building(s), or structure(s).</p> <p>c. <input type="checkbox"/> Maritime Coverage (Jones Act)</p> <p>\$ _____ per occurrence</p> <p>Coverage shall be maintained where applicable to the completion of the Work.</p>
	<p>d. <input type="checkbox"/> Pollution</p> <p>\$ _____ per occurrence</p> <p>e. <input type="checkbox"/> Professional Liability</p> <p>\$ _____ per claim and in the aggregate</p> <ul style="list-style-type: none"> • \$1,000,000 per claim and in the aggregate • \$2,000,000 per claim and in the aggregate <p>f. <input type="checkbox"/> Project Professional Liability</p> <p>\$ _____ per occurrence</p> <p>g. <input type="checkbox"/> Property Insurance</p> <p>\$ _____</p> <p>If the resulting Agreement includes construction of or additions to above ground buildings or structures, bidder shall provide "Builder's Risk" insurance with the minimum amount of insurance to be 100% of the value of such addition(s), building(s), or structure(s).</p> <p><i>To the extent that property damage is covered by commercial insurance, Owner and successful bidder agree to waive all subrogation rights against each other, except such rights as they may have to the proceeds of such insurance. Successful bidder shall require a similar waiver of subrogation from each of its bidder personnel and sub-consultants, to include Special Consultants; successful bidder shall provide satisfactory written confirmation to Owner of these additional waivers.</i></p> <p>h. <input type="checkbox"/> U.S. Longshoreman's and Harborworker's Act</p> <p>Coverage shall be maintained where applicable to the completion of the Work.</p>

Insurance / Bond Type	Required Limits
	i. <input type="checkbox"/> Valuable Papers Insurance \$ _____ per occurrence j. <input type="checkbox"/> Watercraft \$ _____ per occurrence
6. <input checked="" type="checkbox"/> Bid Bond:	Bid bond shall be <u>5% of the total offer</u> of the bid. Bid bond shall be submitted with the bid and shall include project name, location, and / or address and project number. In lieu of the bond, the contractor may file an alternative form of security in the amount of 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.
7. <input checked="" type="checkbox"/> Payment and Performance Bond:	Payment and Performance Bond shall be submitted by bidder for <u>100% of the award amount</u> and shall be presented to Manatee County within ten (10) calendar days of issuance of the notice of intent to award.

Reviewed by Risk: *Shirley D. Keating*

INSURANCE REQUIREMENTS

The amounts and types of insurance coverage shall conform to the minimum requirements set forth in this Exhibit, with the use of Insurance Services Office (ISO) forms and endorsements or their equivalents. If successful bidder has any self-insured retentions or deductibles under any of the listed minimum required coverage, successful bidder must identify on the certificate of insurance the nature and amount of such self-insured retentions or deductibles and provide satisfactory evidence of financial responsibility for such obligations. All self-insured retentions or deductibles will be successful bidder's sole responsibility.

Nothing herein shall in any manner create any liability of Owner in connection with any claim against the successful bidder for labor, services, or materials, or of Subcontractors; and nothing herein shall limit the liability of the successful bidder or successful bidder's sureties to Owner or to any workers, suppliers, material men or employees in relation to the resulting Agreement.

Builder's Risk Coverage. The successful bidder shall procure and maintain during the entire course of the Work a builder's risk policy, completed value form, insured to provide coverage on an all risk basis, including coverage for off-site stored materials and including coverage for theft. This coverage shall not be lapsed or cancelled because of partial Acceptance by the Owner prior to final Acceptance of the Project. Successful bidder shall recommend to Owner any additions to the Project Costs resulting from any casualty described in Article XII General Conditions of the Construction Agreement, including those costs, expenses and other charges (including normal and ordinary compensation to the successful bidder) necessary for reconstruction of the Project substantially in accordance with the Project Plans and Specifications. The nature, level and type of builder's risk coverage (including completed value or replacement cost coverage) shall be determined by Owner through insurers selected by successful bidder and approved by Owner.

Excess Policy or Umbrella. An excess policy or umbrella may be used to cover limits over and above Commercial General Liability.

Subcontractor's Public Liability and Property Damage Insurance. The successful bidder shall require each Subcontractor to procure and maintain during the term of the subcontract, insurance of the type specified above, or insure the activities of Subcontractors in its policy, as approved by Owner prior to performance of any services. The levels of coverage as set forth in the table above may be adjusted to require a reduced level of coverage consistent with the scope of Work to be provided by that particular Subcontractor. Any reduction in the levels of insurance coverage required by the successful bidder's standard form of subcontract shall be approved by the Owner.

Waiver of Subrogation. Owner and successful bidder waive against each other and the Owner's separate Vendors, Contractors, Design Consultants, Subcontractors agents and employees of each and all of them, all damages covered by property insurance provided herein, except such rights as they may have to the proceeds of such insurance. The successful bidder and Owner shall, where appropriate, require similar waivers of subrogation from the Owner's separate Vendors, Design Consultants and Subcontractors and shall require each of them to include similar waivers in their contracts.

Worker's Compensation Insurance. The successful bidder shall procure and maintain during the term of the Contract Documents, workers' compensation insurance for all its employees connected with the Work and shall require all Subcontractors similarly to provide workers' compensation insurance for all their employees unless such employees are covered by the protection afforded by successful bidder. Such insurance shall comply with the Florida Workers' Compensation Law. The successful bidder shall provide adequate insurance, satisfactory to Owner, for the protection of employees not otherwise protected.

By way of its submission of a bid hereto, bidder:

- a. Represents that bidder maintains, and will maintain during the term of any Agreement arising from this solicitation, all insurance coverage required herein from responsible companies duly authorized to do business under the laws of the State of Florida that hold a rating of "A-" or better by Best's Key Guide, latest edition, and are deemed acceptable to Owner as set forth in this solicitation.
- b. Agrees that insurance, as specified herein, shall remain in force and effect without interruption from the date of commencement of the Work throughout the duration of the Project, and shall remain in effect for at least two (2) years after the termination of the Contract Documents.
- c. Agrees that if the initial or any subsequently issued certificate of insurance expires prior to completion of the Work, successful bidder shall furnish to Owner renewal or replacement certificate(s) of insurance no later than ten (10) calendar days after the expiration date on the certificate. Failure of successful bidder to provide Owner with such renewal certificate(s) shall be considered justification for Owner to terminate any and all Agreements.
- d. Agrees that bidder and/or its insurance carrier shall provide thirty (30) days written notice to Owner of policy cancellation or non-renewal on the part of the insurance carrier or the successful bidder. Successful bidder shall also notify Owner, in a like manner, within twenty-four (24) hours after receipt, of any notices of expiration, cancellation, non-renewal or material change in coverage or limits received by successful bidder from its insurer and nothing contained herein shall relieve successful bidder of this requirement to provide notice. In the event of a reduction in the aggregate limit of any policy to be provided by

successful bidder hereunder, successful bidder shall immediately take steps to have the aggregate limit reinstated to the full extent permitted under such policy.

- e. Agrees that failure of successful bidder to obtain and maintain proper amounts of insurance at all times as called for herein shall constitute a material breach of the resulting Agreement, which may result in immediate termination.
- f. Agrees that, should at any time the successful bidder not maintain the insurance coverage(s) required herein, Owner may terminate the Agreement or at its sole discretion shall be authorized to purchase such coverage(s) and charge successful bidder for such coverage(s) purchased. If successful bidder fails to reimburse Owner for such costs within thirty (30) days after demand, Owner has the right to offset these costs from any amount due successful bidder under this Agreement or any other agreement between Owner and successful bidder. Owner shall be under no obligation to purchase such insurance, nor shall it be responsible for the coverage(s) purchased or the insurance companies used. The decision of Owner to purchase such insurance coverage(s) shall in no way be construed to be a waiver of any of its rights under the Contract Documents.
- g. Agrees to provide, upon request, the entire and complete insurance policies required herein.
- h. The payment of deductibles for insurance required of the successful bidder by the Contract Documents shall be the sole responsibility of the successful bidder.

Certificate of Insurance Requirements:

- a. Certificates of insurance in duplicate evidencing the insurance coverage specified herein shall be filed with the Purchasing Division before operations are begun. The required certificates of insurance shall name the types of policy, policy number, date of expiration, amount of coverage, companies affording coverage, and also shall refer specifically to the bid number and title of the Project, and must read: For any and all work performed on behalf of Manatee County.
- b. **Additional Insured:** The Automobile Liability and Commercial General Liability policies provided by the successful bidder to meet the requirements of this IFB shall name Manatee County, Board of County Commissioners, as an additional insured as to the operations of the successful bidder under this IFB and shall contain severability of interests provisions.
- c. In order for the certificate of insurance to be accepted it **must** comply with the following:
 - 1. The "Certificate Holder" shall be:
**Manatee County
Board of County Commissioners
Bradenton, FL
IFB16-1455OV, Replacement of Two (2) Motor Control Centers at Lake Manatee
Water Treatment Plant (Project No.6025974 and 6025973)
For any and all work performed on behalf of Manatee County.**
 - 2. Certificate shall be mailed to:
**Manatee County Purchasing Division
1112 Manatee Avenue West, Suite 803
Bradenton, FL 34205
Attn: Olga Valcich, CPPB, Contract Specialist**

BONDING REQUIREMENTS

Bid Bond/Certified Check. By submitting a bid to this IFB, the bidder agrees should the bidder's bid be accepted, **to execute the form of Agreement and present the same to Manatee County for approval within ten (10) calendar days after notice of intent to award.** The bidder further agrees that failure to execute and deliver said form of Agreement **within ten (10) calendar days** will result in damages to Manatee County and as guarantee of payment of same a bid bond/certified check shall be enclosed within the submitted sealed bid in the amount of five (5%) percent of the total amount of the bid. The bidder further agrees that in case the bidder fails to enter into an Agreement, as prescribed by Manatee County, the bid bond/certified check accompanying the bid shall be forfeited to Manatee County as agreed liquidated damages. If Owner enters into an Agreement with a bidder, or if Owner rejects any and/or all bids, accompanying bond will be promptly returned.

Payment and Performance Bonds. Prior to commencing Work, the successful bidder shall obtain, for the benefit of and directed to Owner, a Payment and Performance Bond satisfying the requirements of Section 255.05, Florida Statutes, covering the faithful performance by the successful bidder of its obligation under the Contract Documents, including but not limited to the construction of the Project on the Project Site and the payment and obligations arising thereunder, including all payments to Subcontractors, laborers, and materialmen. The surety selected by the successful bidder to provide the Payment and Performance Bond shall be approved by Owner prior to issuance of such Bond, which approval shall not be unreasonably withheld or delayed provided that **surety is rated A- or better by Best's Key Guide, latest edition.**

Failure to provide the required bonds on the prescribed form may result in successful bidder being deemed nonresponsive. Bonds must be in the form prescribed in Section 255.05, Florida Statutes, and must not contain notice, demand or other terms and conditions, including informal pre-claim meetings, not provided for in Section 255.05, Florida Statutes.

Surety of such bonds shall be in an amount equal to 100% of the Contract Price issued by a duly authorized and nationally recognized surety company, authorized to do business in the State of Florida, satisfactory to Owner. Surety shall be rated as "A-" or better by Best's Key Guide, latest edition. The attorney-in-fact who signs the bonds must file with the bonds, a certificate and effective dated copy of power-of-attorney. Payment and Performance Bonds shall be issued to Manatee County, a political subdivision of the State of Florida, **within ten (10) calendar days after notice of intent to award.**

In addition, pursuant to Section 255.05(1)(b), Florida Statutes, prior to commencing Work, the successful bidder shall be responsible and bear all costs associated to record the Payment and Performance Bond with the Manatee County Clerk of the Circuit Court. A certified copy of said recording shall be furnished to the Purchasing Division upon filing. Pursuant to Section 255.05(1)(b), Florida Statutes, Owner will make no payment to the successful bidder until the successful bidder has complied with this paragraph.

Furnishing Payment and Performance Bonds shall be requisite to execution of an Agreement with Owner. Said Payment and Performance Bonds will remain in force for the duration of the Agreement with the premiums paid by the successful bidder. Failure of the successful bidder to execute such Agreement and to supply the required bonds shall be just cause for cancellation of the award.

Owner may then contract with the next lowest, responsive and responsible bidder or re-advertise this IFB. If another bidder is accepted, and notice given within ninety (90) days after the opening of the bids, this Acceptance shall bind the bidder as though they were originally the successful bidder.

Failure of Owner at any time to require performance by the successful bidder of any provisions set out in the resulting Agreement will in no way affect the right of Owner, thereafter, to enforce those provisions.

BIDDER'S INSURANCE STATEMENT

THE UNDERSIGNED hereto have read and understand the aforementioned insurance requirements of this IFB and note that the evidence of insurability shall be required within ten (10) days from the date of notice of intent to award.

Bidder Name: _____ Date: _____

Bidder's Signature: _____

Print Name: _____

Insurance Agency: _____

Agent Name: _____ Agent Phone: _____

Please return this completed and signed statement with your bid.

BIDDER'S QUESTIONNAIRE

(Submit in Duplicate)

The 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. **Attach** a minimum of three (3) projects, municipal and / or industrial experience. Provide a brief description and / or similar work performed in excess of one million dollars. Detail your company's role in the performance of the project(s). Provide name of company, entity, contact information and phone number.

BIDDER: _____

13. If any, list MBE/DBE (with Agreement amount) to be utilized:

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

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

16. List the following in connection with 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: _____

BIDDER: _____

ATTACHMENT B
PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

SWORN STATEMENT PURSUANT TO ARTICLE V,
MANATEE COUNTY PROCUREMENT CODE

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.

ATTACHMENT B
PUBLIC CONTRACTING AND ENVIRONMENTAL CRIMES CERTIFICATION

(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 FLORIDA
COUNTY OF _____

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

Personally known _____ OR Produced identification _____
[Type of identification]

Notary Public Signature My commission expires _____

[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.

**ATTACHMENT C
SWORN STATEMENT
THE FLORIDA TRENCH SAFETY ACT**

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 IFB NO.16-14550V
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 Owner and Engineer, 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 Florida: _____

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

ATTACHMENT D: E PAYABLES 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 to:

Via email to: lori.bryan@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

Attachment E
VENDOR CERTIFICATION REGARDING
SCRUTINIZED COMPANIES LISTS

I am agent authorized by the company responding to this solicitation to make the following certification: I hereby certify that the company has reviewed Florida Statutes § 287.135, and that after such review, the company is not prohibited by the terms of that statute from entering into an agreement with Manatee County for the commodities and/or services which are the subject of this solicitation. I further acknowledge that my submission of a false certification may subject me and/or my company to civil penalties, attorney's fees, and/or costs.

Vendor Name: _____
Vendor FEIN: _____
Address: _____
City: _____ State: _____ Zip: _____
Certified by: _____
Who is authorized to sign on behalf of the company listed above.
Authorized Signature: _____
Print Name: _____
Title: _____
Date: _____

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

REPLACEMENT OF TWO (2) MOTOR CONTROL CENTERS AT LAKE MANATEE WATER TREATMENT PLANT

Prepared for
**BOARD OF COUNTY COMMISSIONERS
COUNTY OF MANATEE, FLORIDA**

COUNTY PROJECT NO. 6025974 AND 6025973



ISSUE FOR BID

February 2016

Prepared by



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

Received 5/11/16

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END TOC

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PROFESSIONAL ENGINEER'S CERTIFICATION FOR AUBREY HAUDRICOUT, P.E.

PROJECT NAME: MANATEE COUNTY PHASE A (RAW WATER #2 MCC REPLACEMENT) AND PHASE B (MCC-A REPLACEMENT)

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
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01740 Warranties & Bonds
01900 Permits

DIVISION 2 - SITEWORK

02050 Demolition
02220 Excavation, Backfill, Fill and Grading for Structures
02221 Trenching, Bedding and Backfill for Pipe
02260 Finish Grading

- 02276 Temporary Erosion and Sedimentation Control
- 02821 Chain Link Fences and Gates

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Aubrey Haudricourt, P.E.
Florida Professional Engineer No. 66861
McKim & Creed, Inc.
1365 Hamlet Avenue
Clearwater, Florida 33756

PROFESSIONAL ENGINEER'S CERTIFICATION FOR H.A. HOBI, P.E.

PROJECT NAME: MANATEE COUNTY PHASE A (RAW WATER #2 MCC REPLACEMENT) AND PHASE B (MCC-A REPLACEMENT)

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

03300 Cast-In-Place Concrete
03600 Grouting

DIVISION 5 - METALS

05050 Metal Fastenings
05500 Walk in Electrical Equipment Enclosure

H.A. Hobi, P.E.
Florida Professional Engineer No. 59360
McKim & Creed, Inc.
3903 Northdale Blvd. Suite 140W
Tampa, Florida 33624

END OF SECTION

SECTION 01005 GENERAL REQUIREMENTS

PART 1 GENERAL

1.01 SCOPE AND INTENT

A. Description

Work shall be constructed under one prime Electrical Contractor. Electrical Contractor shall hold a Certified Electrical Contractor license in the State of Florida and self-perform over 60 percent of the total labor work using their own workforce. Electrical Contractor shall have a minimum of over 5 years municipal and/or industrial experience, new construction or improvements, and thus have successfully executed these types of contract(s) with individual value(s) in excess of one million dollars. Such experience to be verified during bid selection. Electrical contractor shall supply and install all electrical equipment. The Electrical Contractor may elect to subcontract out the site/civil, structural, or instrumentation and controls portion of this contract.

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 FDEP Environmental Resource 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 Owner and Engineer, 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 Contractor shall pay all charges of utility service companies for the connections to the work. Additionally, the Contractor is responsible for coordinating with the utility service companies during construction. Other than power provided by the Owner to operate the existing water treatment facility, the Contractor is responsible for payment for electricity, sewer, water and any other utilities need for construction.

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 provide and maintain such modern plant, tools, and equipment as may be necessary, in the opinion of the Engineer, to perform in a satisfactory and acceptable manner all the work required by this Contract. Only equipment of established reputation and proven efficiency shall be used. The Contractor shall be solely responsible for the adequacy of his workmanship, materials and equipment, prior approval of the Engineer notwithstanding.

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 Engineer. 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 Engineer. 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 Owner 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 Owner 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 Engineer, 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 Owner or Engineer, 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 Owner 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 Engineer.

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 Engineer, 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 Engineer and will be provided 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 Engineer, 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 Engineer, should such errors or omissions be discovered. All schedules are given for the convenience of the Engineer 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 and shall be included at no additional cost to the Owner. Work not specified either in 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 Owner, that the manufacturer or subcontractor deal directly with the Owner. 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 Engineer 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 Engineer 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, unless otherwise specified.

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 Owner, such engineer or superintendent shall make all necessary adjustments and tests to prove that such equipment is in proper and satisfactory operating condition, and shall instruct such personnel as may be designated by said engineer 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 Owner 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 Engineer 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 Engineer 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 Owner.

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 Owner formally takes over the operation thereof.

B. Costs

All inspection and testing of materials furnished under this Contract will be performed by the Owner 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 Owner for compliance. The Contractor shall reimburse the Owner 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 Engineer, 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 Engineer may elect to have a representative present at such times during the manufacture as may be necessary to inspect the materials. The Contractor must comply with these

provisions before shipping any material. If inspection is made, 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 Engineer 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 Engineer 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 Owner. 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 Engineer 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 Owner, 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 Owner 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 Owner 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 Engineer 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 Engineer, provide a suitable temporary fence which shall be maintained until the permanent fence is replaced. The Engineer shall be solely responsible for the determination of the necessity for providing a temporary fence and the type of temporary fence to be used. In addition, temporary fencing may be required around staging area(s) and active construction areas. No additional payment will be made for temporary fencing that is required.

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.

B. Power Supply

Electricity as may be required for construction shall be coordinated with the Utility, secured and purchased by the Contractor. Refer to Section 01030 for permanent power requirements.

C. Water and Sewer

The contractor shall coordinate with the County on potable water supply. The contractor shall make connection and install meter at the County approved location(s) at the Contractor's expense. Contractor is responsible for the of supply sanitary facilities during construction. Sewer service is not available onsite.

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 Owner/Engineer. 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.

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 Engineer, 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 Engineer. This does not preclude conforming to the requirements of the insurance underwriters. Copies of surveys, photographs, reports, etc., shall be given to the Engineer.

Prior to the beginning of any excavations, the Contractor shall advise the Owner/Engineer 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 Owner may order the Contractor, for the convenience of the Owner, to remove trees along the line or trench excavation. If so ordered, the Owner 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 Engineer. 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 Owner/Engineer 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 Engineer, 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 Engineer 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 to be performed under these Contract Documents consists of the replacement of two separate motor control centers at the Lake Manatee Water Treatment Plant, inclusive of all equipment, materials and work required for a complete, tested and fully operational system. Work shall be constructed under one prime Electrical Contractor. Electrical Contractor shall hold a Certified Electrical Contractor license in the State of Florida and self-perform over 60 percent of the total labor work using their own workforce. Electrical Contractor shall have a minimum of 5 years municipal and/or industrial experience, new construction or improvements, and thus have successfully executed these types of contract(s) with individual value(s) in excess of one million dollars. Such experience to be verified during bid selection. Electrical contractor shall supply and install all electrical equipment. The Electrical Contractor may elect to subcontract out the site/civil, structural, or instrumentation and controls portion of this contract.
- B. A general description of the work is provided below solely to assist the Contractor in preparing his Bid and does not purport to include all of the equipment, materials and work required for the Contract. The description includes, but is not limited to the following:
1. MCC-A Replacement - Provide all labor, equipment and materials needed to remove and replace the existing Motor Control Center (MCC) including motor controllers, main and feeder breakers, concrete pads conduit and wiring, and replacing with a new MCC, with main and feeder breakers, new solid state motor starters, replacement of all cable runs between switchgear, MCC and motors. In addition provide new NEMA 3R portable generator connection. Contractor to field research and verify all ancillary control requirements to insure motor starters have the correct relays and timers for any equipment associated with them. All power and control wiring is to be traced, intercepted, replaced or removed as required to perform the work. All unused or unneeded wiring and conduit will be removed. Work shall include all necessary demolition equipment and staging to avoid unnecessary shutdowns and to limit unavailability of equipment. Provide temporary power as necessary.
 2. Raw Water #2 Pumping Station - Provide all labor, equipment and materials needed to remove and replace the existing MCC including motor controllers, main and feeder breakers, concrete pads conduit and wiring, and replace them with a pre-fab electrical building hurricane rated including new MCC with main and feeder breakers, new solid state motor starters, replacement of all cable runs between main transformer, MCC and motors. In addition provide new NEMA 3R portable generator connection. All power and control wiring is to be traced, intercepted, replaced or removed as required to perform the work. All unused or

unnecessary wiring and conduit will be removed. Work shall include all necessary demolition equipment and staging to avoid unnecessary shutdowns and to limit unavailability of equipment. Provide temporary power as necessary.

3. Provide all labor, equipment and materials needed to construct and install a prefabricated metal building as specified herein or shown on the Drawings.
4. Furnish and install all instruments, controls, and instrumentation including, but not limited to: all equipment provided by equipment manufacturers, changes to the facility's existing programmable logic controller (PLC), radio telemetry system, and HMI screens, associated above and below ground power and signal conduit, programming, all power and signal wiring needed for all instruments and instrumentation systems, antenna wiring, and all other associated components as specified herein or as shown on the Drawings for a complete, tested, and fully operational system. Contractor shall employ HSQ for any HMI screen modifications. Contractor shall refer to Specifications.
5. The Contractor shall be responsible for startup, testing and training associated with all equipment provided, unless specifically stated herein testing and training, in which case, the Contractor shall be responsible for coordinating with, and assisting the equipment manufacturer/supplier to whatever extent is deemed necessary by the Owner, Engineer or equipment supplier.

The list above is not, and does not purport to be, a complete listing of the labor, equipment and materials needed and is provided only as a general summary of work included. The work is further described within these Specifications or as shown on the Drawings.

- 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 Owner and Engineer.
- 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 CONSTRUCTION AREAS

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

to allow for:

1. Work by other Contractors.
 2. Owner's Use.
 3. Public Use.
- B. Coordinate use of work site under direction of Owner'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 Owner or separate Contractor.
- E. Obtain and pay for the use of additional storage of work areas needed for Contractor operations.

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 Engineer 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 Engineer to give such order shall in no way relieve the Contractor of his obligations to secure the quality of the work and rate of progress required.

1.02 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 Engineer reserves the right to make such modifications in locations as may be found desirable to avoid interference with existing structures or for other reasons.

1.04 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 Engineer 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 Engineer 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 Engineer 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 Engineer, permanent relocation of a utility owned by the Owner is required, he 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 Owner will notify the utility to perform the work as expeditiously as possible. The Contractor shall fully cooperate with the Owner 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 Engineer.

- 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 Engineer 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 Engineer. 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 Engineer.
- 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 Engineer and Owner.
- 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 Engineer and Owner 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 Engineer.

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 Engineer. 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 Engineer and Owner. 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 Owner.

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 Owner 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

- A. Upon notice of award, the Contractor shall immediately apply for and/or obtain all applicable permits not previously obtained by the Owner for the work associated with this Contract from the appropriate governmental agency or agencies as specified in Section 01900 - Permits. Unless authorized by the Owner, no work shall commence until all permits required for the project have been obtained and copies provided to the Owner and Owner's Representative. The Contractor shall be responsible for all costs, application fees, coordination, submittals and all other work required to obtain the permits.

1.02 CONNECTIONS TO EXISTING SYSTEMS

- A. The Contractor shall perform all work necessary to locate, excavate, and prepare for connections to the existing systems, as shown on the Drawings or where directed by the Owner or Owner's Representative. The cost for this work and for the actual connection to the existing systems shall be included in the Base Bid for the project and shall not result in any additional cost to the Owner.

1.03 RELOCATIONS, REMOVAL, AND ABANDONMENT

- A. As part of the cost included in his Bid, the Contractor shall include all work, material, equipment, labor and coordination needed for the relocation, removal, and abandonment of existing facilities that interfere with the positioning of the work as shown on the Drawings.

1.04 EXISTING UNDERGROUND PIPING, STRUCTURES AND UTILITIES

- A. The attention of the Contractor is drawn to the fact that the Lake Manatee Water Treatment Plant (WTP) site contains numerous underground piping, conduit, ductbanks, and other utilities, which have been depicted, based on the information available during preparation of the Contract Documents. As such, structures and underground utilities that are not shown on the Contract Drawings are likely to be encountered during excavation and construction. The Contractor shall exercise extreme caution before and during excavation to locate and flag these lines to avoid damage to the existing lines. Cost for relocation of all existing piping, structures and utilities needed for the Project shall be included in the Base Bid for the project. Should damage occur to an existing underground utility, the Contractor shall bear the cost of all repairs to said utility.
- B. Before any piping and utilities not shown on the Drawings are disturbed, the Contractor shall notify the Owner or Owner's Representative of the location of the pipeline or utility and shall reroute or relocate the pipeline or utility as directed.
- C. The Contractor shall exercise care in any excavation to locate all existing piping

and utilities. All utilities which do not interfere with completed 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.

- D. Existing piping and other underground utilities - Special attention is noted for the number of, and general locations of, existing underground utilities. Contract Drawings depict, based on the information available during preparation of the Drawings, approximate locations of the known underground utilities. The Drawings do not purport to depict actual locations of all underground utilities. The Contractor shall anticipate and include in his Base Bid, all work necessary to expose, identify, relocate, abandon, and/or remove underground utilities needed for Construction. In some locations, the Contractor may need to hand dig or utilize specialized equipment to expose underground utilities to avoid damage.
- E. Extreme caution shall be exercised while locating and performing construction activities in the vicinity of existing natural gas piping.

1.05 SUSPENSION OF WORK

- A. During inclement weather, all work which might be damaged or rendered inferior by such weather conditions shall be suspended. The orders and decisions of the COUNTY as to suspensions shall be final and binding. During suspension of the work from any cause, the work shall be suitably covered and protected so as to preserve it from injury by the weather or otherwise; and, if the COUNTY shall so direct, rubbish and surplus materials shall be removed.

1.06 HURRICANE PREPAREDNESS PLAN

- A. Within 30 days of the date of Notice to Proceed, the Contractor shall submit to the Owner and Owner's Representative, a Hurricane Preparedness Plan. The plan should outline the necessary measures which the Contractor proposes to perform at no additional cost to the Owner in case of a hurricane warning
- B. In the event of inclement weather, or whenever Owner or Owner's Representative 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 Owner's or Owner's Representative, 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

- A. Electricity as may be required for construction and permanent power supply needed for operation of all work for fully operational facility shall be coordinated with the Utility, secured, and purchased by the Contractor.

1.08 CONSTRUCTION CONDITIONS

- A. 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.

1.09 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 comply with all applicable state and local codes and ordinances. Sound levels in excess of those listed in said codes and ordinances are sufficient cause to have the work halted until equipment can be quieted to these levels. Work stoppage by the Owner for excessive noise shall not relieve the Contractor of the other portions of this specification including, but not limited to contract time and contract price.
- C. No extra charge may be made for time lost due to work stoppage resulting from the creation of a public nuisance.

1.10 ADDITIONAL PROVISIONS

- A. Connections to, and integration of new facilities that will involve the existing WTP shall be coordinated with the Owner at least 14-calendar days in advance.
- B. The Contractor shall provide, at his own expense, all necessary temporary facilities to provide access to and for protection of, all existing facilities. The Owner'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 directed by the Owner or Owner's Representative.
- C. Contractor shall provide protective matting, fuel containment and all other materials, equipment and labor during construction. Any spill of fuel, hydraulic fluid, or oil shall be contained. Any contaminated soil shall be removed and disposed of according to all applicable federal, state and local regulations, entirely at the Contractor's expense. Contractor shall, prior to beginning construction, submit a "Fueling Spill Prevention Plan" that shall clearly indicate how fuel spills will be prevented.

1.11 MAINTENANCE OF OPERATIONS FOR EXISTING FACILITIES

- A. Prior to beginning construction, the Contractor shall submit a Construction Sequencing and Phasing Plan for review and approval. The Plan shall include sufficient detail to indicate key activities, durations of key activities, and sequencing/phasing to illustrate the following (at a minimum):

1. How operations of the existing facilities will be maintained during construction;
2. Planned shutdowns of existing treatment facility and durations of shutdowns
3. Mitigation of planned system shutdowns for systems unavailable to be taken off line.

Other than mobilization, no work will be allowed on the site until the Construction Sequencing and Phasing Plan is approved by the Owner and the Owner's Representative.

- B. Any power outage or any work, which requires interruption of the plant flow, shall be scheduled during those times of the day and/or night when potable water demands are low. In such cases, the Contractor shall submit a written request at least 14-calendar days prior to the scheduled work or outage and obtain the written permission from the Owner. The Contractor shall coordinate with the electric utility, as required, regarding the scheduling of the power outages.
- C. The Owner's personnel shall be responsible for the day-to-day operations of the existing WTP, including meter reading, process monitoring, and establishing control system modifications to ensure compliance with the potable water quality standards.
- D. The Contractor shall consider the following scheduling criteria and constraints to assist with the development of the construction and phasing schedule.
 1. Throughout construction, the use of all systems shall remain at a level of service existing prior to construction.
- E. All existing electrical underground services in the vicinity of the Project shall be located and identified prior to starting any new construction
- F. Other work, including new construction and demolition not mentioned in the above schedule may be performed concurrently with the work as long as the performance of such work will in no way jeopardize the continuity and quality of treatment operations at the existing facility, and as submitted and approved by the Owner and Owner's Representative. Nothing contained herein shall preclude the Contractor from suggesting improved sequences of work. The Contractor shall coordinate his work closely with the ongoing functions of the existing treatment facility, chemical and other deliveries and with the work of all subcontractors.

1.12 OPERATIONS DURING CONSTRUCTION

- A. Maintenance of operations of the existing WTP (including current level of service for the on-site wastewater system) is critical. All means, methods and costs to maintain the operations (as specified herein) of said facility shall be included in

the Contractor's Base Bid.

The Contractor is responsible for coordinating with plant staff to perform all required construction, while maintaining operations of the existing WTP as Specified herein.

- B. To minimize impacts not only to the WTP but to the County's water system, the Contractor shall be required to comply with the following requirements during construction:
 - 1. Activities that will require partial shutdown of either surface water treatment plant train (BASIN "A" or BASIN "B") shall not exceed 24 hours each, and shall be limited to three (3) shutdowns during the course of this Contract, unless written approval is received by the Owner. Contractor shall provide written notification at least 14 calendar days prior to any and all activities prior to shutdown(s).
 - 2. Activities that require a temporary shutdown of both SEDIMENTATION BASIN "A" and SEDIMENTATION BASIN "B" shall not exceed 2-hours each, and shall be limited to a maximum of two (2) shut-downs during the Course of this Contract. Contractor shall provide written notification of proposed shutdown at least 14-calendar days prior to said event. No shutdowns will be allowed without written permission of the Owner. It may be necessary to reschedule the shutdown due to the unforeseen circumstances and the Owner's need to produce potable water. In the event that the Owner must reschedule the shutdown, the Owner will notify the Contractor of the need to reschedule.
- C. In addition to the previous requirements, Table 01030-1 provides information for some of the anticipated electrical shutdowns.

TABLE 01030-1 ELECTRICAL SHUT-DOWN INFORMATION				
Shut-down No.	Area	Equipment	Constraints	Maximum Duration
1	Control Building	A-MCC-1 & 2 Entire MCC	All sub fed power panels and required equipment must have temporary power connected for duration of MCC replacement. Transfer Pumps can be off-line. Surface and Backwash Water pumps must be kept operational.	Two weeks
2	Control Building	New MCC- 1A	During Start up and Testing, multiple shutdowns of connected equipment.	Two Weeks
3	Control Building	Existing Equipment connected to A-MCC-1&2	During tracing of power & control wiring, multiple shutdowns connected equipment. (Short duration <1hr)	One Week
4	Raw Water PS#2	Existing MCC	Coordinate shutdown and removal with County. Provide connection to one Raw Water Pump for Emergency Pumping if necessary.	Three Weeks

1.13

CONTRACTOR'S RESPONSIBILITY FOR AUTOCAD RECORD DRAWINGS

- A. Along with the expressed requirements in Section 01720 - Project Record Documents, the Contractor (or other professional hired by the Contractor) shall be entirely responsible and shall be required to perform all work associated with providing complete, updated electronic AutoCAD Drawings that incorporate all modifications from Construction activities associated with this Contract. These modifications include Civil, Mechanical, Electrical, HVAC, Instrumentation, Structural, Details, etc. Contractor shall adhere to the layering used in AutoCAD files provided to the Contractor by the Engineer of Record.
- B. AutoCAD Drawings shall be submitted to the Engineer along with documentation specified in Section 01720 - Project Record Documents, for review by the Engineer of Record and Owner.
- C. Engineer will review and provide comments to the Contractor. The Contractor

shall then address all comments and update AutoCAD Drawings to the satisfaction of the Owner and Engineer prior to issuance of Certificate of Substantial Completion. The Contractor shall note that the layering, line weights, etc. used by the Engineer of Record in preparation of the Contractor Drawings shall be used to develop the Contractor provided and updated, AutoCAD Record Drawings.

- D. In addition to the requirements set forth in Section 01720 - Project Record Documents, the Contractor shall provide seven (7) final, complete and approved AutoCAD Drawings, in CD-R format, to the Engineer of Record.

1.15 MAJOR EQUIPMENT STORAGE

- A. It is important to note that covered storage on-site is extremely limited and the Contractor should anticipate the need to store large equipment at secure off-site locations, in accordance with the manufacturers' storage requirements. Costs for all such storage shall be included in the Contractor's Base Bid.

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 Owner. Do not proceed with work until Owner 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. All survey work required in execution of Project.
 - 2. All costs of construction layout shall be included in the unit and lump sum prices contained in the respective divisions of the Contract Bid Form.
 - 3. Civil, structural or other professional engineering services specified or required to execute Contractor's construction methods.

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 approved by the Owner and paid for by the Contractor. The Contractor shall be responsible for the layout of all such lines and grades, which will be subject to verification by the Engineer.

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.
- C. Make no changes or relocations without prior written notice to Engineer.
- D. Report to Engineer when any reference point is lost or destroyed, or requires relocation because of necessary changes in grades or locations.
- E. Require surveyor to replace project control points which may be lost or destroyed.
- F. 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.

1.06 SUBMITTALS

- A. Submit name and address of Professional Surveyor and Mapper to Engineer for Owner's approval.
- B. Submit certificate signed by the Professional Surveyor and Mapper certifying that elevations and locations of improvements are in conformance, or nonconformance, with Contract Documents.

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 1791 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 Owner Utility Engineering 4410-B 66th St. W. Bradenton, FL 34210
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. All Work not specifically set forth as a pay item in the Bid Form shall be considered a subsidiary obligation of Contractor and all costs in connection therewith shall be included in the prices bid.
- 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 Owner 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 the 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 particular 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. As required in Specification 01370 - Schedule of Values; the Contractor shall be required to provide detailed breakdowns, for approval by the Owner and Engineer, of the lump sum totals.

1.07

UNIT PRICE ITEMS

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 Owner until as-built (record) drawings have been prepared by the Contractor and then submitted and approved by the Engineer.

1. Shop and Working Drawings.
2. Clearing, grubbing and grading except as hereinafter specified.
3. Trench excavation, including necessary pavement removal and rock removal, except as otherwise specified.
4. Dewatering and disposal of surplus water, materials, equipment, soils, and all other items needed for the project.
5. Tipping fees.
6. Structural fill, backfill, and grading.
7. Replacement of unpaved roadways, and shrubbery plots.
8. Cleanup and miscellaneous work.
9. Materials testing.
10. Testing and placing system in operation.
11. Any material and equipment required to be installed and utilized for the tests.
12. Spare parts.
13. Warrantees and guarantees.
14. Pipe, structures, pavement replacement, asphalt and shell driveways, mailboxes and/or appurtenances included within the limits of lump sum work, unless otherwise shown.
15. Maintenance of traffic.
16. Appurtenant work as required for a complete and operable system.
17. Sodding of areas affected by construction.
18. As-built Record Drawings.
19. Foundation and borrow materials, except as hereinafter specified.
20. Disinfection
21. Maintaining the operations of the existing facility during construction
22. Bacteriological sampling and testing.
23. Start-up
24. Demolition
25. Landscaping
26. Training by Manufacturer's Representative
27. Sediment and Erosion Control
28. Seeding and hydromulching

1.08 BID ITEMS

BID ITEM NO. 1 - MOBILIZATION/DEMOBILIZATION

Payment of the applicable lump sum price 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 Owner and Engineer 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 NO. 2 RAW WATER #2 MCC REPLACEMENT

Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to: **1) Walk In Electrical Equipment Enclosure:** all plant, labor, materials and equipment necessary to perform site work; concrete slab preparation, clear and grub the project areas as required; soil erosion and sediment control, excavation, fill, compaction, sodding, fencing, silt fencing as shown on the drawings and as otherwise required to construct and install the equipment enclosure and all other appurtenant work related to this lump sum pay item as presented in the Contract Documents. **2) Demolition,** removal and abandon existing structures, equipment, piping, valves, soil materials and all other items needed to be demolished or removed for installation of new facilities. Some of the items included in this Pay Item may include, but may not be limited to: removal of existing piping, fencing, conduit, power and signal wire, Motor Control Centers, ductbanks, concrete pads, building structures, pipe supports, junction boxes, valves and valve vaults, asphalt, abandonment of existing piping; and all appurtenant and ancillary items as indicated on the drawings; **3) Instrumentation and Controls:** to construct a complete control system including install, set-up, calibrate, program, integrate, and coordinate a complete instrumentation package as specified including all instruments, flow meters, PLC's, software and programming (except for sole-source programming services), fiber optic cable, transmitters, interface panels, programming terminal, and all appurtenances as shown on the plans and specifications; **#2 MCC:** and all plant, labor, materials and

equipment necessary to provide, connect and commission new MCC and all other equipment needed for a complete, tested, and fully operational system, whether or not shown on the Drawings or Specified herein.

BID ITEM NO. 3 MCC-A REPLACEMENT

Payment of the applicable lump sum price shall be full compensation for furnishing, but is not limited to: **1) Demolition:** removal and abandon existing structures, equipment, piping, valves, soil materials and all other items needed to be demolished or removed for installation of new facilities. Some of the items included in this Pay Item may include, but may not be limited to: removal of existing piping, fencing, conduit, power and signal wire, Motor Control Centers, ductbanks, concrete pads, building structures, pipe supports, junction boxes, valves and valve vaults, asphalt, abandonment of existing piping; and all appurtenant and ancillary items as indicated on the drawings; **2) Instrumentation and Controls:** to construct a complete control system including install, set-up, calibrate, program, integrate, and coordinate a complete instrumentation package as specified including all instruments, flow meters, PLC's, software and programming (except for sole-source programming services), fiber optic cable, transmitters, interface panels, programming terminal, and all appurtenances as shown on the plans and specifications; **MCC-A:** and all plant, labor, materials and equipment necessary to provide, connect and commission new MCC and all other equipment needed for a complete, tested, and fully operational system, whether or not shown on the Drawings or Specified herein.

BID ITEM NO. 4 - SOLE SOURCE PROGRAMMING ALLOWANCE

Payment of the applicable lump sum allowance shall be for programming and services provided by HSQ Technology (sole-source) as specified in Section 01010 and per HSQ Technology

BID ITEM NO. 5 - CONTRACT CONTINGENCY

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 Owner and Contractor.

1.02 FORMAT AND DATA REQUIRED

- A. Submit payment requests in the form provided by the Owner 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 Owner 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 Owner and Engineer.
- 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. Complete, detailed 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 Owner/Engineer 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 Owner'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 Owner, 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 Owner for approval. The Owner will distribute executed copies after approval by the Board of Owner Commissioners.

1.08 UNIT PRICE CHANGE ORDER

- A. Contents of Change Orders will be based on, either:
 - 1. Owner's definition of the scope of the required changes.
 - 2. Contractor's Proposal for a change, as approved by the Owner.
 - 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 Owner 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 Owner or Engineer 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. Owner's Engineer.
 - 2. Owner'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. Owner'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 Owner and accomplished in a logical order to maintain utilization and flow through existing facilities, public and private 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 Owner. 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 Owner. Such permission, however, may be revoked at any time by the Owner 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 Engineer to review Contractor's planning, scheduling, management and execution of the work; to assist Engineer 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 Owner 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 Engineer to review all submittals as set forth in the Contract Documents; items of work required of Owner 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 Owner.
- 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 Engineer, 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 Engineer. 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 Engineer 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 Owner, 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 Engineer and Contractor at a monthly schedule meeting and Contractor will address Engineer'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 Engineer 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. Engineer shall have 10 calendar days after receipt of the submittal to respond. Upon receipt of Engineer's comments, Contractor shall make the necessary revisions and submit the revised schedule within 10 calendar days. The resubmittal, if concurred with by Owner, 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 by Engineer and concurrence by Owner. 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 Engineer.

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 Engineer for review and approval: working drawings, shop drawings, test reports and data on materials and equipment (hereinafter in this section called data), 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.
- B. The Contractor is to maintain an accurate updated submittal log and will bring this log to each scheduled progress meeting with the Owner and the Engineer. This log should include the following items:
1. Submittal description and number assigned.
 2. Date to Engineer.
 3. Date returned to Contractor (from Engineer).
 4. Status of Submittal (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.

1.02 CONTRACTOR'S RESPONSIBILITY

- A. It is the duty of the Contractor to check all drawings, data and samples prepared by or for him before submitting them to the Engineer for review. Each and every copy of the Drawings and data shall bear Contractor's stamp showing that they have been so checked. Shop drawings submitted to the Engineer 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. 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.
 5. Cable type and wire identification numbering.

- C. The Contractor shall furnish the Engineer a schedule of Shop Drawing submittals fixing the respective dates for the submission of shop and working drawings, the beginning of manufacture, testing and installation of materials, supplies and equipment. This schedule shall indicate those that are critical to the progress schedule.
- D. 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 Engineer, with No Exceptions Taken or Approved As Noted.
- E. The Contractor shall submit to the Engineer 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 Engineer receives them.
- F. All material & product submittals, other than samples, shall be transmitted electronically as a pdf file. All returns to the contractor will be as a pdf file only unless specifically requested otherwise.
- G. 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 Engineer of the necessary Shop Drawings.

1.03 ENGINEER'S REVIEW OF SHOP DRAWINGS AND WORKING DRAWINGS

- A. The Engineer'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 Engineer, 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 Engineer finds to be in the interest of the Owner and to be so minor as not to involve a change in Contract Price or time for performance, the Engineer may return the reviewed drawings without noting any exception.
- D. When reviewed by the Engineer, 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 Engineer on previous submissions. The Contractor shall make any corrections required by the Engineer.
- F. If the Contractor considers any correction indicated on the drawings to constitute a change to the Contract Drawings or Specifications, the Contractor shall give written notice thereof to the Engineer.
- G. The Engineer 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 Engineer's actual payroll cost.
- H. When the Shop and Working Drawings have been completed to the satisfaction of the Engineer, the Contractor shall carry out the construction in accordance therewith and shall make no further changes therein except upon written instructions from the Engineer.
- I. No partial submittals shall be reviewed. Incomplete submittals shall be returned to the Contractor and shall be considered not approved until resubmitted.

1.04 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 Engineer 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 Engineer 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 Engineer will utilize the color "red" in marking shop drawing submittals.

1.05 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 Engineer where required by the Contract Documents or requested by the Engineer and shall be submitted at least thirty (30) days (unless otherwise specified by the Engineer) in advance of their being required for work.
- C. Working drawings shall be signed by a registered Professional Engineer, currently licensed to practice in the State of Florida and shall convey, or be accompanied by, calculation or other sufficient information to completely explain the structure, machine, or system described and its intended manner of use. Prior to commencing such work, working drawings must have been reviewed without specific exceptions by the Engineer, which review will be for general conformance and will not relieve the Contractor in any way from his responsibility with regard to the fulfillment of the terms of the Contract. All risks of error are assumed by the Contractor; the Owner and Engineer shall not have responsibility therefor.

1.06 SAMPLES

- A. The Contractor shall furnish, for the review of the Engineer, samples required by the Contract Documents or requested by the Engineer. Samples shall be

delivered to the Engineer as specified or directed. The Contractor shall prepay all shipping charges on samples. Materials or equipment for which samples are required shall not be used in work until reviewed by the Engineer.

- B. Samples shall be of sufficient size and quantity to clearly illustrate:
1. Functional characteristics of the product, with integrally related parts and attachment devices.
 2. Full range of color, texture and pattern.
 3. A minimum of two samples of each item shall be submitted.
- C. Each sample shall have a label indicating:
1. Name of 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 Engineer. 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 Engineer 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.

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 Engineer a Schedule of Values allocated to the various portions of the work, within 10 days after date of Notice to Proceed.
- B. The Contractor shall submit substantiating data to support the values 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 Engineer 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 these 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 Owner and Engineer 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 Engineer 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. Entry and exit to facilities where work is to be performed shall also be recorded in areas around gates, overhead signs, and any other areas that could be damaged by equipment transport. 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 produced, and one complete set shall be delivered to the Owner and the second complete set delivered to the Engineer on digital video disks (DVD) for the permanent and exclusive use of the Owner and Engineer 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 Engineer. In addition, no progress payments shall be made until the preconstruction video recordings are accepted by the Engineer.

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. Owner 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. Owner 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 Engineer may require the Contractor to provide statements or certificates from the manufacturers and fabricators that the materials and equipment provided by them are manufactured or fabricated in full accordance with the standard specifications for quality and workmanship indicated in the 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 Owner 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 Engineer.
- H. If the test results indicate the material or equipment complies with the Contract Documents, the Owner shall pay for the cost of the testing laboratory. If the tests and any subsequent retests indicate the materials and equipment fail to meet the requirements of the Contract Documents, the contractor 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 alert the Engineer who will consult with the Owner 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 Engineer 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. One 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 Owner.
 - 3. Names and titles of authorities as directed by Owner.
 - 4. Prime Contractor.
- B. Graphic design, style of lettering and colors: As approved by the Engineer and subject to approval by the Owner.
- C. Erect on the site at a lighted location of high public visibility, adjacent to main entrance to site, as approved by the Engineer and Owner

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

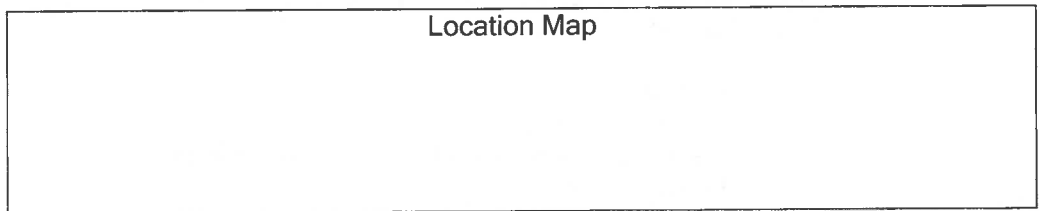
- A. Door Hangers: The Contractor shall generate and distribute door hangers to all residents who will be impacted by project construction.

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 XXXXX of, 20XX and be completed in XXXX of 20XX.



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

Contractor	Project Manager
Contractor Address	PM Address
Contractor Phone (Site Phone)	PM Phone No. & Ext.
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 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 Engineer.
 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 Engineer. 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 Engineer 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 all coordination needed for all equipment providers and 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.
 - b. Provide adequate ventilation to avoid condensation.
 - c. Prevent mixing of refuse or chemically injurious materials or liquids.
- C. 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 Engineer. The intent of this requirement is to reduce on-site storage time prior to installation and/or operation. Under no circumstances shall equipment be delivered to the site more than one month prior to installation without written authorization from the Engineer.
 - 2. All equipment having moving parts such as gears, electric motors, etc. and/or instruments shall be stored in a temperature and humidity

controlled building approved by the Engineer until such time as the equipment is to be installed.

3. All equipment shall be stored fully lubricated with oil, grease, etc. unless otherwise instructed by the manufacturer.
4. 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 Engineer and Owner 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 Engineer determines that the work is not substantially complete:
 - 1. The Engineer 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 Engineer.
 - 3. The Engineer shall re-inspect the work.
- E. When the Engineer finds that the work is substantially complete:
 - 1. The Engineer shall prepare and deliver to the Owner 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 Owner as provided in Conditions of the Contract. When the Engineer considers the work substantially complete, he will execute and deliver to the Owner and the Contractor 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 Owner's representative and are operational.
 5. The work is completed and ready for final inspection.
- B. The Engineer shall make an inspection to verify the status of completion after receipt of such certification.
- C. If the Engineer determines that the work is incomplete or defective:
1. The Engineer 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 Engineer that the work is complete.
 3. The Engineer shall re-inspect the work.
- D. Upon finding the work to be acceptable under the Contract Documents, the Engineer 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 Owner for the Engineer's fees.

1.04 CONTRACTOR'S CLOSEOUT SUBMITTALS TO ENGINEER

- 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 Engineer.
- 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 Owner 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 GENERAL

1.01 REQUIREMENTS INCLUDED

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

1.02 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.

1.03 MARKING DEVICES

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

1.04 AUTOCAD DRAWING UPDATES

- A. Contractor shall obtain AutoCAD Design Drawings from Engineer of Record and shall be entirely responsible for employing professionals and for updating all said AutoCAD Drawings during the course of construction in accordance with Section 1.05 - Recording in this Specification. Refer to Specification 01030 - Special Project Procedures for additional requirements.

1.05 RECORDING

- A. Label each document "PROJECT RECORD" in neat large printed letters.
- B. Record information concurrently with construction progress.

- C. Do not conceal any work until required information is recorded.
- D. Drawings; Legibly mark to record actual construction for all Drawings:
1. All underground and above ground 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.

- E. 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.
- F. Shop Drawings (after final review and approval):
 - 1. Five sets of record drawings for each process equipment, piping, electrical system and instrumentation system.

1.06 SUBMITTAL

- A. 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).
- B. 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 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.
- C. 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 2 STANDARDS

2.01 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 1.04 D above.

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 01730 OPERATIONS AND MAINTENANCE DATA

PART 1 GENERAL

1.01 REQUIREMENTS INCLUDED

- A. Compile product data and related information appropriate for Owner'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 Owner's personnel in maintenance of products and equipment and systems.
- C. Provide five (5) 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 Owner'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 **MANUALS FOR EQUIPMENT AND SYSTEMS**

- A. Submit four 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 and wiring labels. Coordinate field wiring identification and provide on vendor drawings. **Field wiring labels and drawings must match.** Refer to specification 16075 & 16120

Part 3 of both for more information.

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 Owner's personnel.
- D. 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 OWNER'S PERSONNEL

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

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 Engineer for review and transmittal.

1.02 WARRANTY PERIOD

- A. Warranty period shall commence on the date of construction substantial completion, and shall be three (3) years from date of substantial completion, unless a longer warranty period is specified in other Sections of these Specifications.
- B. In no case, shall the warranty period commence prior to the date when beneficial use is obtained by Manatee County.
- C. Refer to ARTICLE 9: WARRANTY, TEST/INSPECTION, CORRECTION for additional requirements.

1.03 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 Owner's personnel:
 - a. Proper procedure in case of failure.
 - b. Instances which might affect the validity of warranty or bond.
 - 7. Contractor, name of responsible principal, address and telephone number.

1.04

FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8-1/2 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.

1.05

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.

1.06

SUBMITTALS REQUIRED

- A. Submit warranties, bonds, service and maintenance contracts as specified in respective sections of Specifications.
- B. Approval by the Owner 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. 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. 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. Manatee County Building Permit (Application and Partial Payment submitted by McKim & Creed).

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02050 DEMOLITION

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. This section includes demolition, debris, abandoned in place and items to be salvaged as indicated on the Drawings and as specified herein.
- B. Demolition items consist of the following:
 - 1. Removal of existing MCC-RW#2 and associated equipment, as shown on drawings.
 - 2. Removal of existing A-MCC-1&2 and associated equipment, as shown on drawings.
 - 3. Removal of existing Plant Water Pump and associated equipment, as shown on drawings.

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, 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. Contractor to locate 42" raw water main and any other underground objects in the path of the proposed ductbank. Contractor to relocate ductbank and other proposed in ground items to avoid. If Contractor prefers, removal of the obstruction is allowed at no charge to

owner.

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.

2.02 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, 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 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.

2.03 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 3 EXECUTION

3.01 STRUCTURES AND BUILDINGS

- A. Remove all parts of existing structures to be demolished to a minimum depth of 3-ft below grade unless otherwise shown on the drawings. Structures left below grade shall be punctured to allow water to pass through and prevent flotation.

3.02 EQUIPMENT

- A. Completely remove equipment which is designated to be removed.
- B. Remove concrete equipment bases if the existing bases are not to be used for new equipment.
- C. Completely remove isolated equipment bases.

3.03 PIPING

- A. Completely remove piping, conduit, and wiring in structures and buildings which are to be demolished, partially demolished, and where otherwise designated to be removed as shown on the Drawings. When not indicated on the Drawings, the removal of said piping, conduit and wiring shall be a minimum of 5-feet from the outside of the structure or building. The Contractor shall schedule underground pipe removal and new pipe installation in order to minimize disruption of the

existing piping system and reduce bypass pumping.

- B. Underground piping, conduit, and wiring which are to be abandoned and do not interfere with new work may be left in place, unless otherwise shown on the Drawings. Plug and seal ends of underground piping to be abandoned. Do not leave abandoned branches of piping and wiring "live". Isolate abandoned branches by closing branch valve at main or by disconnecting branch at main. Plug, cap, and seal active branch at isolating valve or point of disconnection.
- C. Properly disconnect, seal and plug utility services to structures and buildings which are completely demolished. Properly disconnect, seal, and plug utility lines within structures and buildings which are partially demolished.

3.04 DISPOSAL

- A. Equipment, piping, and materials which are designated to remain the property of the Owner shall be moved to a location within the project site designated by the Owner.
- B. All removed equipment, piping, and materials not specifically designated to remain the property of the Owner shall become the property of the Contractor and shall be removed from the site and properly disposed of.
- C. Do not allow debris and rubbish to accumulate on the site. Remove debris and rubbish from the site.

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 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 Engineer.
- 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.

1.02 QUALITY ASSURANCE

- A. Testing Agency:
 - 1. In place soil compaction tests shall be performed by a qualified testing laboratory, as required at the WTP site, including structural foundation areas, backfill around structures, backfill over yard piping, etc.
 - 2. For the forcemain route, 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 Engineer.
- 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 shall be used for backfill.
- B. Crushed stone and shell shall meet or exceed current FDOT Standards.

2.02 UNSUITABLE MATERIAL

- A. 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 Engineer.

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 Engineer.
- 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 Engineer who will make an inspection of the excavation. No concrete or masonry shall be placed until the excavation has been approved by the Engineer.
- C. The elevations of the footing bottom and the base slab as shown on the Drawings, shall be considered as approximate and the Engineer 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 Engineer, 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 Engineer 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 Engineer 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 Engineer.
- C. Fill shall be placed in uniform layers not more than 12" thick and compacted to a minimum of 95 percent of the maximum dry density determined by ASTM D1557, or as directed by the Engineer. Soil types shall be as specified in the reference Geotechnical Reports. The Contractor shall securely tamp the backfill with pneumatic rammer around all wall foundations. The method of compaction shall be satisfactory to the Engineer.
- 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 Engineer.
- 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 Engineer.
 - 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 of the Modified Proctor maximum dry density in accordance with ASTM test D 1557-70T.

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 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 Owner. 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 Engineer. 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 Engineer. 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 Engineer 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 6" 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.
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 Engineer 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 Engineer 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 Engineer.
 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. For each material, the Contractor shall notify the Engineer of the source of the material and shall furnish the Engineer, for approval, a representative sample weighing approximately 50 pounds, at least ten calendar days prior to the date of anticipated use of such material.
2. Additional materials shall be furnished as required from off-site sources and hauled to the site.

B. 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. Structural fill material shall be a minimum of 60 percent clean sand, free of organic, deleterious and/or compressible material. Minimum acceptable density shall be 98 percent of the maximum density as determined by AASHTO T-180. Rock in excess of 2-1/2" in diameter shall not be used in the fill material. If the moisture content is improper for attaining the specified density, either water shall be added or material shall be permitted to dry until the proper moisture content for compaction is reached.

C. Common Fill

1. Common fill material shall be free from organic matter, muck or marl and rock exceeding 2-1/2" in diameter. Common fill shall not contain broken concrete, masonry, rubble or other similar materials. Existing soil may be used to adjust grades over the site with the exception of the construction area.
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 Engineer, is not suitable for reuse shall be spoiled as specified herein for disposal of unsuitable materials by the Contractor.

D. Crushed Stone

1. Crushed stone may be used for pipe bedding, manhole bases, as a drainage layer below structures with underdrains and at other locations indicated on the Drawings.
2. Crushed stone shall be size No. 57 with gradation as noted in Table 1 of Section 901 of Florida Department of Transportation, Construction of Roads and Bridges.

PART 3 EXECUTION

3.01 TRENCH EXCAVATION AND BACKFILLING

- A. Excavation for all trenches required for the installation of pipes and electrical ducts shall be made: 1) to the depths indicated on the Drawings; and/or 2) as required around existing utilities and structures; and/or 3) to maintain minimum cover requirements indicated on the Drawings; and/or 4) in such manner and to such widths as will give suitable room for laying the pipe or installing the ducts within the trenches.
- B. Rock shall be removed to a minimum 6" clearance around the bottom and sides of all the pipe or ducts being laid.
- C. Where pipes or ducts are to be laid in limerock bedding or encased in concrete, the trench may be excavated by machinery to or just below the designated subgrade provided that the material remaining in the bottom of the trench is no more than slightly disturbed.
- D. Where the pipes or ducts are to be laid directly on the trench bottom, the lower part of the trenches shall not be excavated to grade by machinery. The last of the material being excavated manually, shall be done in such a manner that will give a flat bottom true to grade so that pipe or duct can be evenly supported on undisturbed material. Bell holes shall be made as required.
- E. Backfilling over pipes shall begin as soon as practicable after the pipe has been laid, jointed and inspected and the trench filled with suitable compacted material to the mid-diameter of the pipe.

- F. Backfilling over ducts shall begin not less than three days after placing concrete encasement.
- G. All backfilling shall be prosecuted expeditiously and as detailed on the Drawings.
- H. Any space remaining between the pipe and sides of the trench shall be packed full by hand shovel with selected earth, free from stones having a diameter greater than 2" and thoroughly compacted with a tamper as fast as placed, up to a level of one foot above the top of the pipe.
- I. The filling shall be carried up evenly on both sides with at least one man tamping for each man shoveling material into the trench.
- J. The remainder of the trench above the compacted backfill, as just described above, shall be filled and thoroughly compacted by rolling, ramming, or puddling, as the Engineer may direct, sufficiently to prevent subsequent settling.

END OF SECTION

SECTION 02260 FINISHES 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

- A. 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 Owner.

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 Owner and Engineer.
- B. The Contractor shall cut out areas to sub-grade elevation to stabilize base material for paving and sidewalks.
- 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 Engineer. 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 02776 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 Engineer.
- 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 Engineer.
- 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 Engineer.
- B. Seed and sod.

2.02 SEDIMENTATION CONTROL

- A. Bales - clean, seed free cereal hay type.
- B. Netting - fabricated of material acceptable to the Engineer.
- 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 02821 CHAIN-LINK FENCES AND GATES

PART 1 GENERAL

1.01 SUMMARY

- A. This Section includes the following:
 - 1. Galvanized steel chain-link fabric.
 - 2. Galvanized steel framework.

1.02 SUBMITTALS

- A. Product Data: For each product indicated.
- B. Shop Drawings: Show locations, components, materials, dimensions, sizes, weights, finishes of components, installation and operational clearances, gate swings, and details of post anchorage and attachment and bracing.

PART 2 PRODUCTS

2.01 CHAIN-LINK FENCE FABRIC

- A. Steel Chain-Link Fence Fabric: Comply with Chain Link Fence Manufacturers Institute's "Product Manual."
 - 1. Mesh and Wire Size: 2-inch (50-mm) mesh, 0.148-inch (3.76-mm) diameter.
 - 2. Zinc-Coated Fabric: ASTM A 392, with zinc coating applied to steel wire mesh fabric after weaving with Class 1, 1.2-oz./sq. ft. (366-g/sq. m) minimum coating weight.
- B. Fabric Selvage: Twisted at top selvage and knuckled at bottom.

2.02 INDUSTRIAL FENCE FRAMING

- A. Round Steel Pipe: Standard weight, Schedule 40, galvanized steel pipe complying with ASTM F 1083. ASTM F 1043, Material Design Group IA, external and internal coating Type A, consisting of not less than 1.8-oz./sq. ft. (0.55-kg/sq. m) zinc; and line, end, corner, and pull posts and top rail as required for Heavy Industrial Fence.
- B. Post Brace Rails: Match top rail for coating and strength and stiffness requirements. Provide brace rail with truss rod assembly for each gate, end, and pull post. Provide two brace rails extending in opposing directions, each with truss

rod assembly, for each corner post and for pull posts. Provide rail ends and clamps for attaching rails to posts.

- C. Top Rails: With swaged-end or fabricated for expansion-type coupling.
- D. Intermediate Rails: Match top rail for coating and strength and stiffness requirements.
- E. Bottom Rails: Match top rail for coating and strength and stiffness requirements.

2.03 GATES

- A. Horizontal Slide Gates: Comply with ASTM F 1184 for single gates, made from pipe and tubing complying with ASTM F 1043, complete with hardware. Type: II Cantilever Slide, Class 1 with external roller assemblies.
 - 2. Frames and Bracing: Fabricate members from round galvanized steel pipe for the gate type, fabric height, opening width, and overhead clearance indicated.
 - a. Corners: Welded.

2.04 TENSION WIRE AND FITTINGS

- A. Metallic-Coated Steel Tension Wire: 0.177-inch- (4.5-mm-) diameter, marcelled tension wire complying with ASTM A 824 at locations indicated.
- B. Fittings: Provide fittings for a complete fence installation, including special fittings for corners. Comply with ASTM F 626.

2.05 CAST-IN-PLACE CONCRETE

- A. General: Comply with ACI 301 for cast-in-place concrete; materials consisting of portland cement complying with ASTM C 150, aggregates complying with ASTM C 33, and potable water.
 - 1. Concrete Mixes: Normal-weight concrete with not less than 3000-psi (20.7- MPa) compressive strength (28 days), 3-inch (75-mm) slump, and 1-inch (25-mm) maximum size aggregate.

PART 3 EXECUTION

3.01 INSTALLATION

- A. General: Install chain-link fencing to comply with ASTM F 567 and more stringent requirements indicated. Do not begin installation before final grading is completed, unless otherwise permitted by Architect.

- B. Post Excavation: Drill or hand-excavate holes for posts to diameters and spacings indicated, in firm, undisturbed or compacted soil.
- C. Post Setting: Hand-excavate holes for post foundations in firm, undisturbed or compacted soil.
 - 1. Concrete Footings: Place concrete around posts and vibrate or tamp for consolidation. Verify that posts are set plumb, aligned, and at correct height and spacing, and hold in position during placement and finishing operations until concrete is sufficiently cured. Set the following post types in concrete footings and protect portion of posts aboveground from concrete splatter:
 - a. Terminal.
 - b. Line; Using mechanical devices to set line posts per ASTM F 567 is not permitted.
 - c. Gate.
 - d. Gate operator mounting.
- D. Terminal Posts: Locate terminal end, corner, and gateposts per ASTM F 567 and terminal pull posts at changes in horizontal or vertical alignment of.
- E. Line Posts: Space line posts uniformly at 10 feet (3.05 m) o.c.
- F. Intermediate Rails: Install in one piece at post-height center span, spanning between posts, using fittings, special offset fittings, and accessories.
- G. Bottom Rails: Install, spanning between posts, using fittings and accessories.
- H. Chain-Link Fabric: Apply fabric to outside of enclosing framework.
- I. Tie Wires: Attach wire to chain-link fabric per ASTM F 626. Tie fabric to line posts at maximum interval of 12 inches (304 mm) o.c. and to braces at maximum interval of 24 inches (609 mm) o.c.
- J. Gate Installation: Install gates level, plumb, and secure for full opening without interference. Attach hardware using tamper-resistant or concealed means. Install ground-set items in concrete for anchorage. Adjust gate to operate smoothly, easily, and quietly throughout entire operational range. Confirm that latches and locks engage accurately and securely without forcing or binding.

END OF SECTION

SECTION 03300 CAST-IN-PLACE CONCRETE

PART 1 - GENERAL

1.01 RELATED DOCUMENTS

- A. Drawings and general provisions of the Contract, including General and Supplementary Conditions and Division 01 Specification Sections, apply to this Section.
- B. Code references
 - a. 2014 Florida Building code.
 - b. ACI 301, "Structural Concrete for Buildings."
 - c. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - d. ACI 350, "Code Requirements for Environmental Engineering Concrete Structures"

1.02 SUMMARY

- A. Section includes cast-in-place concrete, including formwork, reinforcement, concrete materials, mixture design, placement procedures, and finishes, for the following:
 - 1. Non Structural Concrete.
 - 2. Structural Concrete.
- B. Related Sections:
 - 1. Section 02220 "Excavation, Backfill, Fill and Grading for Structures" for fill under slabs-on-grade and bottom slabs and footings.
 - 2. Section 09900 "Paintings and Special Coatings" for all interior and exterior coating liquid containment structures applications.

1.03 DEFINITIONS

- A. Cementitious Materials: Portland cement alone or in combination with one or more of the following: blended hydraulic cement, fly ash and other pozzolans, ground granulated blast-furnace slag, and silica fume; subject to compliance with requirements.

1.04 ACTION SUBMITTALS

- A. Product Data: For each type of product indicated.
- B. Submittals:

1. Design Mixtures: For each concrete mixture. Submit alternate design mixtures when characteristics of materials, Project conditions, weather, test results, or other circumstances warrant adjustments.
 2. Indicate amounts of mixing water to be withheld for later addition at Project site.
- C. Steel Reinforcement Shop Drawings: Placing drawings that detail fabrication, bending, and placement. Include bar sizes, lengths, material, grade, bar schedules, stirrup spacing, bent bar diagrams, bar arrangement, splices and laps, mechanical connections, tie spacing, hoop spacing, and supports for concrete reinforcement.
- D. Formwork Shop Drawings: Prepared by or under the supervision of a qualified professional engineer detailing fabrication, assembly, and support of formwork.
1. Shoring and Reshoring: Indicate proposed schedule and sequence of stripping formwork, shoring removal, and reshoring installation and removal.
- E. Construction Joint Layout: Indicate proposed construction joints required to construct the structure.
1. Location of construction joints is subject to approval of the Engineer.
- F. Samples: None.

1.05 INFORMATIONAL SUBMITTALS

- A. Qualification Data: For Installer, manufacturer and testing agency.
- B. Welding certificates.
- C. Material Certificates: For each of the following, signed by manufacturers:
1. Cementitious materials.
 2. Admixtures.
 3. Form materials and form-release agents.
 4. Steel reinforcement and accessories.
 5. Waterstops.
 6. Curing compounds.
 7. Floor and slab treatments.
 8. Bonding agents.
 9. Adhesives.
 10. Vapor retarders.
 11. Semi rigid joint filler.
 12. Joint-filler strips.
 13. Repair materials.
- D. Material Test Reports: For the following, from a qualified testing agency, indicating compliance with requirements:
1. Aggregates. Include service record data indicating absence of deleterious expansion of concrete due to alkali aggregate reactivity.

- E. Floor surface flatness and levelness measurements indicating compliance with specified tolerances.
- F. Field quality-control reports.
- G. Minutes of pre-installation conference.

1.06 QUALITY ASSURANCE

- A. **Installer Qualifications:** A qualified installer who employs on Project personnel qualified as ACI-certified Flatwork Technician and Finisher and a supervisor who is an ACI-certified Concrete Flatwork Technician.
- B. **Manufacturer Qualifications:** A firm experienced in manufacturing ready-mixed concrete products and that complies with ASTM C 94/C 94M requirements for production facilities and equipment.
 - 1. Manufacturer certified according to NRMCA's "Certification of Ready Mixed Concrete Production Facilities."
- C. **Testing Agency Qualifications:** An independent agency, acceptable to authorities having jurisdiction, qualified according to ASTM C 1077 and ASTM E 329 for testing indicated.
 - 1. Personnel conducting field tests shall be qualified as ACI Concrete Field Testing Technician, Grade 1, according to ACI CP-1 or an equivalent certification program.
 - 2. Personnel performing laboratory tests shall be ACI-certified Concrete Strength Testing Technician and Concrete Laboratory Testing Technician - Grade I. Testing Agency laboratory supervisor shall be an ACI-certified Concrete Laboratory Testing Technician - Grade II.
- D. **Source Limitations:** Obtain each type or class of cementitious material of the same brand from the same manufacturer's plant, obtain aggregate from single source, and obtain admixtures from single source from single manufacturer.
- E. **Welding Qualifications:** Qualify procedures and personnel according to AWS D1.4/D 1.4M, "Structural Welding Code - Reinforcing Steel."
- F. **ACI Publications:** Comply with the following unless modified by requirements in the Contract Documents:
 - 1. ACI 301, "Specifications for Structural Concrete."
 - 2. ACI 117, "Specifications for Tolerances for Concrete Construction and Materials."
 - 3. ACI 318, "Building Code Requirements for Reinforced Concrete."
 - 4. ACI 350, "Environmental Engineering Concrete Structures."
 - 5. ACI 305, "Hot Weather Concreting."
 - 6. ACI 306, "Cold Weather Concreting."
- G. **Concrete Testing Service:** Engage a qualified independent testing agency to perform material evaluation tests and to design concrete mixtures.

- H. Mockups: None.
- I. Pre-installation Conference: Conduct conference at Project site.
 - 1. Before submitting design mixtures, review concrete design mixture and examine procedures for ensuring quality of concrete materials. Require representatives of each entity directly concerned with cast-in-place concrete to attend, including the following:
 - a. Contractor's superintendent.
 - b. Independent testing agency responsible for concrete design mixtures.
 - c. Ready-mix concrete manufacturer.
 - d. Concrete subcontractor.
 - e. Special concrete finish subcontractor.
 - 2. Review special inspection and testing and inspecting agency procedures for field quality control, concrete finishes and finishing, cold- and hot-weather concreting procedures, curing procedures, construction contraction and isolation joints, and joint-filler strips, semi rigid joint fillers, forms and form removal limitations, shoring and reshoring procedures, vapor-retarder installation, anchor rod and anchorage device installation tolerances, steel reinforcement installation, floor and slab flatness and levelness measurement, concrete repair procedures, and concrete protection.

1.07 DELIVERY, STORAGE, AND HANDLING

- A. Steel Reinforcement: Deliver, store, and handle steel reinforcement to prevent bending and damage. Avoid damaging coatings on steel reinforcement, if applicable.
- B. Waterstops: Store water stops under cover to protect from moisture, sunlight, dirt, oil, and other contaminants.

PART 2 - PRODUCTS

2.01 FORM-FACING MATERIALS

- A. Smooth-Formed Finished Concrete: Form-facing panels that will provide continuous, true, and smooth concrete surfaces. Furnish in largest practicable sizes to minimize number of joints.
 - 1. Plywood, metal, or other approved panel materials.
 - 2. Exterior-grade plywood panels, suitable for concrete forms, complying with DOC PS 1, and as follows:
 - a. High-density overlay, Class 1 or better.
 - b. Medium-density overlay, Class 1 or better; mill-release agent treated and edge sealed.
 - c. Structural 1, B-B or better; mill oiled and edge sealed.
 - d. B-B (Concrete Form), Class 1 or better; mill oiled and edge sealed.

- B. Rough-Formed Finished Concrete: Plywood, lumber, metal, or another approved material. Provide lumber dressed on at least two edges and one side for tight fit.
- C. Forms for Cylindrical Columns, Pedestals, and Supports: Metal, glass-fiber-reinforced plastic, paper, or fiber tubes that will produce surfaces with gradual or abrupt irregularities not exceeding specified formwork surface class. Provide units with sufficient wall thickness to resist plastic concrete loads without detrimental deformation.
- D. Pan-Type Forms: Glass-fiber-reinforced plastic or formed steel, stiffened to resist plastic concrete loads without detrimental deformation.
- E. Void Forms: Biodegradable paper surface, treated for moisture resistance, structurally sufficient to support weight of plastic concrete and other superimposed loads.
- F. Chamfer Strips: Wood, metal, PVC, or rubber strips, 3/4 by 3/4 inch, minimum.
- G. Rustication Strips: Wood, metal, PVC, or rubber strips, kerfed for ease of form removal.
- H. Form-Release Agent: Commercially formulated form-release agent that will not bond with, stain, or adversely affect concrete surfaces and will not impair subsequent treatments of concrete surfaces.
 - 1. Formulate form-release agent with rust inhibitor for steel form-facing materials.
- I. Form Ties: Factory-fabricated, removable or snap-off metal or glass-fiber-reinforced plastic form ties designed to resist lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
 - 1. Furnish units that will leave no corrodible metal closer than 1 inch to the plane of exposed concrete surface.
 - 2. Furnish ties that, when removed, will leave holes no larger than 1 inch in diameter in concrete surface.
 - 3. Furnish ties for liquid containment structures that have an integral water stop that is tightly welded to the tie.
 - 4. Furnish ties for exposed concrete that are the cone-washer type. The cones shall be made of approved wood or plastic. Common wire will not be allowed for form ties

2.02 STEEL REINFORCEMENT

- A. Recycled Content of Steel Products: Postconsumer recycled content plus one-half of pre-consumer recycled content not less than 25 percent.
- B. Reinforcing Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), deformed.
- C. Low-Alloy-Steel Reinforcing Bars: None.
- D. Galvanized Reinforcing Bars: None.
- E. Epoxy-Coated Reinforcing Bars: None.

- F. Stainless-Steel Reinforcing Bars: None.
- G. Steel Bar Mats: None.
- H. Plain-Steel Wire: ASTM A 82/A 82M, as drawn.
- I. Deformed-Steel Wire: ASTM A 496/A 496M.
- J. Epoxy-Coated Wire: None.
- K. Plain-Steel Welded Wire Reinforcement: ASTM A 185/A 185M, plain, fabricated from as-drawn steel wire into flat sheets.
- L. Deformed-Steel Welded Wire Reinforcement: None.
- M. Galvanized-Steel Welded Wire Reinforcement: None.
- N. Epoxy-Coated Welded Wire Reinforcement: None.

2.03 REINFORCEMENT ACCESSORIES

- A. Joint Dowel Bars: ASTM A 615/A 615M, Grade 60 (Grade 420), plain-steel deformed bars, cut true to length with ends square and free of burrs.
- B. Bar Supports: Bolsters, chairs, spacers, and other devices for spacing, supporting, and fastening reinforcing bars and welded wire reinforcement in place. Manufacture bar supports from steel wire, plastic, or precast concrete according to CRSI's "Manual of Standard Practice," of greater compressive strength than concrete and as follows:
 - 1. For concrete surfaces exposed to view where legs of wire bar supports contact forms, use CRSI Class 1 plastic-protected steel wire or CRSI Class 2 stainless-steel bar supports.

2.04 CONCRETE MATERIALS

- A. Cementitious Material: Use the following cementitious materials, of the same type, brand, and source, throughout Project:
 - 1. Portland Cement: ASTM C 150, Type II, gray. Supplement with the following:
 - a. Fly Ash: ASTM C 618, Class F. use Slag (ASTM C 989, Grade 120), as a substitute for Fly Ash, if Fly Ash is not available.
 - 1) Use one brand of cement and fly ash or Slag through out the Project.
 - 2) Fly ash or Slag will be used as a partial cement replacement. Fly ash or Slag content shall not exceed 20% of the total Cementitious material weight.
- B. Normal-Weight Aggregates: ASTM C 33, Provide aggregates from a single source with documented service record data of at least 10 years' satisfactory service in similar

applications and service conditions using similar aggregates and cementitious materials.

1. Fine Aggregate: Free of materials with deleterious reactivity to alkali in cement. Use Clean, sharp, natural silica sand free of loam, clay, lumps, and other deleterious substances. Dune sand, bank run sand, and manufactured sand are not acceptable.
2. Coarse Aggregate: Clean, uncoated, processed aggregate containing no clay, mud, loam, or foreign matter. Coarse aggregate shall comply with the following:
 - 1) Crushed stone, processed from natural rock or stone.
 - 2) Washed gravel, either natural or crushed. Slag, pit gravel, and bank-run gravel are not allowed.
 - 3) Coarse Aggregate Size: ASTM C33/C33M, No. 57 stone, unless otherwise approved by ENGINEER.

C. Water: ASTM C 94/C 94M and potable.

2.05 ADMIXTURES

A. Air-Entraining Admixture: ASTM C 260.

B. Chemical Admixtures: Provide admixtures certified by manufacturer to be compatible with other admixtures and that will not contribute water-soluble chloride ions exceeding those permitted in hardened concrete. Do not use calcium chloride or admixtures containing calcium chloride.

1. Water-Reducing Admixture: ASTM C 494/C 494M, Type A.
2. Retarding Admixture: ASTM C 494/C 494M, Type B.
3. Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type D.
4. High-Range, Water-Reducing Admixture: ASTM C 494/C 494M, Type F.
5. High-Range, Water-Reducing and Retarding Admixture: ASTM C 494/C 494M, Type G.
6. Plasticizing and Retarding Admixture: ASTM C 1017/C 1017M, Type II.

2.06 WATERSTOPS

A. Flexible PVC Waterstops: CE CRD-C 572, with factory-installed metal eyelets, for embedding in concrete to prevent passage of fluids through joints. Factory fabricated corners, intersections, and directional changes.

1. Manufacturers: Subject to compliance with requirements, available manufacturers offering products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BoMetals, Inc.
 - b. Greenstreak.

2. Profile: Ribbed with center bulb.
 3. Dimensions: 6 inches by 3/8 inch thick or 9 inches by 3/8 inch thick; nontapered, as indicated on drawings.
- B. Self-Expanding Rubber Strip Waterstops: Manufactured rectangular or trapezoidal strip, bentonite-free hydrophilic polymer modified chloroprene rubber, for adhesive bonding to concrete, 3/8 by 3/4 inch.
1. Products: Subject to compliance with requirements, a. Waterstop material shall expand by minimum of 80 percent of dry volume in the presence of water to form a watertight joint seal without damaging the concrete in which it is cast, b. Waterstop material shall absorb water and cause a completely reversible and repeatable increase in volume, c. Waterstop material shall be dimensionally stable after repeated wet-dry cycles with no deterioration of swelling potential. Available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Adeka Ultra Seal/OCM, Inc.; Adeka Ultra Seal.
 - b. Greenstreak; Hydrotite.
 - c. Sika; Sika Swell S-2.

2.07 VAPOR RETARDERS

- A. Sheet Vapor Retarder: ASTM E 1745, Class C. Include manufacturer's recommended adhesive or pressure-sensitive joint tape.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Fortifiber Building Systems Group; Moistop Plus.
 - b. Raven Industries Inc.; Vapor Block 6.
 - c. Reef Industries, Inc.; Griffolyn Type-65 or Type-85.
 - d. Stego Industries, LLC; Stego Wrap, 10 mil Class C.
- B. Granular Fill: Clean mixture of crushed stone or crushed or uncrushed gravel; ASTM D 448, Size 57, with 100 percent passing a 1-1/2-inch (37.5-mm) sieve and 0 to 5 percent passing a No. 8 (2.36-mm) sieve.

2.08 LIQUID FLOOR TREATMENTS

- A. VOC Content: Liquid floor treatments shall have a VOC content of 200 g/L or less when calculated according to 40 CFR 59, Subpart D (EPA Method 24).
- B. Penetrating Liquid Floor Treatment: Clear, chemically reactive, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and densifies concrete surfaces.
1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:

- a. ChemMasters; Chemisil Plus.
 - b. Dayton Superior Corporation; Day-Chem Sure Hard (J-17).
 - c. Euclid Chemical Company (The), an RPM company; Euco Diamond Hard.
- C. Penetrating Liquid Floor Treatments for Polished Concrete Finish: Clear, waterborne solution of inorganic silicate or silicate materials and proprietary components; odorless; that penetrates, hardens, and is suitable for polished concrete surfaces.
- 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. Advanced Floor Products; Retro-Plate 99.

2.09 CURING MATERIALS

- A. Absorptive Cover: AASHTO M 182, Class 2, burlap cloth made from jute or kenaf, weighing approximately 9 oz./sq. yd. (305 g/sq. m) when dry.
- B. Moisture-Retaining Cover: ASTM C 171, polyethylene film or white burlap-polyethylene sheet.
- C. Water: Potable.
- D. Clear, Waterborne, Membrane-Forming Curing Compound: ASTM C 309, Type 1, Class B, dissipating. Allowed for non-liquid containment structures.
 - 1. Products: Subject to compliance with requirements, available products that may be incorporated into the Work include, but are not limited to, the following:
 - a. BASF Construction Chemicals - Building Systems; Kure 200.
 - b. ChemMasters; Safe-Cure Clear.
 - c. Conspec by Dayton Superior; W.B. Resin Cure.
 - d. Dayton Superior Corporation; Day-Chem Rez Cure (J-11-W).
 - e. Edoco by Dayton Superior; Res X Cure WB.
 - f. Euclid Chemical Company (The), an RPM company; Kurez W VOX; TAMMSCURE WB 30C.
 - g. Meadows, W. R., Inc.; 1100-CLEAR.

2.10 RELATED MATERIALS

- A. Expansion- and Isolation-Joint-Filler Strips: Provide preformed expansion joint filler complying with ASTM D 1752, Type I (spong rubber) .
- B. Semi rigid Joint Filler: Two-component, semi rigid, 100 percent solids, epoxy resin with a Type A shore durometer hardness of 80 aromatic polyurea with a Type A shore durometer hardness range of 90 to 95 per ASTM D 2240.
- C. Bonding Agent: ASTM C 1059/C 1059M, Type II, non-redispersible, acrylic emulsion or styrene butadiene.

- D. Epoxy Bonding Adhesive: ASTM C 881, two-component epoxy resin, capable of humid curing and bonding to damp surfaces, of class suitable for application temperature and of grade to suit requirements, and as follows:
 - 1. Types I and II, non-load bearing and Types IV and V, load bearing, for bonding hardened or freshly mixed concrete to hardened concrete.
- E. Reglets: Fabricate reglets of not less than 0.022 thick, galvanized-steel sheet. Temporarily fill or cover face opening of reglet to prevent intrusion of concrete or debris.
- F. Dovetail Anchor Slots: Hot-dip galvanized-steel sheet, not less than 0.034 inch thick, with bent tab anchors. Temporarily fill or cover face opening of slots to prevent intrusion of concrete or debris.

2.11 REPAIR MATERIALS

- A. Repair Underlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/8 inch and that can be feathered at edges to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of underlayment manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by underlayment manufacturer.
 - 4. Compressive Strength: Not less than 4100 psi at 28 days when tested according to ASTM C 109/C 109M.
- B. Repair Overlayment: Cement-based, polymer-modified, self-leveling product that can be applied in thicknesses from 1/4 inch and that can be filled in over a scarified surface to match adjacent floor elevations.
 - 1. Cement Binder: ASTM C 150, portland cement or hydraulic or blended hydraulic cement as defined in ASTM C 219.
 - 2. Primer: Product of topping manufacturer recommended for substrate, conditions, and application.
 - 3. Aggregate: Well-graded, washed gravel, 1/8 to 1/4 inch or coarse sand as recommended by topping manufacturer.
 - 4. Compressive Strength: Not less than 5000 psi at 28 days when tested according to ASTM C 109/C 109M.

2.12 CONCRETE MIXTURES, GENERAL

- A. Prepare design mixtures for each type and strength of concrete, proportioned on the basis of laboratory trial mixture or field test data, or both, according to ACI 301.
 - 1. Use a qualified independent testing agency for preparing and reporting proposed mixture designs based on laboratory trial mixtures.

- B. **Cementitious Materials:** Use fly ash as needed to reduce the total amount of portland cement, which would otherwise be used. Limit percentage, by weight, of cementitious materials other than portland cement in concrete as follows:
 - 1. **Fly Ash or Slag:** Shall not exceed twenty percent (20%) of the total cementitious content by weight.
- C. **Limit water-soluble, chloride-ion content in hardened concrete to 0.06 percent by weight of cement.**
- D. **Admixtures:** Use admixtures according to manufacturer's written instructions.
 - 1. Use high-range water-reducing or plasticizing admixture in concrete, as required, for placement and workability.
 - 2. Use water-reducing and retarding admixture when required by high temperatures, low humidity, or other adverse placement conditions.
 - 3. Use water-reducing admixture in pumped concrete, concrete for heavy-use industrial slabs and parking structure slabs, concrete required to be watertight, and concrete with a water-cementitious materials ratio below 0.50.
 - 4. Use corrosion-inhibiting admixture in concrete mixtures where indicated.
- E. **Color Pigment:** If required by Architectural contract drawings, add color pigment to concrete mixture according to manufacturer's written instructions and to result in hardened concrete color consistent with approved mockup.

2.13 CONCRETE MIXTURES

- A. **Non-Structural Concrete::** Proportion normal-weight concrete mixture as follows:
 - 1. **Minimum Compressive Strength:** 3000 psi at 28 days.
 - 2. **Minimum Cementitious Materials Content:** 470 lb/cu. Yd.
 - 3. **Maximum Water-Cementitious Materials Ratio:** 0.5.
 - 4. **Slump Limit:** 4 inches, plus or minus 1 inch.
 - 5. **Air Content:** 4 percent, plus or minus 1 percent at point of delivery.
 - 6. **Air Content:** Do not allow air content of trowel-finished floors to exceed 3 percent.
- B. **Structural Concrete:** Proportion normal-weight concrete mixture as follows:
 - 1. **Minimum Compressive Strength:** 4000 psi at 28 days.
 - 2. **Minimum Cementitious Materials Content:** 564 lb/cu. yd.
 - 3. **Maximum Water-Cementitious Materials Ratio:** 0.45.
 - 4. **Slump Limit:** 3 inches, 8 inches for concrete with verified slump of 1 to 3 inches before adding high-range water-reducing admixture or plasticizing admixture, plus or minus 1 inch.
 - 5. **Air Content:** 4 percent, plus or minus 1 percent at point of delivery.

2.14 FABRICATING REINFORCEMENT

- A. **Fabricate steel reinforcement according to CRSI's "Manual of Standard Practice."**

2.15 CONCRETE MIXING

- A. Ready-Mixed Concrete: Measure, batch, mix, and deliver concrete according to ASTM C 94/C 94M, and furnish batch ticket information.
 - 1. When air temperature is between 85 and 90 deg F (30 and 32 deg C), reduce mixing and delivery time from 1-1/2 hours to 75 minutes; when air temperature is above 90 deg F (32 deg C), reduce mixing and delivery time to 60 minutes.

PART 3 - EXECUTION

3.01 FORMWORK

- A. Design, erect, shore, brace, and maintain formwork, according to ACI 301, to support vertical, lateral, static, and dynamic loads, and construction loads that might be applied, until structure can support such loads.
- B. Construct formwork so concrete members and structures are of size, shape, alignment, elevation, and position indicated, within tolerance limits of ACI 117.
- C. Limit concrete surface irregularities, designated by ACI 347 as abrupt or gradual, as follows:
 - 1. Class A, 1/8 inch for smooth-formed finished surfaces.
 - 2. Class B, 1/4 inch for rough-formed finished surfaces.
- D. Construct forms tight enough to prevent loss of concrete mortar.
- E. Fabricate forms for easy removal without hammering or prying against concrete surfaces. Provide crush or wrecking plates where stripping may damage cast concrete surfaces. Provide top forms for inclined surfaces steeper than 1.5 horizontal to 1 vertical.
 - 1. Install keyways, reglets, recesses, and the like, for easy removal.
 - 2. Do not use rust-stained steel form-facing material.
- F. Set edge forms, bulkheads, and intermediate screed strips for slabs to achieve required elevations and slopes in finished concrete surfaces. Provide and secure units to support screed strips; use strike-off templates or compacting-type screeds.
- G. Provide temporary openings for cleanouts and inspection ports where interior area of formwork is inaccessible. Close openings with panels tightly fitted to forms and securely braced to prevent loss of concrete mortar. Locate temporary openings in forms at inconspicuous locations.
- H. Chamfer exterior corners and edges of permanently exposed concrete.
- I. Form openings, chases, offsets, sinkages, keyways, reglets, blocking, screeds, and bulkheads required in the Work. Determine sizes and locations from trades providing such items.

- J. Clean forms and adjacent surfaces to receive concrete. Remove chips, wood, sawdust, dirt, and other debris just before placing concrete.
- K. Retighten forms and bracing before placing concrete, as required, to prevent mortar leaks and maintain proper alignment.
- L. Coat contact surfaces of forms with form-release agent, according to manufacturer's written instructions, before placing reinforcement.

3.02 EMBEDDED ITEMS

- A. Place and secure anchorage devices and other embedded items required for adjoining work that is attached to or supported by cast-in-place concrete. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.
 - 1. Install anchor rods, accurately located, to elevations required and complying with tolerances in Section 7.5 of AISC's "Code of Standard Practice for Steel Buildings and Bridges."
 - 2. Install reglets to receive waterproofing and to receive through-wall flashings in outer face of concrete frame at exterior walls, where flashing is shown at lintels, shelf angles, and other conditions.
 - 3. Install dovetail anchor slots in concrete structures as indicated.

3.03 REMOVING AND REUSING FORMS

- A. General: Formwork for sides of beams, walls, columns, and similar parts of the Work that does not support weight of concrete may be removed after cumulatively curing at not less than 50 deg F (10 deg C) for 24 hours after placing concrete. Concrete has to be hard enough to not be damaged by form-removal operations and curing and protection operations need to be maintained.
 - 1. Leave formwork for beam soffits, joists, slabs, and other structural elements that supports weight of concrete in place until concrete has achieved at least 75 percent of its 28-day design compressive strength.
 - 2. Remove forms only if shores have been arranged to permit removal of forms without loosening or disturbing shores.
- B. Clean and repair surfaces of forms to be reused in the Work. Split, frayed, delaminated, or otherwise damaged form-facing material will not be acceptable for exposed surfaces. Apply new form-release agent.
- C. When forms are reused, clean surfaces, remove fins and laitance, and tighten to close joints. Align and secure joints to avoid offsets. Do not use patched forms for exposed concrete surfaces unless approved by Architect.

3.04 SHORES AND RESHORES

- A. Comply with ACI 318 (ACI 318M) and ACI 301 for design, installation, and removal of shoring and reshoring.

1. Do not remove shoring or reshoring until measurement of slab tolerances is complete.
- B. In multistory construction, extend shoring or reshoring over a sufficient number of stories to distribute loads in such a manner that no floor or member will be excessively loaded or will induce tensile stress in concrete members without sufficient steel reinforcement.
- C. Plan sequence of removal of shores and re-shore to avoid damage to concrete. Locate and provide adequate reshoring to support construction without excessive stress or deflection.

3.05 VAPOR RETARDERS

- A. Sheet Vapor Retarders: Place, protect, and repair sheet vapor retarder according to ASTM E 1643 and manufacturer's written instructions.
 1. Lap joints 6 inches and seal with manufacturers recommended tape.
- B. Bituminous Vapor Retarders: if applicable.

3.06 STEEL REINFORCEMENT

- A. General: Comply with CRSI's "Manual of Standard Practice" for placing reinforcement.
 1. Do not cut or puncture vapor retarder. Repair damage and reseal vapor retarder before placing concrete.
- B. Clean reinforcement of loose rust and mill scale, earth, ice, and other foreign materials that would reduce bond to concrete.
- C. Accurately position, support, and secure reinforcement against displacement. Locate and support reinforcement with bar supports to maintain minimum concrete cover. Do not tack weld crossing reinforcing bars.
 1. Weld reinforcing bars according to AWS D1.4/D 1.4M, where indicated.
- D. Set wire ties with ends directed into concrete, not toward exposed concrete surfaces.
- E. Install welded wire reinforcement in longest practicable lengths on bar supports spaced to minimize sagging. Lap edges and ends of adjoining sheets at least one mesh spacing. Offset laps of adjoining sheet widths to prevent continuous laps in either direction. Lace overlaps with wire.
- F. Epoxy-Coated Reinforcement: Repair cut and damaged epoxy coatings with epoxy repair coating according to ASTM D 3963/D 3963M. Use epoxy-coated steel wire ties to fasten epoxy-coated steel reinforcement.

- G. **Zinc-Coated Reinforcement:** Repair cut and damaged zinc coatings with zinc repair material according to ASTM A 780. Use galvanized steel wire ties to fasten zinc-coated steel reinforcement.

3.07 JOINTS

- A. **General:** Construct joints true to line with faces perpendicular to surface plane of concrete.
- B. **Construction Joints:** Install so strength and appearance of concrete are not impaired, at locations indicated or as approved by Engineer.
 - 1. Place joints perpendicular to main reinforcement. Continue reinforcement across construction joints unless otherwise indicated. Do not continue reinforcement through sides of strip placements of floors and slabs.
 - 2. Form keyed joints as indicated. Embed keys at least 1-1/2 inches into concrete.
 - 3. Locate joints for beams, slabs, joists, and girders in the middle third of spans. Offset joints in girders a minimum distance of twice the beam width from a beam-girder intersection.
 - 4. Locate horizontal joints in walls and columns at underside of floors, slabs, beams, and girders and at the top of footings or floor slabs.
 - 5. Space vertical joints in walls as indicated. Locate joints beside piers integral with walls, near corners, and in concealed locations where possible.
 - 6. Use a bonding agent at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
 - 7. Use epoxy-bonding adhesive at locations where fresh concrete is placed against hardened or partially hardened concrete surfaces.
- C. **Contraction Joints in Slabs-on-Grade:** Form weakened-plane contraction joints, sectioning concrete into areas as indicated. Construct contraction joints for a depth equal to at least one-fourth of concrete thickness as follows:
 - 1. **Grooved Joints:** Form contraction joints after initial floating by grooving and finishing each edge of joint to a radius of 1/8 inch. Repeat grooving of contraction joints after applying surface finishes. Eliminate groover tool marks on concrete surfaces.
 - 2. **Sawed Joints:** Form contraction joints with power saws equipped with shatterproof abrasive or diamond-rimmed blades. Cut 1/8 inch wide joints into concrete when cutting action will not tear, abrade, or otherwise damage surface and before concrete develops random contraction cracks.
- D. **Isolation Joints in Slabs-on-Grade:** After removing formwork, install joint-filler strips at slab junctions with vertical surfaces, such as column pedestals, foundation walls, grade beams, and other locations, as indicated.
 - 1. Extend joint-filler strips full width and depth of joint, terminating flush with finished concrete surface unless otherwise indicated.
 - 2. Terminate full-width joint-filler strips not less than 1/2 inch or more than 1 inch below finished concrete surface where joint sealants are indicated.
 - 3. Install joint-filler strips in lengths as long as practicable. Where more than one length is required, lace or clip sections together.

- E. Doweled Joints: Install dowel bars and support assemblies at joints where indicated. Lubricate or asphalt coat one-half of dowel length to prevent concrete bonding to one side of joint.

3.08 WATERSTOPS

- A. Flexible Waterstops: Install in construction joints and at other joints indicated to form a continuous diaphragm. Install in longest lengths practicable. Support and protect exposed water stops during progress of the Work. Field fabricate joints in water stops according to manufacturer's written instructions.
- B. Self-Expanding Strip Waterstops: Install in construction joints and at other locations indicated, according to manufacturer's written instructions, adhesive bonding, mechanically fastening, and firmly pressing into place. Install in longest lengths practicable.

3.09 CONCRETE PLACEMENT

- A. Before placing concrete, verify that installation of formwork, reinforcement, and embedded items is complete and that required inspections have been performed.
- B. Do not add water to concrete during delivery, at Project site, or during placement unless approved by Engineer.
- C. Before test sampling and placing concrete, water may be added at Project site, subject to limitations of ACI 301.
 - 1. Do not add water to concrete after adding high-range water-reducing admixtures to mixture.
- D. Deposit concrete continuously in one layer or in horizontal layers of such thickness that no new concrete will be placed on concrete that has hardened enough to cause seams or planes of weakness. If a section cannot be placed continuously, provide construction joints as indicated. Deposit concrete to avoid segregation.
 - 1. Deposit concrete in horizontal layers of depth to not exceed formwork design pressures and in a manner to avoid inclined construction joints.
 - 2. Consolidate placed concrete with mechanical vibrating equipment according to ACI 301.
 - 3. Do not use vibrators to transport concrete inside forms. Insert and withdraw vibrators vertically at uniformly spaced locations to rapidly penetrate placed layer and at least 6 inches into preceding layer. Do not insert vibrators into lower layers of concrete that have begun to lose plasticity. At each insertion, limit duration of vibration to time necessary to consolidate concrete and complete embedment of reinforcement and other embedded items without causing mixture constituents to segregate.
- E. Deposit and consolidate concrete for floors and slabs in a continuous operation, within limits of construction joints, until placement of a panel or section is complete.

1. Consolidate concrete during placement operations so concrete is thoroughly worked around reinforcement and other embedded items and into corners.
 2. Maintain reinforcement in position on chairs during concrete placement.
 3. Screed slab surfaces with a straightedge and strike off to correct elevations.
 4. Slope surfaces uniformly to drains where required.
 5. Begin initial floating using bull floats or darbies to form a uniform and open-textured surface plane, before excess bleed water appears on the surface. Do not further disturb slab surfaces before starting finishing operations.
- F. Cold-Weather Placement: Comply with ACI 306.1 and as follows. Protect concrete work from physical damage or reduced strength that could be caused by frost, freezing actions, or low temperatures.
1. When average high and low temperature is expected to fall below 40 deg F (4.4 deg C) for three successive days, maintain delivered concrete mixture temperature within the temperature range required by ACI 301.
 2. Do not use frozen materials or materials containing ice or snow. Do not place concrete on frozen subgrade or on subgrade containing frozen materials.
 3. Do not use calcium chloride, salt, or other materials containing antifreeze agents or chemical accelerators unless otherwise specified and approved in mixture designs.
- G. Hot-Weather Placement: Comply with ACI 301 and as follows:
1. Maintain concrete temperature below 90 deg F (32 deg C) at time of placement. Chilled mixing water or chopped ice may be used to control temperature, provided water equivalent of ice is calculated to total amount of mixing water. Using liquid nitrogen to cool concrete is Contractor's option.
 2. Fog-spray forms, steel reinforcement, and subgrade just before placing concrete. Keep subgrade uniformly moist without standing water, soft spots, or dry areas.

3.10 FINISHING FORMED SURFACES

- A. Rough-Formed Finish: As-cast concrete texture imparted by form-facing material with tie holes and defects repaired and patched. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces not exposed to public view.
- B. Smooth-Formed Finish: As-cast concrete texture imparted by form-facing material, arranged in an orderly and symmetrical manner with a minimum of seams. Repair and patch tie holes and defects. Remove fins and other projections that exceed specified limits on formed-surface irregularities.
1. Apply to concrete surfaces exposed to public view, to receive a rubbed finish, to be covered with a coating or covering material applied directly to concrete.
- C. Rubbed Finish: Apply the following to smooth-formed finished as-cast concrete where indicated:

1. Smooth-Rubbed Finish: Not later than one day after form removal, moisten concrete surfaces and rub with carborundum brick or another abrasive until producing a uniform color and texture. Do not apply cement grout other than that created by the rubbing process.
 2. Grout-Cleaned Finish: Wet concrete surfaces and apply grout of a consistency of thick paint to coat surfaces and fill small holes. Mix one part portland cement to one and one-half parts fine sand with a 1:1 mixture of bonding admixture and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Scrub grout into voids and remove excess grout. When grout whitens, rub surface with clean burlap and keep surface damp by fog spray for at least 36 hours.
 3. Cork-Floated Finish: Wet concrete surfaces and apply a stiff grout. Mix one part portland cement and one part fine sand with a 1:1 mixture of bonding agent and water. Add white portland cement in amounts determined by trial patches so color of dry grout will match adjacent surfaces. Compress grout into voids by grinding surface. In a swirling motion, finish surface with a cork float.
- D. Related Unformed Surfaces: At tops of walls, horizontal offsets, and similar unformed surfaces adjacent to formed surfaces, strike off smooth and finish with a texture matching adjacent formed surfaces. Continue final surface treatment of formed surfaces uniformly across adjacent unformed surfaces unless otherwise indicated.

3.11 FINISHING FLOORS AND SLABS

- A. General: Comply with ACI 302.1R recommendations for screeding, re-straightening, and finishing operations for concrete surfaces. Do not wet concrete surfaces.
- B. Scratch Finish: While still plastic, texture concrete surface that has been screeded and bull-floated or darbied. Use stiff brushes, brooms, or rakes to produce a profile amplitude of 1/4 inch in one direction.
1. Apply scratch finish to surfaces indicated and to receive mortar setting beds for bonded cementitious floor finishes.
- C. Float Finish: Consolidate surface with power-driven floats or by hand floating if area is small or inaccessible to power driven floats. Re-straighten, cut down high spots, and fill low spots. Repeat float passes and re-straightening until surface is left with a uniform, smooth, granular texture.
1. Apply float finish to surfaces to receive trowel finish.
- D. Trowel Finish: After applying float finish, apply first troweling and consolidate concrete by hand or power-driven trowel. Continue troweling passes and re-straighten until surface is free of trowel marks and uniform in texture and appearance. Grind smooth any surface defects that would telegraph through applied coatings or floor coverings.
1. Apply a trowel finish to surfaces exposed to view or to be covered with resilient flooring, carpet, ceramic or quarry tile set over a cleavage membrane, paint, or another thin-film-finish coating system.
 2. Finish surfaces to the following tolerances, according to ASTM E 1155 (ASTM E 1155M), for a randomly trafficked floor surface:

- a. Specified overall values of flatness, F(F) 25; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 17; and of levelness, F(L) 15.
 - b. Specified overall values of flatness, F(F) 35; and of levelness, F(L) 25; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 17; for slabs-on-grade.
 - c. Specified overall values of flatness, F(F) 30; and of levelness, F(L) 20; with minimum local values of flatness, F(F) 24; and of levelness, F(L) 15; for suspended slabs.
 - d. Specified overall values of flatness, F(F) 45; and of levelness, F(L) 35; with minimum local values of flatness, F(F) 30; and of levelness, F(L) 24.
3. Finish and measure surface so gap at any point between concrete surface and an unlevelled, freestanding, 10-ft. long straightedge resting on two high spots and placed anywhere on the surface does not exceed 1/8 inch.
 4. Trowel and Fine-Broom Finish: Apply a first trowel finish to surfaces where ceramic or quarry tile is to be installed by either thickset or thin-set method. While concrete is still plastic, slightly scarify surface with a fine broom.
 5. Comply with flatness and levelness tolerances for trowel-finished floor surfaces.
- E. Broom Finish: Apply a broom finish to exterior concrete platforms, steps, ramps, and elsewhere as indicated.
1. Immediately after float finishing, slightly roughen trafficked surface by brooming with fiber-bristle broom perpendicular to main traffic route. Coordinate required final finish with Architect before application.

3.12 MISCELLANEOUS CONCRETE ITEMS

- A. Filling In: Fill in holes and openings left in concrete structures after work of other trades is in place unless otherwise indicated. Mix, place, and cure concrete, as specified, to blend with in-place construction. Provide other miscellaneous concrete filling indicated or required to complete the Work.
- B. Curbs: Provide monolithic finish to interior curbs by stripping forms while concrete is still green and by steel-troweling surfaces to a hard, dense finish with corners, intersections, and terminations slightly rounded.
- C. Equipment Bases and Foundations:
1. Coordinate sizes and locations of concrete bases with actual equipment provided.
 2. Install dowel rods to connect concrete base to concrete floor. Unless otherwise indicated, install dowel rods on 12-inch centers around the full perimeter of concrete base.
 3. For supported equipment, install stainless steel anchor bolts that extend through concrete base, and anchor into structural concrete substrate.
 4. Prior to pouring concrete, place and secure anchorage devices. Use setting drawings, templates, diagrams, instructions, and directions furnished with items to be embedded.

5. Cast anchor-bolt insert into bases. Install anchor bolts to elevations required for proper attachment to supported equipment.

3.13 CONCRETE PROTECTING AND CURING

- A. General: Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with ACI 306.1 for cold-weather protection and ACI 301 for hot-weather protection during curing.
- B. Evaporation Retarder: Apply evaporation retarder to unformed concrete surfaces if hot, dry, or windy conditions cause moisture loss approaching 0.2 lb/sq. ft. x h before and during finishing operations. Apply according to manufacturer's written instructions after placing, screeding, and bull floating or darbying concrete, but before float finishing.
- C. Formed Surfaces: Cure formed concrete surfaces, including underside of beams, supported slabs, and other similar surfaces. If forms remain during curing period, moist cure after loosening forms. If removing forms before end of curing period, continue curing for the remainder of the curing period.
- D. Unformed Surfaces: Begin curing immediately after finishing concrete. Cure unformed surfaces, including floors and slabs, concrete floor toppings, and other surfaces.
- E. Cure concrete according to ACI 308.1, by one or a combination of the following methods:
 1. Moisture Curing: Keep surfaces continuously moist for not less than seven days with the following materials:
 - a. Water.
 - b. Continuous water-fog spray.
 - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with 12-inch lap over adjacent absorptive covers.
 2. Moisture-Retaining-Cover Curing: Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Cure for not less than seven days. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
 - a. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive floor coverings.
 - b. Moisture cure or use moisture-retaining covers to cure concrete surfaces to receive penetrating liquid floor treatments.
 - c. Cure concrete surfaces to receive floor coverings with either a moisture-retaining cover or a curing compound that the manufacturer certifies will not interfere with bonding of floor covering used on Project.
 3. Curing Compound: Apply uniformly in continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to

heavy rainfall within three hours after initial application. Maintain continuity of coating and repair damage during curing period.

a. Removal: After curing period has elapsed, remove curing compound without damaging concrete surfaces by method recommended by curing compound manufacturer.

4. Curing and Sealing Compound: Apply uniformly to floors and slabs indicated in a continuous operation by power spray or roller according to manufacturer's written instructions. Recoat areas subjected to heavy rainfall within three hours after initial application. Repeat process 24 hours later and apply a second coat. Maintain continuity of coating and repair damage during curing period.

3.14 JOINT FILLING

- A. Prepare, clean, and install joint filler according to manufacturer's written instructions.
 - 1. Defer joint filling until concrete has aged at least one month. Do not fill joints until construction traffic has permanently ceased.
- B. Remove dirt, debris, saw cuttings, curing compounds, and sealers from joints; leave contact faces of joint clean and dry.
- C. Install semi rigid joint filler full depth in saw-cut joints and at least 2 inches deep in formed joints. Overfill joint and trim joint filler flush with top of joint after hardening.

3.15 CONCRETE SURFACE REPAIRS

- A. Defective Concrete: Repair and patch defective areas when approved by Engineer. Remove and replace concrete that cannot be repaired and patched to Engineer's approval.
- B. Patching Mortar: Mix dry-pack patching mortar, consisting of one part portland cement to two and one-half parts fine aggregate passing a No. 16 sieve, using only enough water for handling and placing.
- C. Repairing Formed Surfaces: Surface defects include color and texture irregularities, cracks, spalls, air bubbles, honeycombs, rock pockets, fins and other projections on the surface, and stains and other discolorations that cannot be removed by cleaning.
 - 1. Immediately after form removal, cut out honeycombs, rock pockets, and voids more than 1/2 inch in any dimension to solid concrete. Limit cut depth to 3/4 inch. Make edges of cuts perpendicular to concrete surface. Clean, dampen with water, and brush-coat holes and voids with bonding agent. Fill and compact with patching mortar before bonding agent has dried. Fill form-tie voids with patching mortar or cone plugs secured in place with bonding agent.
 - 2. Repair defects on surfaces exposed to view by blending white portland cement and standard portland cement so that, when dry, patching mortar will match surrounding color. Patch a test area at inconspicuous locations to verify mixture

- and color match before proceeding with patching. Compact mortar in place and strike off slightly higher than surrounding surface.
3. Repair defects on concealed formed surfaces that affect concrete's durability and structural performance as determined by Architect.
- D. Repairing Unformed Surfaces: Test unformed surfaces, such as floors and slabs, for finish and verify surface tolerances specified for each surface. Correct low and high areas. Test surfaces sloped to drain for trueness of slope and smoothness; use a sloped template.
1. Repair finished surfaces containing defects. Surface defects include spalls, popouts, honeycombs, rock pockets, crazing and cracks in excess of 0.01 inch wide or that penetrate to reinforcement or completely through unreinforced sections regardless of width, and other objectionable conditions.
 2. After concrete has cured at least 14 days, correct high areas by grinding.
 3. Correct localized low areas during or immediately after completing surface finishing operations by cutting out low areas and replacing with patching mortar. Finish repaired areas to blend into adjacent concrete.
 4. Correct other low areas scheduled to receive floor coverings with a repair underlayment. Prepare, mix, and apply repair underlayment and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface. Feather edges to match adjacent floor elevations.
 5. Correct other low areas scheduled to remain exposed with a repair topping. Cut out low areas to ensure a minimum repair topping depth of 1/4 inch to match adjacent floor elevations. Prepare, mix, and apply repair topping and primer according to manufacturer's written instructions to produce a smooth, uniform, plane, and level surface.
 6. Repair defective areas, except random cracks and single holes 1 inch or less in diameter, by cutting out and replacing with fresh concrete. Remove defective areas with clean, square cuts and expose steel reinforcement with at least a 3/4-inch clearance all around. Dampen concrete surfaces in contact with patching concrete and apply bonding agent. Mix patching concrete of same materials and mixture as original concrete except without coarse aggregate. Place, compact, and finish to blend with adjacent finished concrete. Cure in same manner as adjacent concrete.
 7. Repair random cracks and single holes 1 inch or less in diameter with patching mortar. Groove top of cracks and cut out holes to sound concrete and clean off dust, dirt, and loose particles. Dampen cleaned concrete surfaces and apply bonding agent. Place patching mortar before bonding agent has dried. Compact patching mortar and finish to match adjacent concrete. Keep patched area continuously moist for at least 72 hours.
- E. Perform structural repairs of concrete, subject to Engineer's approval, using epoxy adhesive and patching mortar.
- F. Repair materials and installation not specified above may be used, subject to Engineer's approval.

3.16 FIELD QUALITY CONTROL

- A. Testing and Inspecting: Owner will engage a qualified testing and inspecting agency to perform field tests and inspections and prepare test reports.
- B. Testing and Inspecting: Engage a qualified testing and inspecting agency to perform tests and inspections and to submit reports.
- C. Inspections:
 - 1. Steel reinforcement placement.
 - 2. Steel reinforcement welding.
 - 3. Headed bolts and studs.
 - 4. Verification of use of required design mixture.
 - 5. Concrete placement, including conveying and depositing.
 - 6. Curing procedures and maintenance of curing temperature.
 - 7. Verification of concrete strength before removal of shores and forms from beams and slabs.
 - 8. Water levels for hydraulic structures.
- D. Concrete Tests: Testing of composite samples of fresh concrete obtained according to ASTM C 172 shall be performed according to the following requirements:
 - 1. Testing Frequency: Obtain one composite sample for each day's pour of each concrete mixture exceeding 5 cu. yd., but less than 25 cu. yd., plus one set for each additional 50 cu. yd. or fraction thereof.
 - a. When frequency of testing will provide fewer than five compressive-strength tests for each concrete mixture, testing shall be conducted from at least five randomly selected batches or from each batch if fewer than five are used.
 - 2. Slump: ASTM C 143/C 143M; one test at point of placement for each composite sample, but not less than one test for each day's pour of each concrete mixture. Perform additional tests when concrete consistency appears to change.
 - 3. Air Content: ASTM C 231, pressure method, for normal-weight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 4. Concrete Temperature: ASTM C 1064/C 1064M; one test hourly when air temperature is 40 deg F (4.4 deg C) and below and when 80 deg F (27 deg C) and above, and one test for each composite sample.
 - 5. Unit Weight: ASTM C 567, fresh unit weight of structural lightweight concrete; one test for each composite sample, but not less than one test for each day's pour of each concrete mixture.
 - 6. Compression Test Specimens: ASTM C 31/C 31M.
 - a. Cast and laboratory cure two sets of two standard cylinder specimens for each composite sample.
 - b. Cast and field cure two sets of two standard cylinder specimens for each composite sample.

7. Compressive-Strength Tests: ASTM C 39/C 39M; test one set of two laboratory-cured specimens at 7 days and one set of two specimens at 28 days.
 - a. Test one set of two field-cured specimens at 7 days and one set of two specimens at 28 days.
 - b. A compressive-strength test shall be the average compressive strength from a set of two specimens obtained from same composite sample and tested at age indicated.
 8. When strength of field-cured cylinders is less than 85 percent of companion laboratory-cured cylinders, Contractor shall evaluate operations and provide corrective procedures for protecting and curing in-place concrete.
 9. Strength of each concrete mixture will be satisfactory if every average of any three consecutive compressive-strength tests equals or exceeds specified compressive strength and no compressive-strength test value falls below specified compressive strength by more than 500 psi.
 10. Test results shall be reported in writing to Engineer, concrete manufacturer, and Contractor within 48 hours of testing. Reports of compressive-strength tests shall contain Project identification name and number, date of concrete placement, name of concrete testing and inspecting agency, location of concrete batch in Work, design compressive strength at 28 days, concrete mixture proportions and materials, compressive breaking strength, and type of break for both 7- and 28-day tests.
 11. Nondestructive Testing: Impact hammer, sonoscope, or other nondestructive device may be permitted by Engineer but will not be used as sole basis for approval or rejection of concrete.
 12. Additional Tests: Testing and inspecting agency shall make additional tests of concrete when test results indicate that slump, air entrainment, compressive strengths, or other requirements have not been met, as directed by Engineer. Testing and inspecting agency may conduct tests to determine adequacy of concrete by cored cylinders complying with ASTM C 42/C 42M or by other methods as directed by Engineer.
 13. Additional testing and inspecting, at Contractor's expense, will be performed to determine compliance of replaced or additional work with specified requirements.
 14. Correct deficiencies in the Work that test reports and inspections indicate do not comply with the Contract Documents.
- E. Measure floor and slab flatness and levelness according to ASTM E 1155 (ASTM E 1155M) within 48 hours of finishing.
- F. All concrete structures designed to contain liquid shall be tested for liquid containment (water tightness)

3.17 PROTECTION OF LIQUID FLOOR TREATMENTS

- A. Protect liquid floor treatment from damage and wear during the remainder of construction period. Use protective methods and materials, including temporary covering, recommended in writing by liquid floor treatments installer.

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 I
 - 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 I
 - 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

SECTION 05050 METAL FASTENINGS

PART 1 - GENERAL

1.01 SCOPE

- A. All necessary fastenings of adequate strength for the purpose intended shall be provided by the Contractor and shall be compatible with the metals being fastened. All fasteners shall be of domestic (USA) manufacture and shall meet all requirements of other appropriate sections of these Specifications.

PART 2 - MATERIALS AND EQUIPMENT

2.01 ACCESSORIES

- A. Field connections of structural steel shall be made by bolting with heavy structural hex bolts, nuts and washers, in strength grade A325 (Type 3), except as otherwise directed by the Engineer or shown on the Drawings.

2.02 QUALITY CONTROL

- A. High strength bolts not designated as Slip Critical (SC) Connections on the Plans shall be installed in properly aligned holes and tightened to the snug tight conditions, per the AISC Manual of Steel Construction, latest edition. .
- B. High strength boles designed as Slip Critical (SC) Connections on the Drawings shall be tightened to the minimum tension specified in Table 4 of the Specification for Structural Joints using ASTM A325 or A490 Bolts.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Slip Critical (SC) Connections shall be made in conformance to AISC Specifications, using the turn-of-nut tightening method.

END OF SECTION

SECTION 5500 WALK-IN ELECTRICAL EQUIPMENT ENCLOSURE

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 an walk-in electrical enclosure, complete and operational with all anchor bolts, fasteners and accessories.
2. CONTRACTOR shall be responsible for all electrical work.
3. The Work also includes providing openings in fabricated metal building to accommodate the Work under this and other Sections.
4. MCC manufacturer shall be responsible for supplying walk-in electrical equipment enclosure.

B. Coordination:

1. Review installation procedures under other Sections and coordinate the installation of items that must be installed with, or before, walk-in electrical equipment enclosure

C. Related Sections:

1. Division 03, Concrete.
2. Division 05, Metals
3. Division 16, Electrical.

1.02 REFERENCES

A. Standards referenced in this Section are listed below:

1. National Electric Manufacturers Association (NEMA)
2. American Institute of Steel Construction (AISC)
3. NFPA 70- National Electrical Code (NEC)
4. Florida Building Code (FBC)
5. American National Standard I American Society of Civil Engineers (ANSI/ASCE)
6. American Iron and Steel Institute (AISI)
7. American Welding Society (AWS)
8. Steel Structures Painting Council (SSPC)
9. American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE)
10. UL 845-UL Standard for Safety Motor Control Centers.
11. Building Officials Code Administrators,(BOCA).

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer:

- a. Minimum of five years' experience producing substantially similar walk-in enclosures and able to show evidence of at least five installations in satisfactory operation for at least five years.
- b. Upon request by ENGINEER, CONTRACTOR shall obtain from manufacturer certification of continuous Quality Control Program and certified test results of physical properties of equipment provided.

2. Professional Engineer:

- a. Engage a Registered Professional Engineer legally qualified to practice in the State of Florida and experienced in providing engineering structural and electrical services of the kind indicated.
- b. Submit qualifications data.
- c. Responsibilities include but are not necessarily limited to:
 - 1) Carefully reviewing product performance and design criteria stated in the Contract Documents.
 - 2) Preparing written requests for clarifications or interpretations of performance or design criteria for submittal to ENGINEER by CONTRACTOR.
 - 3) Preparing the design calculations and related drawings, Shop Drawings, testing plan development, test-result interpretation and a comprehensive engineering analysis verifying compliance of the product with the requirements of the Contract Documents.
 - 4) Signing and sealing all calculations and design drawings, and Shop Drawings.
 - 5) Certifying that the Registered Professional Engineer has performed the design of the product in accordance with the performance and design criteria stated in the Contract Documents, and the said design conforms to all applicable local, state and federal codes, rules and regulations, and to the prevailing standards of practice.

B. Component Supply and Compatibility:

1. Obtain all equipment included in this Section regardless of the component manufacturer from a single manufacturer.
2. Obtain certificate of product compliance from manufacturer/supplier for all components furnished under this Section.
3. All components shall be specifically constructed for the specified service conditions and shall be integrated into the overall product assembly by the product manufacturer.

1.04 SUBMITTALS

A. Action Submittals: Submit the following:

1. Shop Drawings:
 - a. Detailed structural drawings showing the component fabrications and the interfaces with other components. Include dimensions, size, and location of connections to Work under other Sections.
 - b. External utility requirements such as air, water, and power.
 - c. Setting drawings, templates and directions for installation of anchor bolts and other anchorages.
 - d. Shop Drawings shall include electrical drawings which shall include the following:
 - 1) Electrical notes.
 - 2) Enclosure electrical plan showing conduit, wireways and any other means of wiring transit. Drawings shall contain conduit fills.
 - 3) Grounding system layout.
2. Product Data:
 - a. Manufacturer's literature, illustrations, specifications identification of materials of construction, dimensions, profiles and finishes.
3. Delegated Design Data:
 - a. Provide project-specific information as required and as necessary to clearly show calculations, dimensions, logic and assumptions, and referenced standards and codes on which design is based.
 - b. Certification of Design: CONTRACTOR shall submit written certification from the manufacturer, signed and sealed by a Registered Professional Engineer in the State of Florida verifying that the design of the Walk-in Electrical Equipment Enclosure meets the loading conditions, lateral restraint, and wind load design requirements specified herein.

B. Information Submittals: Submit the following:

1. Qualifications Statements: Submit for approval qualifications data as specified in Paragraph 1.3.A, above, for:
 - a. Manufacturer.
 - b. Professional Engineer.
2. Source Quality Control Submittals: Submit for acceptance the following:
 - a. Test Reports.
 - b. Certificates.
3. Supplier's Instructions:

- a. Special shipping, storage and protection, and handling instructions.
- 4. Site Quality Control Submittals:
 - a. Manufacturer's Field Reports.

1.05 DELIVERY, STORAGE AND HANDLING

- A. Walk-in electrical equipment enclosure shall be designed as one unit with no assembly required at the job site. Enclosures that require onsite assembly due to multiple-section delivery to the jobsite will not be considered acceptable. The only exception will be in response to the air conditioning equipment referenced under Paragraph 2.3.1 .
- B. CONTRACTOR shall provide the necessary spreader bars, slings, shackles and any other equipment required to off-load the structure onto its foundation slab.
- C. Store materials to permit easy access for inspection and identification. Protect equipment including packaged materials from corrosion and deterioration. Storage of equipment shall be in accordance with Section 01 66 00, Product Storage and Handling Requirements.
- D. CONTRACTOR shall be responsible for wiring the primary power supply into the enclosure as well as making the final connections for the control equipment and pump station leads.

1.06 WARRANTY

- A. Provide manufacturer's standard written warranty.

1.07 PERMITTING

- A. CONTRACTOR shall supply all required support information and secure all permits required to erect the enclosure.

PART 2 -.PRODUCTS

2.01 MANUFACTURERS

- A. Provide walk-in electrical enclosure building as provided by one of the following:
 - 1. Square D/Schneider Electric.
 - 2. No equal

2.02 SERVICE CONDITIONS

- A. Furnish an walk-in electrical enclosure sized per electrical drawings suitable for outdoor installation at a municipal water treatment facility. The building shall conform to 2014 Florida Building Code for Hurricane wind loading and be weathertight. The Building will be utilized to house pump station MCC and

ancillary electrical equipment as shown on electrical drawings. Consequently, building shall be capable of withstanding continuous exposure to corrosive atmosphere.

- B. Walk-In electrical equipment enclosure shall be installed on and anchored to a concrete pad as required to satisfy wind load criteria. CONTRACTOR is advised that the concrete pad shown on the drawings- is considered minimum. Pad thickness may increase as required, subject to ENGINEER's approval, to support wind load design.

2.03 DETAILS OF CONSTRUCTION

A. General:

- 1. Building shall be structural steel frame fabricated from ASTM A36 channel, wide flange and angle sections forming a self-supporting grid.
- 2. Structural Performance: Provide a walk-in enclosure capable of withstanding the effects of gravity loads and the following loads and stresses:
 - 1) Dead Load: Full dead load of all walk-in enclosure framing and accessories including enclosure cladding.
 - 2) Live Loads: Include vertical loads induced by the walk-in enclosure occupancy. Include loads induced by personnel, materials, and equipment for roof live loads use 30 pounds per square foot.
 - 3) Wind Loads: Include horizontal loads induced by an ultimate wind speed corresponding to the requirements of The 2014 Florida Building Code and ASCE 7-10.
 - a) Ultimate Wind Speed= 158 miles per hour. (Exposure C)
 - b) Risk Category= IV
 - 4) Collateral Loads: Include minimum of 10 pounds per square foot additional collateral load to cover any unanticipated dead load from equipment or piping that may be supported from the walk-in enclosure, other than the weight of enclosure.
 - a) In addition to the listed loads, walk in enclosure design shall include loads from all enclosure supported equipment, such as sprinklers, mechanical systems, electrical systems, material conveying systems, ceilings, piping and accessories shown and required.
 - 5) Load Combinations: Design walk-in enclosure to withstand the most critical effects of load factors and load combinations

B. Enclosure Materials:

- 1. Walls, Ceiling, and Flooring

- a. Roof panels of 16ga minimum pre-galvanized G90 sheet steel tightly interlocking panels. Panels ribs repeat a maximum of 16" center to center. Roof slope is 1/4" per foot minimum or as specified. The entire roof perimeter is trimmed with a fascia that aesthetically hides the standing rib roof edges and prevents high velocity rainwater run-off.
- b. Ceiling panels of 14 ga minimum pre-galvanized G90 sheet steel interlocking panels with vertical standing ribs. Panels ribs repeat a maximum of 16" center to center.
- c. Exterior wall panel shall be 16 ga minimum pre-galvanized G90 sheet steel tightly interlocking panels. Panels ribs repeat a maximum of 16" center to center. Interior wall panel shall be 18 ga minimum pre-galvanized G90 sheet steel interlocking panels. Each interior wall panel is formed with an over and under crease at seams to receive adjacent panels at each splice.
- d. Flooring shall be constructed of ASTM A36 1/4" minimum hot rolled steel floor plate and welded to all main structural base members and ground smooth. The floor is flat and free of voids or extrusions. Provide anchor bolts to hold down the prefabricated structure.
- e. Minimum of 2 Sets of lift lugs.
- f. Building insulation shall be in accordance with the Florida Energy Code latest edition.

2. Personnel Doors

- a. Insulated steel doors shall be manufactured from 18 ga. min. pre-galvanized steel.
- b. Minimum of 1.75" thick, UL listed R4.17, 1.5 hour fire rated.
- c. Weatherproof gasketed with stainless steel hinges and aluminum threshold
- d. Button type Panic Hardware with thumb latch and keyed cylinder lock.
- e. Closure with stopping arm. f. Crash chain.
- g. Drip shield.
- h. Exterior Signs "Danger High Voltage - Keep Out"

3. Finishing.

- a. Exterior Color- White.
- b. Interior Color- ANSI-61 Gray.
- c. Floor Color- ANSI-61 Gray.
- d. Federal Specification TT-C-5208. e. Asbestos Free.
- f. Flammability- 0".
- g. Prior to painting, all exterior and interior surfaces shall be thoroughly cleaned and prepared per the coating manufacturers' recommendations. The enclosure interior and exterior shall be painted with high solids epoxy primer 1.0 to 1.5 OFT minimum and top coated with 1.0 to 1.5 mils OFT minimum of high solids polyurethane enamel.
- h. The floor (top area) shall be coated with a high solids epoxy primer

and top-coated with high solids polyurethane. A non-skid additive shall be applied to the walkway area within the enclosure.

- i. The base and floor underside shall be cleaned to remove oil, water and loose rust and then under coated with epoxy to resist rust and corrosion.

4. Electrical, Lighting ,and Wiring.

- a. All electrical utilities shall be UL listed and labeled on devices.
- b. All exposed conduit shall be installed according to NEC and Division 16 specs.
- c. Powering Wiring shall be minimum XHHW-2, #12AWG Strand min.
- d. HVAC control wiring shall be minimum #16AWG thermostat cable.
- e. Contractor is to wire main circuit breaker as required in MCC.
- f. Fluorescent interior lights, LED exterior lights - in accordance to electrical drawings and specs.
- g. Snap switch, duplex receptacle - in accordance to electrical drawings and specs.

5. Grounding:

- a. Provide minimum of 2 ground pads with 2 hole stainless steel welded and 2 grounding lugs capable of attaching minimum #4/0 grounding wire.

6. HVAC

- a. Minimum of 2- 6 Ton, 480V, 3phase, industrial wall mounted unit, alarm relay, and auto change thermostat located on enclosure wall interior.

7. Accessories:

- a. CONTRACTOR shall coordinate floor cutouts with fabricator and shall provide removable 12 gauge galvanized cover.
- b. CONTRACTOR shall provide 2 Fire Extinguishers B:C C02.

PART 3 - EXECUTION

3.01 INSTALLATION

- A. Install all Work in complete accordance with manufacturer's instructions and recommendations, and the approved Shop Drawings.
- B. Do not install damaged items until repairs are made in accordance with manufacturer's written instructions and approval by ENGINEER. Only minor repair work will be permitted in the field. Return all other damaged items requiring remedial work to manufacturer for repair or replacement.
- C. Set anchor bolts in accordance with manufacturer's approved drawings.

3.02 STARTUP

- A. CONTRACTOR shall verify that all Work furnished and installed is compatible with design function and shall make all adjustments required to place all Work in proper operating condition.

END OF SECTION

SECTION 09900 PAINTING AND SPECIAL COATINGS

PART 1 GENERAL

1.01 DESCRIPTION OF WORK

- A. The work includes furnishing all labor, materials and equipment required to complete the painting and coatings as indicated on the Drawings and in these specifications.
- B. Surface preparation, paint and coatings materials, and their application shall be as recommended by the coating manufacturer and approved by the OWNER'S Representative. The CONTRACTOR shall take all health and safety precautions necessary to prevent accidents during the storage, handling, application, and drying of any of the coatings described.
- C. Paints and coatings used to furnish the surfaces of structures or vessels which come into contact with potable water shall meet the applicable requirements of the County Health Department and the State Department of Environmental Protection or other regulatory agencies having jurisdiction.

1.02 QUALITY ASSURANCE

- A. The CONTRACTOR is responsible for a satisfactory paint application which will adhere without peeling, flaking, blistering or discoloration. Before application of any painting materials, the CONTRACTOR shall submit a letter of Certification from the manufacturer of the materials selected for the application proposed.
- B. Available Manufacturers: Subject to compliance with requirements, manufacturers offering products which may be incorporated in the work are limited to the following:
 - 1. Tnemec Company, Inc. - Basis of Design
 - 2. Carboline Company
 - 3. Induron Coatings
 - 4. Dudick Inc.

1.03 SUBMITTALS

- A. Data Sheets and Color Charts:
 - 1. The full name of each product and descriptive literature shall be submitted along with a list of water and wastewater plants in Florida where the product has been used.
 - 2. Within a minimum of 30 days prior to application of paints and coatings, the CONTRACTOR shall submit six sets of color charts and data sheets for selection by the OWNER. Before work is commenced, the CONTRACTOR

shall prepare samples as required until the color and textures are satisfactory to the OWNER.

3. Resubmit samples as requested until required sheen, color and texture is achieved.
 - a. On 12-inch x 12-inch hardboard, provide two samples of each color and material, with texture to simulate finish conditions. On actual wood surfaces, provide two 4-inch x 8-inch samples for stained wood finish. On concrete Masonry, provide two 4-inch square samples of masonry for each type of finish and color, defining filler, prime and finish coats. On actual wall surfaces and other building components, duplicate painted finish of acceptable samples, as directed by the OWNER'S Representative.

1.04 DELIVERY AND STORAGE

- A. Deliver materials to job site in new, original, and unopened containers bearing manufacturer's name, trade name, and label analysis. Store where directed in accordance with manufacturer's instructions. All paint materials used on the job shall be kept in a single place which shall be kept neat and clean. All oily rags, waste or debris shall be removed every night and all precautions taken to avoid the danger of fire. NOTE: Materials may be flammable, and the area should be marked accordingly. Keep coatings out of the weather.
- B. Extra Stock: At the conclusion of the project, the CONTRACTOR shall provide the OWNER with a minimum of one quart from each 50 gallons or fraction thereof for each paint system used on the project. The paint or coating container shall indicate the applicable paint system as indicated in these specifications.

1.05 JOB CONDITIONS

- A. Painting or coating and finishing of interior and exterior items and surfaces, unless otherwise indicated:
 1. Paint all new construction and portions of existing facilities disturbed by new construction.
 2. Paint all exposed surfaces, except as otherwise indicated, whether or not colors are designated. If not designated, colors will be selected by the OWNER'S Representative from standard colors available for the coatings required.
 3. Includes field painting of bare and covered pipes and ducts (including color coding), and hangers, exposed steel and iron work, and primed metal surfaces of equipment installed under mechanical and electrical work.
 4. Painting shall be done at such times as the CONTRACTOR and OWNER'S Representative may agree upon in order that dust-free and neat work is obtained. Painting shall be done strictly in accordance with the

manufacturer's instructions and shall be performed in a manner satisfactory to the OWNER'S Representative.

5. "Shop" painting as referred to defines the paint coat which shall be applied in the shop or plant immediately after manufacture, fabrication or assembly and prior to shipment to the site of installation. "Field" painting defines the paint coats to be applied at the project site where the structure or equipment is completed, erected, or installed in place as specified.

B. Materials and Application:

1. Obtain painting materials from one manufacturer. Painting materials not obtainable from the prime manufacturer shall be obtained from a second source recommended by the prime manufacturer. All solvents for thinning shall be obtained from the coating manufacturer. Only use solvents as listed on the manufacturer's product literature.
2. There shall be a perceptible difference in shades of successive coats of paint so that the application of successive coats of paint can be properly and uniformly spread and inspected. Pipes, sheet metal ducts and other metal items which are to be installed in inaccessible locations shall be painted prior to installation.
3. Each coat shall be allowed to dry for the period of time recommended by the manufacturer before the next coat is applied.
4. Proceeding to apply the coatings indicates that the coating contractor has accepted the condition of the existing coating. If questions arise, they should be brought to the attention of the OWNER or OWNER'S REPRESENTATIVE. Do not proceed until resolved.

C. Equipment, Machinery, and Shop Fabricated Items:

1. Pumps, motors, machinery, equipment and other manufactured items shall have surfaces prepared, primed and finish-coated in accordance with the standard practice of the manufacturer. Finish coat colors shall be as approved by the OWNER'S Representative.
2. Shop-fabricated items and components for field assembly shall have surfaces prepared and shop-primed. Finish coat colors shall be as approved by the OWNER'S Representative. Items for submerged service shall be field sandblasted and primed per Paint System B-4.

PART 2 PRODUCTS

2.01 GENERAL REQUIREMENTS - ALL SYSTEMS

- A.** The film thickness designated and/or the number of coats to be applied shall not be decreased and shall be increased where required to meet other manufacturer's recommendations.

- B. Manufacturer's recommendations as to which finish coat should be used with a particular primer shall be observed. In all cases, the prime coat, intermediate coat, finish coat, and all solvents and thinners shall be from the same manufacturer. All paint shall be mildew resistant.
- C. Tnemec products are given as examples of painting and coating systems identified in the following paragraphs. The products of other manufacturer's (listed in Paragraph 1.02.B.) may be used as long as they are of the same quality and meet the performance criteria.
- D. Substitution requests must be considered provided they are submitted ten (10) days prior to bid opening and follow the criteria specified in Section 01600.

2.02 GROUP A - CONCRETE AND MASONRY (NOT IN CONTACT WITH POTABLE WATER)

- A. System A-1: For use on above grade interior walls, ceilings, and architectural surfaces not subject to high moisture, corrosion, splashing, or fumes. Typical areas would include storage and electrical rooms.

Surface Preparation: Level protrusions and remove mortar splatter from all surfaces. Allow new concrete to cure 28 days prior to coating. All surfaces shall be clean and dry before proceeding.

1. Interior Concrete Surfaces Excluding CMU (Non-Immersion):

- a. Prime: Apply 1 coat of Tnemec Series 54 Masonry Filler at 80 - 100 sq.ft. per gallon.
- b. Intermediate: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.

2. Interior CMU or Porous Block (Non-Immersion):

- a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at approximately 75 - 100 sq.ft. per gallon.
- b. Intermediate: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.

- B. System A-2: For use on above grade interior walls, ceilings, and non-traffic slabs that are subject to high moisture, physical abuse, mild chemical fumes, splashing and spillage of water or wastewater byproducts, etc.

Surface Preparation: Level protrusions and remove mortar splatter from all surfaces. Allow new concrete to cure 28 days. All surfaces shall be clean and dry before proceeding. Pressure washing may assist in removing loose dirt and contamination.

1. Interior Concrete Surfaces Excluding CMU (Non-Immersion):

- a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at 125 - 150 sq.ft. per gallon.
- b. Intermediate: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.

2. Interior CMU or Porous Block (Non-Immersion):

- a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at approximately 120 - 130 sq.ft. per gallon.
- b. Intermediate: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series N69 Hi-Build Epoxoline II at 4.0 - 6.0 mils dft.

3. Interior CMU or Porous Block For Locker Rooms, Bathrooms:

Surface Preparation: Clean and dry, level protrusions, and remove mortar splatter from all surfaces. Allow mortar to cure 14 days before proceeding with coating.

- a. Prime/Surfer: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at 120 - 130 sq.ft. per gallon.
- b. Intermediate: Apply 1 coat of Tnemec Series 113 H.B. Tneme-Tufcoat at 4.0 - 6.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series 113 H.B. at 4.0 - 6.0 mils dft.

C. System A-3: For use on exterior concrete walls above grade to a point at least 6" below finish grade (extend to depth where nearest course ends, if applicable). Applicable to all buildings and structures.

Surface Preparation: Fill all voids with grout; remove loose mortar, mortar splatter, protrusions, etc. Allow all concrete or grout to cure a minimum 28 days before proceeding. Remove all dirt or contamination before proceeding.

1. Exterior Concrete Buildings: Poured or cast-in-place.

- a. Prime: Apply 1 coat of Tnemec Series 1026 Enduratone at 2.0 - 3.0 mils dft.
- b. Intermediate: Apply 1 coat of Tnemec Series 1026 Endrutatone at 2.0 - 3.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series 1026 Enduratone at 2.0 - 3.0 mils dft.

2. Exterior Concrete Buildings: CMU

- a. Prime: Apply 1 coat of Tnemec Series 1254 Epoxoblock WB at a spreading rate of between 120 - 130 sq.ft. per gallon.

- b. Intermediate: Apply 1 coat of Tnemec Series 1026 Enduratone at 2.0 - 3.0 mils dft.
- c. Finish: Apply 1 coat of Tnemec Series 1026 Enduratone at 2.0 - 3.0 mils dft.

Or, if an elastomer is preferred, use the following:

- 3. Exterior Concrete Buildings: CMU or PIP - Elastomeric
 - a. Prime: Apply 1 coat of Tnemec Series 156 Enviro-Crete at 4.0 - 6.0 mils dft.
 - b. Finish: Apply 1 coat of Tnemec Series 156 Enviro-Crete at 4.0 - 6.0 mils dft.

- D. System A-4: For use on all exterior concrete walls below a point six inches below finish grade.

Surface Preparation: Remove all loose dirt and contamination. Clean and dry before proceeding.

- 1. Exterior Concrete Walls: Poured or Cast-in-Place
 - a. Prime: Apply 1 coat of Tnemec Series 46H-413 Tneme-Tar at 8.0 - 10.0 mils dft.
 - b. Finish: Apply 1 coat of Tnemec Series 46H-413 Tneme-Tar at 8.0 - 10.0 mils dft.

- E. System A-5: For use on interior concrete floors.

Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic film tape-down test" (reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor using Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed three pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13).

- 1. Interior Concrete Floors: Electrical Room, Storage Room, similar.
 - a. Surface Profile: Abrade to ICRI CSP 2-3.
 - b. Prime: Apply 1 coat of Tnemec Series 287 Enviro-Pox at 3.0 - 4.0 mils dft.
 - c. Intermediate: Apply 1 coat of Tnemec Series 287 Enviro-Pox at 3.0 - 4.0 mils dft.

- d. Finish: Apply 1 coat of Tnemec Series 290 (pigmented) CRU at 2.0 - 3.0 mils dft.

2.03

GROUP B - STRUCTURAL STEEL; STEEL TANKS; EQUIPMENT AND PIPING (NOT IN CONTACT WITH POTABLE WATER)

- A. System B-1: For all new steel or site fabricated steel: Exterior or interior and moderate immersion exposure.
 - 1. Surface Preparation: Non-immersion - For exposed steel, excluding immersion service, abrasive blast per SSPC SP6 to a Commercial Grade finish to obtain a 1.5 mil blast profile. For immersion exposure - abrasive blast per SSPC SP10 to a Near White finish to obtain a minimum 1.5 mil blast profile.
 - 2. Shop or field apply 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft. As an option, apply 1 coat of Tnemec Series 90G-1K97 Tneme-Zinc at 2.5 - 3.5 mils dft.
- B. System B-2: For use on exterior exposed structural and miscellaneous steel; interior and exterior - non immersion exposure. Typical items include steel piping, exterior of steel tanks, structural support steel, etc. This system can be exposed to a corrosive atmosphere; not in contact with wastewater or where a color finish is desired.
 - 1. Surface Preparation: Remove all grease and dirt per SSPC SP1 before proceeding. Commercial blast clean per SSPC SP-6 to achieve a minimum 1.5 mil blast profile.
 - 2. Shop Prime: Apply 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft.
 - 3. Prime Coat: For steel that has been shop primed, clean damaged areas by Power Tool Cleaning SSPC SP3 and spot prime using Tnemec Series 27WB at 3.0 - 5.0 mils dft before applying the "Primer". For steel that has not been shop primed, apply 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft.
 - 4. Intermediate: Apply 1 coat of Tnemec Series 27WB Typoxy at 4.0 - 6.0 mils dft.
 - 5. Finish: Apply 1 coat of Tnemec Series 1095 Endura-Shield at 3.0 - 5.0 mils dft.
- C. System B-3: For use on bituminous coated cast iron or steel pipe.
 - 1. Surface Preparation for bituminous pipe: Wash to remove all grease and dirt before coating. Sweep blast per SSPC SP7 or Power Tool Clean per SSPC SP-3.
 - 2. Prime: Spot prime all bare and damaged areas with one coat of Tnemec Series 135 Chembuild at 3.0 - 5.0 mils dft.

3. Intermediate: Apply 1 coat overall of Tnemec Series 135 Chembuild at 3.0 - 5.0 mils dft.
 4. Finish: Apply 1 coat of Tnemec Series 1095 Endura-Shield at 3.0 - 5.0 mils dft.
- D. System B-4: For use on exterior steel tanks, piping and equipment, submerged in moderate corrosive service, excluding chains, sprockets and similar items. This system shall be used for all materials submerged in wastewater. For use in splash and spillage and where a color stable topcoat is required, use System B-2.
1. Surface Preparation: For a shop application, see System B-1. For field applications, abrasive blast all steel to a Near White finish per SSPC SP10 to achieve a minimum 1.5 mil blast profile.
 2. Prime: All steel shall be primed with 1 coat of Tnemec Series 1 Omnithane at 2.5 - 3.5 mils dft, whether shop or field applied.
 3. Intermediate: Apply 1 coat of Tnemec Series 446 Perma-Shield MCU at 6.0 - 8.0 mils dft.
 4. Finish: Apply 1 coat of Tnemec Series 446 Perma-Shield MCU at 6.0 - 8.0 mils dft. Use alternating colors between coats.
- E. System B-5: For all submerged metals in severe wastewater service or area subject to severe H₂S exposures or severe abrasion exposure.
1. Surface Preparation: Field abrasive blast to a White Metal finish per SSPC-SP5 to achieve a minimum 3.0 mil blast profile. Prime before any rust bloom.
 2. Prime: Apply 1 coat of Tnemec Series 435 Perma-Glaze at 15.0 - 20.0 mils dft.
 3. Finish: Apply 1 coat of Tnemec Series 435 Perma-Glaze at 15.0 - 20.0 mils dft. Alternating colors should be used.
- F. System B-6: For use on hollow metal (steel) doors and frames, steel embedments, and steel lintels: Pre-primed with alkyd primer, shop or unknown primer, or bare metal. Interior or exterior exposure.
1. Surface Preparation: Remove all grease and oil before proceeding by SSPC SP1. Abrade per SSPC-SP3 before proceeding.
 2. Prime (touch-up only): Prime bare or damaged areas with 1 coat of Tnemec Series 27WB Typoxy at 2.0 - 5.0 mils dft.
 3. Intermediate: Apply 1 coat of Tnemec Series 27WB Typoxy at 3.0 - 5.0 mils dft.

4. Finish: Apply 1 coat of Tnemec Series 1095 Endura-Shield at 3.0 - 5.0 mils dft.
- G. System B-7: For use on ductile iron pipe with immersion in potable water
1. Surface Preparation (shop): Abrasive blast all surfaces per NAPF-500-03-04 (pipe), and NAPF-500-03-05 (fittings).
Surface Preparation (field repairs): NAPF 500-03-03 - Power Tool Cleaning
 2. Primer: Tnemec Series N140-1211 @ 6.0-8.0 mils DFT
 3. Spot Field Repair: Tnemec Series N140-Color @ 3.0-5.0 mils DFT
 4. Intermediate: Tnemec Series N140-Color @ 3.0-5.0 mils DFT
 5. Finish: Tnemec Series N140-Color @ 3.0-5.0 mils DFT
- H. System B-8: For use on ductile iron pipe non submerged, exterior, exposed to atmospheric conditions and UV
1. Surface Preparation (shop): Abrasive blast all surfaces per NAPF-500-03-04 (pipe),and NAPF-500-03-05 (fittings).
Surface Preparation (field repairs): NAPF 500-03-03 - Power Tool Cleaning
 2. Primer: Tnemec Series N140-1211 @ 6.0-8.0 mils DFT
 3. Spot Field Repair: Tnemec Series N140-Color @ 3.0-5.0 mils DFT
 4. Intermediate: Tnemec Series 27WB @ 3.0-5.0 mils DFT
 5. Finish: Tnemec Series 1095 @ 2.5-4.0 mils DFT

2.04 GROUP C - GALVANIZED AND NON-FERROUS METALS

- A. System C-1: For galvanized steel in interior (buildings) or exterior substrates in corrosive areas, non-submerged surfaces, non-potable water applications, include ductwork.
1. Surface Preparation: Remove all grease and oil before proceeding by SSPC SP1. Abrade all surfaces to be coated by Brush-Off blasting per SSP SP7 to achieve a minimum 1.5 mil blast profile.
 2. Prime: Spot prime all bare or rusted areas with 1 coat of Tnemec Series 27WB Typoxy at 2.0 - 5.0 mils dft.
 3. Intermediate: Apply 1 coat of Tnemec Series 27WB Typoxy at 3.0 - 5.0 mils dft.
 4. Finish: Apply 1 coat of Tnemec Series 1095 Endura-Shield @ 3.0-4.0 mils DFT

- B. System C-2: For use on (in interior dry) all aluminum, including ductwork.
 - 1. Surface Preparation: Solvent clean per SSPC-SP1 and abrade the surface to provide a mechanical bond.
 - 2. Prime: Apply 1 coat of Tnemec Series 115 Unibond DF @ 2.0-4.0 mils DFT
 - 3. Finish: Apply 1 coat of Tnemec Series 115 Unibond DF @ 2.0-34.0 mils DFT
- C. System C-3: For use in exterior non-corrosive areas, galvanized steel and aluminum materials, including ductwork. Refer to System C-1 or C-2.

2.05 GROUP D - EXPOSED HOT METAL SURFACES

- A. System D-1: For use on un-insulated surfaces at temperatures between 250° and 1000°.
 - 1. Surface Preparation: Solvent clean per SSPC-SP1 before proceeding. Abrasive blast all ferrous metal to be coated to an SSPC SP10 Near White Finish with a 1.5 mil blast profile.
 - 2. Prime: Apply 1 coat of Dampney Thurmalox 245 High Heat primer at 1.5 - 2.0 mils dft.
 - 3. Finish: Apply 1 coat of Dampney Thurmalox 230 High Heat coating at 1.5 - 2.0 mils dft. For an aluminum finish, use Dampney Thermalox 280 at the same thickness.

2.06 GROUP E - WOOD

- A. System E-1: For use on interior wood where a natural or stained finish is required.
 - 1. Surface Preparation: Sand smooth, wipe off any excess accumulations of sap, pitch, etc. by SSPC SP1. Fill holes, checks, scratches, etc. with appropriate tinted wood filler.
 - 2. Natural Finish:
 - a. Prime: None required.
 - b. Finish: Apply a pure tung oil with a rag and work into wood grain. Allow to dry over night and repeat.
 - 3. Stained Finish:
 - a. Prime: Apply 1 coat of penetrating wood stain of the color chosen.
 - b. Finish: Apply 2 coats of a water-based clear polyurethane to provide a smooth and UV resistant finish.
- B. System E-2: For use on interior surfaces not exposed to moisture or corrosive conditions.

1. Surface Preparation: Sand smooth, seal knots with white shellac (fill holes with vinyl putty after prime).
 2. Prime: Apply 1 coat of Tnemec Series 10 Tnemec Primers at 2.0 - 3.5 mils dft.
 3. Intermediate: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.
 4. Finish: Apply 1 coat of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft.
- C. System E-3: For use on interior surfaces exposed to moisture or corrosive conditions, exterior wood, and exterior wood surfaces.
1. Surface Preparation: Remove excess sap or pitch before proceeding. Sand smooth. Prime first before sealing cracks with an acceptable filler.
 2. Prime: Apply 1 coat of Tnemec Series 287 Enviro-Pox at 2.0 - 3.0 mils dft.
 3. Finish: Apply 1 coat of Tnemec Series 287 Enviro-Pox at 2.0 - 3.0 mils dft.
- D. System E-4: For use on interior wood paneling and trim. Refer to System E-2.
- E. System E-5: For use on exterior wood surfaces where a natural finish is desired.
1. Apply two coats of clear sealant, Flood Co. - CWF, or equal, applied in accordance with manufacturer's recommendations.

2.07 GROUP G - GYPSUM BOARD AND PLASTER (INTERIOR)

- A. System G-1: For use on interior walls and ceilings of gypsum board or plaster.
1. Surface Preparation: Gypsum wall board - Tape joints, spackle nail head, sand smooth, and wipe with a damp cloth to remove dust. Plaster - Nibs shall be scraped and sanded smooth, cracks spackled smooth, sanded and sealed.
 2. Prime: Apply 1 coat of Tnemec Series 51 PVA Sealer at 1.0 - 2.0 mils dft.
 3. Intermediate and Finish: Apply 2 coats of Tnemec Series 1029 Enduratone at 2.0 - 3.0 mils dft per coat.

2.08 GROUP H - PORTLAND CEMENT PLASTER (STUCCO)

- A. System H-1: For use on exterior stucco where an elastomeric coating is required. Smooth or texture is available.
1. Surface Preparation: Stucco shall have nibs scraped and sanded smooth. Cracks shall be spackled, smooth sanded, and sealed.

2. Prime: Apply 1 coat of Tnemec Series 151 Elasto-Grip FC at 300 - 350 sq.ft. per gallon.
3. Intermediate and Finish: Apply 2 coats of Tnemec Series 156 Enviro-Crete at 4.0 - 8.0 mils dft per coat. A minimum of 10 mils dft is required. For a textured finish, use Tnemec Series 157 Enviro-Crete at the same thickness.

2.09 GROUP J - WATER TANKS AND SURFACES IN CONTACT WITH POTABLE WATER

The interior tank paint system shall meet USEPA, National Sanitation Foundation (NSF), and Florida Department of Environmental Protection (FDEP) health standards for use in potable water service. A letter of acceptance by the FDEP shall be furnished to the ENGINEER for the system selected prior to paint application. Disinfection of tank shall be in accordance with Section 02616: Disinfection.

- A. System J-1: For poured or cast-in-place concrete in immersion service of potable water requiring an NSF 61 approved lining. All concrete surfaces must be allowed to cure for a minimum of 28 days at 75°F.

1. Surface Preparation: Remove all dirt and debris before proceeding. Abrasive blast the surface per SSPC SP13/NACE 6 to achieve a surface profile per ICRI CSP 5. Fill all holes, voids, cracks, and pits with Tnemec Series 218 Mortarclad as required. Apply one (1) coat of Tnemec Series 218 Mortarclad to all surfaces at an average of 1/16" dft.

Choose the preference for a liner. Both materials are NSF 61 tested and listed.

2. Immersion Service: Epoxy
 - a. Prime: None needed
 - b. Finish: Apply 1 coat of Tnemec Series FC 22 Epoxoline at 20 - 25 mils dft.
3. Immersion Service: Elastomeric flexible liner
 - a. Prime: Apply 1 coat of Tnemec Series 20 Pota-Pox @ 4 - 6 mils dft.
 - b. Finish: Apply 1 coat of Tnemec Series 264 Elasto-Shield at 50 - 60 mils dft.

- B. System J-2: For steel tanks in immersion service for potable water when the lining is required to meet NSF 61 standards.

1. Surface Preparation: Abrasive blast all surfaces to a minimum Near White Finish in accordance with SSPC SP10 to achieve a minimum 2.0 mil blast profile.
2. Prime: Apply 1 coat of Tnemec Series N140 Pota-Pox Plus at 3.0 - 5.0 mils dft.

3. Intermediate: Stripe by brush all welds, edges, corners, etc. with 1 coat of Tnemec Series N140 Pota-Pox Plus.
 4. Finish: Apply 1 coat of Tnemec Series FC 22 Epoxoline at 20 - 25 mils dft.
- C. System J-3: For poured or cast-in-place concrete tanks in immersion service of potable water requiring an NSF 61 approved lining.
1. Surface Preparation: Allow new concrete to cure for a minimum of 28 days. Test for moisture by plastic film tape down test (ASTM D 4263). Remove all laitance, fines, curing compounds, form release oils, and other foreign contaminants by Brush-off Blast cleaning (abrasive blasting). All surfaces must be clean and dry prior to the application of any coatings. All concrete surfaces must have a surface profile equivalent to ICRI CSP5. Apply first coat as soon as possible the same day as surface preparation to avoid contamination of the surface.
 2. Resurfacing Concrete: Apply Tnemec Series 218-1000 MortarClad to all prepared surfaces @ an average of 1/16" DFT in order to reduce the potential of concrete outgassing in the finish coat, fill voids and bugholes, and establish a 'paintable' surface.
 - a. Note: The coating system may be applied over Series 218 within 12-18 hours(@ 75 deg. F)
 3. Prime: Tnemec Series 22 Epoxoline@ 12.0-14.0 mils DFT.
 4. Finish: Tnemec Series 22 Epoxoline@ 12.0-14.0 mils DFT.

Total DFT for the two coat system: 24.0-28.0 mils DFT

2.10 GROUP K - METAL EXPOSED TO CORROSIVE ATMOSPHERE (EXTERIOR OF NEW STEEL TANKS); EXPOSED INTERIOR OF OPEN TOP STEEL TANKS; STRUCTURAL STEEL, EQUIPMENT AND PIPING

- A. System K-1: For use on the exterior of new steel tanks and support structures; steel catwalks, and other exposed structural steel, equipment, and piping subject to a corrosive atmosphere. Refer to System B-2.

2.11 GROUP L - CONCRETE TANKS - IMMERSION SERVICE

- A. System L-1: For use on exterior of concrete tank walls below a point 6 inches below finish grade. Refer to System A-4.
- B. System L-2: For use on the interior of open top concrete tanks. Exposed concrete or masonry surfaces in a corrosive immersion environment. Typical areas would include areas of high H₂S environments.
1. Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic firm tape-down test" (reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using

Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed 3 pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13). Abrasive blast the surface per SSPC SP13/NACE 6 to achieve a surface profile of ICRI CSP 5. Fill all holes, voids, cracks and pits with Tnemec Series 218 Mortarclad as required.

2. Surfacer: Surface all walls with 1 coat of Tnemec Series 218 Mortarclad at a minimum 1/16" dft. For floors, Tnemec Series 215 may be used.
 3. Intermediate: Apply 1 coat of Tnemec Series 434 Perma-Shield H2S at a minimum 125 mils dft.
 4. Finish: Apply 1 coat of Tnemec Series 435 Perma-Glaze at 15 - 20 mils dft.
- C. System L-3: For use on the interior of open top concrete tanks. Exposed concrete or masonry surfaces in a corrosive immersion environment. Typical areas would include clarifiers, digesters, etc.
1. Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic firm tape-down test" (reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed 3 pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13). Abrasive blast the surface per SSPC SP13/NACE 6 to achieve a surface profile of ICRI CSP 5. Fill all holes, voids, cracks and pits with Tnemec Series 218 Mortarclad as required.
 2. Surfacer: Surface all walls with 1 coat of Tnemec Series 218 Mortarclad at a minimum 1/16" dft. For floors, Tnemec Series 215 may be used.
 3. Prime: Apply 1 coat of Tnemec Series N69-1211 Hi-Built Epoxoline II at 4.0 - 6.0 mils dft.
 4. Intermediate and Finish: Apply 2 coats of Tnemec Series 446 Perma-Shield MCU at 5.0 - 7.0 mils dft. Alternating colors may be used.

- D. System L-4: For use on the exterior of concrete tanks.
1. Surface Preparation: Remove all loose dirt, debris and contamination. Clean and dry.
 2. Intermediate and Finish: Apply 2 coats of Tnemec Series 156 Enviro-Crete at 4.0 - 8.0 mils dft. A minimum of 10 mils dft shall be applied.

2.12 GROUP M - SPECIAL COATINGS

- A. System M-1: For use as barrier between dissimilar materials and metals; i.e., such as aluminum and concrete connections.
1. Surface Preparation: Clean and dry.
 2. Prime: None
 3. Finish: Apply 2 coats of Tnemec Series 46-465 H.B. Tnemecol at 8.0 - 12.0 mils per coat.
- B. System M-2: For use as a primer - sealer for coloring asphaltic and tar surfaces.
1. Prime: Apply 1 coat of Tnemec Series 66HS Epoxoline at 4.0 - 6.0 mils, dft.
 2. Finish: Coat primer with paint appropriate to location and environment.
- C. System M-3: For sealing concrete floors where concrete is shown as natural in the Finish Schedules and on all exposed concrete floors where no finish has been shown.
1. Surface Preparation: Allow new concrete to cure 28 days. Verify dryness by testing for moisture with a "plastic firm tape-down test" (reference ASTM D 4263). Should moisture be detected, perform "Standard Test Method for Measuring Moisture Vapor Emission Rate of Concrete Subfloor Using Anhydrous Calcium Chloride" (reference ASTM F 1869). Moisture content not to exceed 3 pounds per 1,000 sq.ft. in a 24-hour period. Acid-etch or mechanically abrade concrete to remove laitance and create profile. If acid-etching, no contaminants or surface additives/treatments such as form release agents, curing compounds, hardeners or sealers should be present in the surface of the concrete as they can impede the acid's ability to properly etch and profile the floor. If these conditions exist, mechanical preparation is the only recommended method to clean and profile the floor. Large voids and other cavities should be filled with recommended filler or surfacer (reference SSPC-SP13).
 2. Prime: Apply 1 coat of Tnemec Series 287 Enviro-Pox clear at 3.0 - 5.0 mils dft.
 3. Finish: Apply 1 coat of Tnemec Series 294 Clear CRU at 2.0 - 3.0 mils dft. Both products are available in a pigmented version if a solid color floor is preferred.

- D. System M-4: For coating of PVC piping, interior or exterior.
1. Surface Preparation: Degrease and clean per SSPC-SP-1 first, then scarify surface.
 2. Prime: Apply 1 coat of Tnemec Series 66 Hi-Build Epoxoline at 2.0 - 3.0 mils dft.
 3. Finish: Apply 1 coat of Tnemec Series 1095 Endurashield at 2.5 - 5.0 mils dft.
- E. System M-5: For coating of FRP piping, interior or exterior.
1. Surface Preparation: SSPC-SP-1 first, then abrade the surface to be coated. Remove any dust, dirt or contamination before proceeding. Clean and dry.
 2. Prime: Apply 1 coat of Tnemec Series 66 Hi-Build Epoxoline at 2.0 - 3.0 mils dft.
 3. Finish: Apply 1 coat of Tnemec Series 1095 Endurashield at 2.5 - 4.0 mils dft.

2.13

GROUP N - COATINGS FOR DUCTILE IRON PIPE IN WASTEWATER ENVIRONMENTS

This section covers the specification for lining ductile iron pipe for wastewater environments, both interior and exterior of pipe. The system shall also be specified for all fittings and flanges.

- A. System N-1: Exterior coating system for above ground exposed DIP where a color is required. Non-immersion service. Pipe should be ordered as shop primed.
1. Surface Preparation: Ductile iron pipe is cleaned per NAPF Standards 500-03 for Commercial Grade abrasive blast cleaning.
 2. Shop Primed: Apply 1 coat of Tnemec Series N140 Pota-Pox Plus at 4.0 - 6.0 mils dft. The following is for pipe in the field:
 - a. Power tool clean all bare and damaged areas by SSPC SP3.
 - b. Prime: Apply 1 coat of Tnemec Series 27WB Typoxy at 3.0 - 5.0 mils dft.
 - c. Intermediate: Apply 1 coat of Tnemec Series 27WB at 4.0 - 6.0 mils dft.
 - d. Finish: Apply 1 coat of Tnemec Series 1095 Endurashield at 3.0 - 5.0 mils dft.
- B. System N-2: For the exterior of ductile iron pipe in immersion service or exposed to a severe H₂S environment.
1. Surface Preparation: Ductile iron pipe is cleaned per NAPF Standards 500-03 for Commercial Grade abrasive blast cleaning to obtain a 3 mil blast profile.
 2. Finish: Apply Tnemec Series 435 Perma-Shield Glaze at 35.0 - 40.0 mils dft.

3. Where above grade and exposed to sunlight apply one coat of semi-gloss acrylic polyurethane, 2-4 mils dft Tnemec 73U Endura-Shield to prevent chalking. Prior to over coating, Series 435 shall be scarified to degloss the surface.
- C. System N-3: Lining ductile iron pipe for severe wastewater environments. Order pipe lined from the factory.
1. Surface Preparation: Abrasive blast and grind pipe to SSPC SP5 White Metal Finish with a minimum 3.0 mil blast profile.
 2. Finish: Apply Tnemec Series 431 Perma-Shield PL at a nominal 40 mil thickness or Induron's Protecto 401 at a nominal 40 mil thickness.
- D. System N-4: Lining ductile iron pipe and fittings conveying aggressive potable water in the water treatment plant. Order pipe lined from the factory.
1. Surface Preparation: Abrasive blast and grind pipe to SSPC SP5 white metal finish with a minimum 3.0 mil blast profile.
 2. Finish: Apply Induron's Ceramapure at a nominal 30 mil thickness. The Ceramapure shall be NSF 61 approved.

2.14 FINISH COAT OVER EXISTING FINISH

- A. The required painting shall consist of one coat of the system "Finish Coat" to provide continuity of texture and color over previously painted surface.

2.15 THINNING

- A. Where thinning is necessary, only the products for the particular purpose and by the manufacturer furnishing the paint shall be allowed. All thinning shall be done strictly in accordance with the manufacturer's instructions and with the full knowledge and approval of the OWNER'S Representative.

PART 3 EXECUTION

3.01 GENERAL

- A. All painting shall be done in strict accordance with the recommendations of the manufacturer and shall be performed in a manner satisfactory to the Owner/Engineer.
- B. All recommendations of the paint manufacturer in regard to mixing, applying, thinning and curing, as well as the health and safety of the workers, shall be followed.
- C. Dry film thickness for masonry is approximate for application to a smooth surface.
- D. Sequence painting to ensure work area is dust free.

3.02 SHOP PAINTING

- A. All ferrous and non-ferrous surfaces shall be solvent cleaned before priming. Primer shall be applied in the shop to protect surfaces from rust during shipment and storage.
- B. Apply two coats of paint to surfaces which are inaccessible after assembly or erection.

3.03 FIELD PREPARATION

- A. All surfaces to be painted shall be prepared in a workmanlike manner with the objective of obtaining a smooth, clean and dry surface. No painting shall be done before the prepared surfaces are approved by the OWNER'S Representative.
- B. Surface preparation for miscellaneous surfaces to be painted, not specifically covered in these specifications, shall be as recommended by the manufacturer of the paint selected for use and as approved by the OWNER'S Representative.
- C. Perform preparation and cleaning procedures in strict accordance with coating manufacturer's instructions for each substrate condition.
- D. Remove hardware and accessories, machined surfaces, plates, lighting fixtures and similar items in place and not to be finish-painted, or provide surface-applied protection. Reinstall removed items after painting is completed. Measure moisture content of surfaces using an electronic moisture meter. Do not apply finishes to masonry walls unless moisture content of surfaces are below 12 percent.

3.04 MIXING

- A. Exercise care to keep fire hazards to a minimum. Provide an approved hand fire extinguisher near each paint storage and mixing area. No oily waste, rags, or painting equipment shall be left scattered throughout the premises.
- B. Mix coatings in accordance with manufacturer's instructions. Colors shall be thoroughly mixed with no streaks or separation of color. Do not add thinners, driers or other additives except as recommended by the coating manufacturer. Do not incorporate in the coating any thinners or solvents used for cleaning brushes or equipment.
- C. Protect all adjacent areas against damage and leave storage and mixing areas clean at the completion of painting.

3.05 PROTECTION OF ADJACENT SURFACES

- A. Provide necessary protection for completed work and all adjoining surfaces. Provide temporary closures as required to prevent circulation of dust from adjacent areas where other work is in progress. Where it is necessary to remove existing protection of work of others, such protection shall be fully replaced.

- B. Locate and protect all existing utilities, structures, or appurtenances.

3.06 APPLICATION

- A. Mix, prepare, and store painting and finishing materials in accordance with manufacturer's directions.
- B. Apply painting and finishing materials in accordance with the manufacturer's directions. Use applicators and techniques best suited for the material and surfaces to which applied.
- C. Workmanship for applying paint shall be of professional quality. The painter shall apply each coat at the rate recommended by the manufacturer smoothly without runs, sags, or holidays. If the material has thickened or must be diluted for use with a spray gun, the coating shall be built up to the same thickness as achieved with undiluted materials. In other words, one gallon of paint as originally furnished by the manufacturer shall not cover a great square foot area when applied by spray gun than when applied by brush. Deficiencies in film thickness shall be corrected by the application of an additional coat or coats of paint. On masonry, application rates will vary according to the surface texture; however, in no case shall the manufacturer's stated coverage rate be exceeded. On porous surfaces, it shall be the painter's responsibility to achieve a protective and decorative finish either by decreasing the coverage rate or by applying additional coats of paint. Before succeeding coats are applied to a surface, the preceding coat shall have been approved by the OWNER'S Representative.
- D. Drying time shall be construed to mean "under normal conditions". Where conditions are other than normal because of the weather or because painting must be done in confined spaces, longer drying times will be necessary. Additional coats of paint shall not be applied, nor shall units be placed in service, until paints are thoroughly dry.

3.07 VENTILATION

- A. Provide adequate ventilation for safe application and for proper drying of coatings on interior surfaces. Ensure solvent vapors are released during and after application of coatings. Remove vapors by exhausting air from the lowest portions of tanks or enclosed spaces and keep tops open and clear. During coating application in enclosed areas, the capacity of ventilating fans shall be at least 300 cfm per gallon of coating applied per hour. Provide continuous forced ventilation at a rate of at least one complete air change per 4 hours for at least 7 days after coating application is completed.

3.08 CLEAN UP

- A. At completion of the painting work, clean off all paint spots and other paint materials from surfaces where they are not intended to be. Remove from the premises all rubbish and accumulated material and leave the work in clean orderly condition, acceptable to the ENGINEER and OWNER. All cloths and waste that might constitute a fire hazard shall be placed in closed metal containers or destroyed at the end of each day. Upon completion of the work, all

staging, scaffolding, and containers shall be removed from the site and/or destroyed in an approved and legal manner.

3.09 DAMAGED COATINGS

- A. Damaged coatings, pinholes, and holidays shall have edges feathered and repaired in accordance with the recommendations of the manufacturer, as approved by the ENGINEER.
- B. All finish coats, including touch-up and damage-repair coats, shall be applied in a manner which will present a uniform texture and color-match appearance.

3.10 UNSATISFACTORY APPLICATION

- A. If the item has an improper finish, color, or insufficient dry film thickness, the surface shall be cleaned and top coated with the specified material to obtain the specified color and coverage. Specific surface preparation information to be secured from the coatings' manufacturer and the ENGINEER.
- B. All visible areas of chipped, peeled, or abraded paint shall be hand or power sanded, feathering the edges. The areas shall then be primed and finish coated in accordance with the specifications.
- C. Work shall be free of runs, bridges, shiners, laps, or other imperfections. Evidence of these conditions shall be cause for rejection.
- D. Any defects in the coating system shall be repaired by the CONTRACTOR per written recommendations of the coating manufacturer.
- E. Any repairs made on steel surfaces for immersion service shall be holiday detected in accordance with ASTM G 62 low voltage holiday detection. Areas found to have holidays shall be marked and repaired in accordance with the paint manufacturer's instructions. The ENGINEER shall be notified of time of testing so that he might be present to witness testing.

3.11 GUARANTEE AND ANNIVERSARY INSPECTION

- A. All work shall be warranted in accordance with the General Conditions and Specification 01740.
- B. The OWNER will notify the CONTRACTOR at least 30 days prior to the anniversary date and shall establish a date for the inspection. Any defects in the coating system shall be repaired by the CONTRACTOR at no additional cost to the OWNER. Should a failure occur to 25% of the painted surface, either interior or exterior, the entire surface shall be cleaned and painted in accordance with these specifications.

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 includes 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. Verify and trace all existing power and control wiring impacted by this project and relabel missing or unreadable wiring identification. Refer to section 16075. Update all panel schedules impacted by project.
- D. Existing Unused or wiring abandoned as part of this project shall be removed in its entirety; empty conduit shall be removed to nearest junction point of embedment outside of demolition area.
- E. 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.
- F. The work shall include complete testing of all electrical components, including wiring.
- G. 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.
- H. 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, and local codes and to include the County's construction standards. Additionally, the applicable requirements in the Florida Building Code, including but not limited to regional wind and seismic criterion.
- 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 and appropriate equipment labeled as such.
- 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 fire rated or waterproof (location dependent) conduit sleeves and place all sleeves for conduits penetrating floors, walls, partitions, etc. Locate all necessary areas of penetration for electrical work, install sleeves 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 and ductbank routings.
- 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 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.
 4. Shop drawings shall be arranged and labeled according to specification section and Contract Drawing.
 5. Submit shop drawings prior to purchase or fabrication of equipment. See individual Division 16 sections for additional specific requirements.
 6. Prior to submittals of shop drawings, coordinate electrical equipment, particularly motor control equipment, control panels, and instrumentation, with all applicable equipment and systems interfacing with that equipment.
 7. Submittals shall be made in the following combinations:
 - a) Conduits, raceways, cable trays, ductbank details, wire and cable .
 - b) Motor control centers and control equipment, low voltage switchboards, safety switches, dry-type (specialty) transformers, panelboards, power factor correction capacitors, grounding.
 - c) Lamps, interior lighting, exterior building lighting, site lighting.
 - d) Wiring devices.

- e) Provide a wire or cable identification schedule with lengths, for all power, control, signal, process and protective circuits. The schedule shall be submitted in an electronic spreadsheet type Excel compatible file format and include the following information:
 - (1) Wire or Cable tag number.
 - (2) Number of conductors.
 - (3) Conductor size and type.
 - (4) Wire or Cable usage description.
 - (5) Conduit tag number
 - (6) Conduit routing (to and from).
 - (7) Conduit size and type.
 - (8) Additional notes
 - 8. For each product, clearly identify manufacturer by name. When general data sheets are provided as part of the submittal, specifically identify the products to be used on this Project. Provide manufacturer's technical information on products to be used, including:
 - a) Product descriptive bulletin.
 - b) Electrical data pertinent to the Project and necessary to assure compliance with Specifications and Contract Drawings.
 - c) Equipment dimensions, where applicable.
 - d) Evidence that the products submitted meet the requirements of the standards referenced.
 - e) Specify part number with explanation of options selected.
 - 9. Ensure that all submittals clearly indicate the equipment is UL or ETL listed.
 - 10. For all equipment, provide manufacturer's installation instructions.
- B. When a quality standard has been established by identification of a specific manufacturer or catalog number, submittals for proposed alternates and substitutions shall include:
- 1. Alternate and substitute equipment cross-referenced to the equipment it is replacing. Submittal shall be marked to show how differences will be accommodated.

2. Calculations and other detail data to allow determination of alternate and substitute equipment equivalency to the equipment it is replacing. Data supplied shall allow detailed comparison of all significant characteristics upon which the design equipment is based.
 3. Dimensioned drawings, of the same or larger scale as the Contract Drawings, for all alternate and substitute equipment, which differs in size, configuration, service accessibility or in any significant way from the equipment it is replacing.
 - a) Complete system layout, except that portion which is identical to the Contract Drawings.
 - b) Redesign and modifications to all work required by the alternate or substitute equipment.
- C. Operation and Maintenance Manuals.
- D. 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. At a minimum include the following:
1. Actual equipment layout
 2. Actual conduit routing
 3. Actual wire lengths

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 1.10.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 or Engineer will evaluate equipment submitted on an "approved equal" basis in accordance with Specification Section 01340.

1.12 GUARANTEES AND WARRANTIES

- A. All items furnished under the Electrical Specifications shall be guaranteed and/or warranted for three (3) years from date of Substantial Project Completion, in writing, against defects in materials, construction and workmanship as specified under Section 01740 of these Specifications.

END OF SECTION

SECTION 16062 LIGHTNING PROTECTION SYSTEM FOR STRUCTURES

PART 1 GENERAL

1.01 DESCRIPTION

A. Scope:

1. CONTRACTOR shall employ qualified Lightning Protection System Subcontractor to provide all labor, materials, equipment, services, and incidentals shown, specified, and required to furnish and install lightning protection systems for:
 - a. Raw Water Pump Station #2 Electrical enclosure
 - b. Site Lighting Poles
 - c. Verify lightning protection at Pump area, and Transformer enclosure

B. Coordination:

1. Review installation procedures included under other Sections and coordinate installation of items to be installed with or before lightning protection systems.

C. Related Sections:

1. Section 16450, Grounding.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. Lightning Protection Institute (LPI), LPI 175, Standard of Practice.
2. LPI 176, Standard of Materials.
3. NFPA 70, National Electrical Code.
4. NFPA 780, Standard for the Installation of Lightning Protection Systems.
5. UL 96A, Installation Requirements for Lightning Protection Systems.
6. UL 651, Schedule 40 and 80 PVC Conduit.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Lightning Protection System Subcontractor:
 - a. Retain services of lightning protection Subcontractor regularly engaged in providing Master Labeled lightning protection systems.
2. Subcontractor shall be LPI-certified Master Installer or Inspector.
3. Subcontractor shall be listed with UL.

- B. Component Supply and Compatibility:
 - 1. Obtain all materials equipment included in this Section regardless of component manufacturer from a single lightning protection system manufacturer.
 - 2. Lightning protection system manufacturer shall review and approve or prepare all Shop Drawings and other submittals for all components furnished under this Section.
 - 3. All components shall be specifically constructed for specified service conditions and shall be integrated into the overall system by lightning protection system manufacturer.

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. Complete scaled drawings showing proposed routing and layout of lightning protection system with installation details. Drawings shall include equipment connection details and download details.
 - 2. Product Data:
 - a. Manufacturer's catalog cuts and technical information.
 - b. Technical specifications.
- E. Informational Submittals: Submit the following:
 - 1. Certificates:
 - a. Certificates of LPI code compliance provided by manufacturer, together with UL Master Label certificate or letter of finding.
 - 2. Field Quality Control Submittals:
 - a. Master Installer or Inspector's final inspection report following installation.
 - 3. Qualifications Statements:
 - a. Lightning protection system Subcontractor.

1.05 GUARANTEE

- A. Guarantee:

1. Lightning protection system shall be guaranteed by lightning protection system manufacturer against defective parts and installation for three years from date of Substantial Completion.

PART 2 PRODUCTS

2.01 SYSTEM PERFORMANCE

A. System Description:

1. Each lightning protection system shall consist of a complete cable network on the roof or top of structure involving all air terminals, splices, and bonds with cable downloads routed concealed either directly in the building construction or in conduit to ground, and ground rods all connected together in an appropriate manner and certified by LPI to provide a zone of protection to entire building against lightning strikes, in accordance with NFPA 780.
2. Provide complete, certified lightning protection system. Provide bonding connections and miscellaneous items for complete system.

2.02 MANUFACTURERS

A. Manufacturers: Provide products of one of the following:

1. Heary Brothers Lightning Protection Company.
2. Thompson Lightning Protection, Inc.
3. Robbins Lightning Inc.
4. Or approved equal

2.03 MATERIALS

A. General:

1. Size materials in accordance with NFPA 780, UL 96A, and LPI 176.
2. Materials and equipment shall be labeled or listed by UL for use in Master Labeled lightning protection systems. Completed system shall conform to NFPA 70, NFPA 780, LPI 175, LPI 176, and UL96A.
3. Materials shall comply in weight, size, and composition for class of structure to be protected in accordance with the following:
 - a. Use Class I materials for systems on structures not exceeding 75 feet in height.
 - b. Use Class II materials for systems on structures exceeding 75 feet above grade.
4. Materials shall be corrosion-resistant, heavy-duty type. Unless otherwise specified, materials shall be Type 316 stainless steel, copper, or high copper-content bronze castings. Bolts, screws, and hardware shall be Type 316 stainless steel.
5. Use aluminum materials in locations where system components are mounted on aluminum surfaces to avoid electrolytic corrosion of dissimilar metals.

6. Provide fittings, mounting bases, couplings, connectors, fasteners, and other system devices required for complete system.
- B. Ground Rods: Comply with Section 16450, Grounding
- C. Ground Cables:
1. Ground cables shall be copper, except in connections to aluminum surfaces as required to prevent dissimilar metals reaction.
 2. Ground cable stranding, number and size shall be suitable for classification of structure to be protected.
 3. Exposed ground cable shall be corrosion resistant.
- D. Air Terminals:
1. Air terminals shall be stainless steel 5/8-inch diameter and minimum of 18 inches long.
 2. Air terminals shall include a cast bronze point protector, stainless steel adapter, and copper base.
- E. Non-Metallic Conduit and Fittings:
1. Non-metallic conduit shall be Schedule 80 PVC plastic, rated for 90 degrees C, conforming to UL 651.
 2. Non-metallic fittings shall be of same material and manufacturer as base conduit. Provide cement for joining fittings to conduit. Fittings shall be by same manufacturer as base conduit.

PART 3 - EXECUTION

3.01 INSPECTION

- A. Examine the 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. Install main conductors to provide two-way path from each air terminal horizontally or downward to connections with ground terminals.
- B. Install conductors free of excessive splices and sharp bends. Conductor bends shall form an included angle of not less than 90 degrees and shall not have bend radius less than eight inches. Secure conductors to structure at intervals not exceeding three feet.
- C. Provide one down conductor at upper and lower extremities connected to structural steel. Make connections to steel frame with bonding plates having eight square inches of contact, or by exothermic weld connections.
- D. Provide air terminals at intervals not exceeding 20 feet around perimeter of structure. Air terminals shall project a minimum of 10 inches above the area protected.

- E. Do not connect copper equipment to aluminum surfaces, except using bimetal transition fitting. Lead coating is unacceptable for bimetal transition.
- F. Install roof penetrations using through-roof assemblies with solid bars and appropriate roof flashing. Conductors shall not pass directly through roof.
- G. Grounded metal bodies shall be bonded to the system using bonding connections and fittings. When ground conductors are installed in conduit, conduit shall be non-metallic.
- H. Bond building ground systems including electrical, communication, and telephone services and arresters.
- I. Bond metal pipes and roof mounted metal structure to the roof ground loop or to downlead cables.
- J. Provide ground electrodes for down conductor dedicated for lightning protection system and bond electrodes to building or structure grounding system. Connect down conductor to ground rod using high-strength, removable ground clamp. Provide bronze ground rod clamp having at least 1.5 inches of contact between rod and conductor, measured parallel to the axis of the rod, at ground test wells.

3.03 FIELD QUALITY CONTROL

- A. Inspection:
 - 1. During installation, lightning protection system shall be inspected by Master Installer or Inspector at several stages during installation in accordance with LPI requirements.
 - 2. Do not conceal system components until inspection has been completed and successfully inspected, and observed by ENGINEER.
 - 3. Upon completion of lightning protection system, arrange for final lightning system inspection and submit final inspection report to ENGINEER. Final lightning system inspection shall be performed by Master Installer or Inspector in accordance with LPI requirements.

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.

B. Related Sections:

1. 16120 Low Voltage Conductors 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:

- 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.
- 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 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"
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. ID Pro Plus WMS-xxx by Brady.
 - b. Or approved equal.
2. Shall be pre-tensioned acrylic/vinyl construction coiled to completely encircle conduit for conduit up through five-inch diameter, or pre-molded to conform to circumference of conduit six-inch diameter and larger.
3. Attach strap-on style for six-inch diameter conduit with stainless steel springs.
4. Shall be blank for use with custom printed labels.
5. Custom Labels:
 - a. Shall have black lettering on yellow background.
 - b. Shall not contain abbreviations in legend.
 - c. Shall be custom printed on continuous tape with permanent adhesive using thermal printer specified below.

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) Or equal.
 - b. White heat-shrinkable irradiated polyolefin shrink-on sleeves. Labels shall be thermal printed. Labels shall be not less than two inches 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) Or 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) Or 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) Or equal.
- b. Desktop, Products and Manufacturers: Provide one of the following:
 - 1) BBP72 by Brady.
 - 2) Or 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, Section 16123, Medium Voltage Cable.

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. Aluminum rigid conduits shall be used at all locations aboveground and exposed within structures and buildings except where otherwise shown on the Contract Drawings.
- C. Aluminum rigid conduits shall be used at all locations where exposed 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 direct buried underground, under-slab or in-slab or in wall applications except where otherwise shown on the Contract Drawings.
- E. Schedule 80 PVC conduits shall be used in corrosive areas such as chlorine storage areas, digesters, fluoride storage and handling areas, etc.
- F. Schedule 40 PVC conduit shall be used in all concrete ductbanks. Provide conduit spacers every 6 feet or less to hold separation of conduits.
- G. All conduits of a given type shall be the product of one manufacturer.
- H. Except where otherwise shown on the Contract Drawings, or hereinafter specified, all boxes shall be aluminum.
- I. Surface mounted switch, receptacle and control station boxes shall be 316 Stainless Steel
- J. Devices designated as NEMA Type 4 shall be 316 stainless steel, gasketed.
- K. Devices designated as NEMA Type 4X shall be 316 stainless steel, gasketed, except as otherwise shown on the Contract Documents.
- L. Combination expansion-deflection fittings shall be used where conduits cross structural expansion joints and at every 100' of exposed conduit run.

- M. Electrical Metal Tubing only permitted for conduit less than 1" in interior air-conditioned spaces above ceiling tile.
- N. PVC Coated Rigid metal steel conduit shall be used for floor penetrations through concrete.

PART 2 PRODUCTS

2.01 MATERIALS

A. Rigid Conduit

1. Rigid conduit shall be Aluminum as manufactured by the Allied Tube & Conduit, SAPA Group., or approved equal.
2. Rigid PVC steel conduit shall be Carlon Plus 80 rigid PVC non-metallic conduit (extra heavy wall EPC-80) as manufactured by Carlon, or approved equal.
3. Electrical metallic tubing shall be hot-dipped galvanized steel as manufactured by U.S. Steel Corp., Youngstown Sheet and Tube Company, or approved equal.
4. PVC Sch 80 & 40 conduit 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., shall be Aluminum as manufactured by Bridgeport Fittings, Wheatland, or approved equal.
 - b. Conduit hubs shall be as manufactured by Meyers Electric Products, Inc., or 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.
3. EMT Conduit Fittings: **(Only allowed in Administration Buildings above ceilings.)** EMT fittings shall be hot-dipped galvanized steel, rain-tight, concrete tight, compression type, as manufactured by Crouse-Hinds, Appleton Electric Company, 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 hot-dipped galvanized steel.
 - b. The boxes shall have continuously welded seams which shall be ground smooth prior to being galvanized.
 - 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.
 - e. The boxes shall be as manufactured by Hoffman Engineering Company, or approved equal.
- I. Conduit Mounting Devices: Hangers, rods, channel, backplates, clips, straps, beam clamps, etc., shall be 316 stainless steel as manufactured by Appleton Electric Company, Thomas and Betts Company, 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 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. For all aluminum conduits, the field-cut threads shall be thoroughly cleaned and coated with Lithium grease compound. This treatment shall also be used on any nipples, elbows, etc.
- E. Conduits shall be supported at intervals of 8-feet or less, as required to obtain a rigid installation.
- F. Exposed conduits shall be run parallel with and/or perpendicular to the surrounding surface(s). No diagonal runs will be allowed.
- G. 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.
- H. Multiple horizontal runs of conduits shall be supported by trapeze type hangers (channel) suspended by threaded rod, 3/8-inch minimum diameter.
- I. Multiple vertical runs of conduits shall be supported by structurally mounted channel in combination with conduit clamps.
- J. Conduit support devices shall be attached to structural steel by welding or beam or channel clamps as indicated on the Contract Drawings.
- K. Conduit support devices shall be attached to concrete surfaces by "spot type" concrete inserts.
- L. Conduits terminating in pressed steel boxes shall have double locknuts and insulated bushings.
- M. Conduits terminating in gasketed enclosures shall be terminated with conduit hubs.
- N. Conduit wall seals, waterproof type, shall be used at all locations where conduits penetrate walls.
- O. 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.

- P. Flexible couplings shall be used in hazardous locations for all motor terminations and for all connections/terminations where vibration is anticipated.
- Q. Conduit stubouts for future construction shall be capped at both ends with threaded PVC conduit caps.
- R. The cement used for PVC conduit installations shall be as manufactured by Carlon, or approved equal.
- S. Metal 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.
- T. PVC rigid steel 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 PVC coated Rigid Steel.
- U. 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.
- V. Provide pull strings in all spare conduits or where conduit fill is < 30%.

3.02

GUARANTEES AND WARRANTIES

The Contractor shall guarantee and warrant all materials and labor provided under this Section for three (3) years from date of Substantial Completion in accordance with Section 01740 of these Specifications.

END OF SECTION

SECTION 16120 LOW VOLTAGE CONDUCTORS 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 AND RELATED SECTIONS

- A. The requirements of Section 01340, 16050, 16075 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 THWN, stranded copper.
- B. The wire for all power circuits and motor leads shall be type THWN-2, stranded copper.
- C. Single conductor wires for control, indication and metering shall be type THWN-2, No. 14 AWG, stranded copper.
- D. Multiconductor control cable shall be No. 14 AWG, stranded copper.
- E. The wire for process instrumentation shall be No. 16 AWG, stranded copper.

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.

2.03 INSTRUMENTATION AND CONTROL WIRING

- A. Process instrumentation wiring shall be No. 16 AWG tinned stranded twisted pair, 600 Volt, cross-linked polyethylene insulated, individual aluminum tape shielded and over all shielded, XLP/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.

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 UL listed for use with the insulation specified and cable manufacturer recommendations.
- D. Pulling:
 - 1. Use insulating types of pulling compounds containing no mineral oil.
 - 2. Pulling tension shall be within limits recommended by wire and cable manufacturer.
 - 3. Use dynamometer where mechanical means are used.
 - 4. Cut off section subject to mechanical means.
 - 5. Limit bending radius to six times overall cable diameter
- 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 PANEL 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.

- J. 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.
- K. Splices:
1. Where possible, install cable continuous, without splice, from termination to termination.
 2. Where required, splice as shown and also where required for cable installation. Splices below grade, in manholes, handholes, and wet locations shall be waterproof.
 3. Splices are not allowed in conduits.
- L. Identification:
1. Identify conductors in accordance with Section 16075, Identification for Electrical Systems.
 2. Identify power conductors by circuit number and phase at each terminal or splice location.
 3. Identify control and status wiring using numeral tagging system.
- M. Color-code power cables as follows:
1. No. 8 AWG and Smaller: Provide colored conductors.
 2. No. 6 AWG and Larger: Apply general purpose, flame retardant tape at each end, wrapped in overlapping turns to cover an area of at least two inches.
 3. Colors: Match color scheme in use at the Site. If the Site does not have an existing color scheme, use the following colors:

System	Conductor	Color
All Systems	Equipment Grounding	Green
240/120 Volts Single-Phase, Three-Wire	Grounded Neutral	White
	One Hot Leg	Black
	Other Hot Leg	Red
208Y/120 Volts Three-Phase, Four-Wire	Grounded Neutral	White
	Phase A	Black
	Phase B	Red
	Phase C	Blue

System	Conductor	Color
240/120 Volts Three-Phase, Four-Wire Delta, Center Tap Ground on Single-Phase	Grounded Neutral	White
	Phase A	Black
	High (wild) Leg	Orange
	Phase C	Blue
480Y/277 Volts Three-Phase, Four-Wire	Grounded Neutral	Gray
	Phase A	Brown
	Phase B	Orange
	Phase C	Yellow
CONTROL	COLOR	REMARKS
120V	Yellow	External Powered
120V	Red	Powered from PLC
24VDC	Blue	Discrete Signal
24VAC	Orange	Discrete Signal

3.02 FIELD QUALITY CONTROL TESTS

- A.
1. Test each electrical circuit after permanent cables are in place, to demonstrate that circuit and equipment are connected properly and will perform satisfactorily, free from improper grounds and short circuits.
 2. Individually test 600-volt cable mechanical connections after installation and before they are put in service, with calibrated torque wrench. Values shall be in accordance with manufacturer's recommendations.
 3. Individually test 600-volt cables for insulation resistance between phases and from each phase to ground. Test after cables are installed and before they are put in service, with Megger for one minute at voltage rating recommended by cable manufacturer or in accordance with ANSI/NETA ATS recommendations.
 4. Insulation resistance for each conductor shall not be less than value recommended by cable manufacturer. Cables not meeting recommended value or that fail when tested under full load conditions shall be replaced with a new cable for full length.

- B. 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.
- C. 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 for three (3) years from date of Substantial Completion in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16134 EXPANSION DEFLECTION FITTINGS

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 conduit expansion and deflection fittings.

B. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16110, Conduits and Fittings.
3. Section 16505, Hangers and Supports for Electrical Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. UL 514B, Conduit, Tubing, and Cable Fittings.
2. UL 467, Grounding and Bonding Equipment.

1.03 QUALITY ASSURANCE

A. Regulatory Requirements: Comply with the following:

1. NEC Article 300, Wiring Methods.

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 locations where fittings are required.
2. Product Data:
 - a. Manufacturer's literature and technical information for expansion and deflection fittings proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Products and Manufacturers: Provide one of the following:
1. Type DX for expansion/deflection or AX for expansion only, by O-Z Gedney Company.
 2. Type XD for expansion/deflection or XJ for expansion only, by Crouse Hinds Company.
 3. Type DF for expansion/deflection or XJ for expansion only, by Appleton Electric Company.
 4. Or equal.
- B. Cast gray iron alloy or bronze end couplings, malleable iron, or hot-dipped galvanized body, stainless steel clamps and tinned copper braid bonding jumper. Fitting shall be watertight, corrosion-resistant, UL-listed, and compatible with the conduit system.
- C. Features:
1. Expansion/Deflection Fittings:
 - a. Axial expansion or contraction up to 3/4-inch.
 - b. Angular misalignment up to 30 degrees.
 - c. Parallel misalignment up to 3/4-inch.
 2. Expansion Fittings:
 - a. Expansion/Contraction: Eight-inch total movement.
- D. Expansion/Deflection fittings shall comply with UL 514B and UL 467.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which the Work will be performed 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 fittings in accordance with NEC, ANSI or local Laws and Regulations.

- B. Provide expansion fittings on exposed conduit runs crossing structural expansion joints and where necessary to compensate for thermal expansion and contraction. Provide expansion fittings on exposed conduit runs exceeding 200 feet.
- C. Provide expansion/deflection fittings on embedded conduit runs crossing structural expansion joints. Provide fittings above waterstops.
- D. Unless specifically shown or indicated otherwise, when crossing structural expansion joints larger than one inch, provide expansion fitting together with expansion/ deflection fitting. Install fittings on each conduit run in accordance with manufacturer's recommendations to accommodate additional movement necessary.
- E. Provide expansion/deflection fittings for underground conduit runs at penetrations of buildings, manholes, handholes, and outdoor concrete equipment pads.
- F. Where required in non-metallic conduit and duct systems, provide rigid metal conduit nipples and metal rigid-to-PVC adapters for connection to fittings. Ensure that joints exposed to water or other liquid are made watertight.

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 Section 16050 General Provisions for Electrical Systems.
- 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 three 90-degree bends.
 - 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 other Laws and Regulations.
- 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, General Provisions for Electrical Systems.
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 16134, Expansion/Deflection Fittings.
6. Section 16450, Grounding

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, Rigid Conduits. Conduit types shall be as follows:
 - 1. Schedule 40 PVC conduits for power circuits.
 - 2. Galvanized rigid steel conduits for the following types of circuits: low voltage status, analog, and communication.
- 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.
- G. Duct Sealing Compound:
 - 1. Products and Manufacturers: Provide one of the following:
 - a. 0-Z/Gedney, Type DUX.
 - b. Or 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, spacers, and separators. Position separators to provide minimum three-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 PVC galvanized rigid steel 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. If ducts are not concrete-encased, provide expansion and deflection fittings in accordance with Section 16134, Expansion/Deflection Fittings.
6. 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 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-Interruptioners.
 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 Approved 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 13136, 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. 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 16144 CONTROL STATIONS

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 control stations, including pushbuttons, selector switches, and other control stations elements.

B. Coordination:

1. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before control stations Work.
2. Notify other contractors in advance of installing control stations to provide other contractors with sufficient time for installing items included in their contracts that will be installed with or before control stations Work.

C. Related Sections:

1. Section 16050, General Provisions for Electrical Systems.
2. Section 16505, Hangers and Supports for Electrical Systems.
3. Section 16075, Identification for Electrical Systems.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. NEMA ICS 2, Controllers, Contactors and Overload Relays Rated 600 Volts.
2. NEMA ICS 5, Industrial Control and Systems: Control-Circuits and Pilot Devices.
3. NEMA ICS 6, Industrial Control and Systems Enclosures.
4. NEMA 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
5. UL 508, Industrial Control Equipment.

1.03 QUALITY ASSURANCE

A. Component Supply and Compatibility:

1. Obtain all control stations furnished under this Section from a single control station manufacturer.
2. Components shall be suitable for the specified application and shall be integrated into the overall assembly by control station manufacturer.

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 control stations to be furnished with their location, rating, and NEMA enclosure type for each.
 - 2. Product Data:
 - a. Manufacturer's technical information and specifications for control stations proposed for use.

PART 2 PRODUCTS

2.01 MATERIALS

- A. Control Stations: ALL CONTROL STATIONS TO BE 316 or 304L STAINLESS STEEL NEMA 4X, unless otherwise noted.
 - 1. Manufacturers: Provide products of one of the following:
 - a. Square-D Company.
 - b. Or approved equal.
 - 2. Type: 30.5 mm industrial, heavy duty, oil-tight construction with clearly-marked legend plates.
 - 3. Emergency Stop: Emergency stop pushbuttons shall be two-position, push-pull type with maintained contact and mushroom head. Provide control stations with legend plate reading "PUSH-TO-STOP, PULL-TO-START".
 - 4. Pushbuttons: Momentary or maintained types, NEMA A600 contact rating.
 - 5. Selector Switches: Rotary type with round or oval handles and positioning device to securely hold switch in selected position for maintained type and for spring return from left, right, or both left and right to maintained position.
 - 6. Control stations shall comply with NEMA ICS 2, NEMA ICS 5, and UL 508, and shall bear the UL label.
 - 7. Indicating Lights: LED module, push-to-test. Lens color shall be in accordance with Section 16075, Identification for Electrical Systems.
 - 8. Enclosures: As required in Section 16050, General Provisions for Electrical Systems, and complying with NEMA 250 and NEMA ICS 6.
 - 9. Identification: Identify enclosures in accordance with Section 16075, Identification for Electrical Systems. Devices shall include front-mounted

nameplates identifying function and equipment controlled, if not readily apparent.

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. Install equipment as shown and indicated, and provide sufficient access and working space for ready and safe operation and maintenance.
- B. Securely fasten equipment to walls or other surfaces on which equipment is mounted. Provide independent supports where no wall or other surface exists, in accordance with Section 16505, Hangers and Supports for Electrical Systems.

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 MCC-A, including all equipment connected.
 - b. New MCC-RW#2, including all equipment connected.
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.
3. Section 16271, Transformers
4. Section 16423, Motor Control Centers
5. Section 16430, Low-Voltage Switchgear

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, 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 and NFPA 70E.
- 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.

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. Eaton Cutler Hammer
 2. Square D
 3. General Electric.

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.
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 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 16442, 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 16423, Motor Control Centers.
3. Section 16430, Low Voltage Switchgear.
4. Section 16442, 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 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, Operations 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. 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 16272, Secondary Unit Substations.
 - c. Section 16423, Motor Control Centers.
 - d. Section 16442, 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 16423 MOTOR CONTROL CENTERS

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 motor control centers.
2. MCC-1A and MCC-RW#2 wiring shall conform to Section 16120, Wires and Cables.

B. The CONTRACTOR shall provide the coordination:

1. To properly size circuit breakers, starters, and control power transformers, obtain motor nameplate data on equipment being furnished under this and other contracts as required.
2. To properly size control power transformers, obtain data on motor space heater and other accessories.
3. Review installation procedures under this and other Sections and coordinate installation of items to be installed with or before motor control center Work.

C. Related Sections:

1. Section 16075, Identification for Electrical Systems.
2. Section 16120, Wires and Cables
3. Section 16215, Electrical Power Distribution Studies.
4. Section 16289, Surge Protective Devices

1.02 REFERENCES

A. Standards referenced in this Section are:

1. ANSI/IEEE C37.2, Electrical Power System Device Function Numbers and Contact Designations.
2. ANSI/NETA ATS, Acceptance Testing Specifications for Electrical Power Equipment and Systems.
3. NEMA ICS 18, Motor Control Centers.
4. NEMA ICS 1, Industrial Controls and Systems: General Requirements.
5. UL 845, Motor Control Centers.

1.03 QUALITY ASSURANCE

A. Qualifications:

1. Manufacturer: Shall have not less than five years experience of producing equipment substantially similar to that required and shall be able to submit documentation of not less than five installations in satisfactory operation for at least five years each.

2. Independent Field Testing Firm:
 - a. Retain an independent testing firm to perform field acceptance testing of motor control centers.
 - b. Testing firm and its assigned personnel shall be experienced in inspecting and testing motor control centers.
 - c. Testing firm shall be a member company of NETA.
- B. Component Supply and Compatibility:
 1. Obtain materials and equipment included in this Section, regardless of component manufacturer, from one motor control center equipment manufacturer.
 2. Motor control center equipment manufacturer shall review and approve, or shall prepare, all Shop Drawings and other submittals for components furnished under this Section.
 3. Equipment shall be specifically constructed for specified service conditions. Equipment and components shall be integrated into overall motor control center equipment system by motor control center equipment manufacturer.
- C. Regulatory Requirements: Comply with the following:
 1. NEC Article 430, Motors, Motor Circuits, and Controllers.

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. Outline and summary sheets with schedules of equipment in each unit.
 - b. One-line diagrams indicating circuit breaker sizes, bus rating, motor controller ratings, and other pertinent information to demonstrate compliance with the Contract Documents.
 - c. Unit control schematic and elementary wiring diagrams showing numbered terminal points and interconnections to other units.
 2. Product Data:
 - a. Manufacturer specifications, cut sheets, dimensions, and technical data for all components, materials, and equipment proposed for use.
 3. Testing Plans, Procedures, and Testing Limitations:

- a. Not less than 30 days prior to actual factory testing, submit proposed testing methods, procedures, and apparatus.
 - b. Not less than 30 days prior to actual field testing, submit proposed testing methods, procedures, and apparatus.
- E. Informational Submittals: Submit the following:
 - 1. Supplier Instructions:
 - a. Instructions for shipping, storing and protecting, and handling the materials and equipment.
 - b. Installation data for the equipment, including setting drawings, templates, and directions and tolerances for installing anchorage devices.
 - c. Instructions for start-up and troubleshooting.
 - 2. Source Quality Control Submittals:
 - a. Reports of completed factory testing, including procedures used and test results.
 - 3. Site Quality Control Submittals:
 - a. Reports of completed field testing, including procedures used and test results.
 - 4. 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.
 - 5. Qualifications Statements:
 - a. Independent testing firm.
 - b. Manufacturer, when requested by ENGINEER.
- F. Closeout Submittals: Submit the following:
 - 1. Operations and Maintenance Data:
 - a. Submit complete installation, operation and maintenance manuals including test reports, maintenance data and schedules, description of operation, and spare parts information.
 - b. Manuals shall include record drawings of control schematics, including point-to-point wiring diagrams.
 - c. Comply with Section 01730, Operations and Maintenance Data.
- G. Maintenance Material Submittals: Furnish the following:
 - 1. Spare Parts:

- a. Furnish, tag, and box for shipment and long term storage the following spare parts and special tools for each motor control center lineup furnished:

Item	Quantity per Switchgear Lineup Furnished
1) Starters and feeder breakers	Quantities and sizes as shown on drawings
2) Fuses	Six of each type and size used
3) Auxiliary control relays	Two, with at least two normally open and two normally closed contacts
4) Control power transformers	Two of each size used
5) Indicating lamps	Twelve
6) Covers for indicating lamps	Six of each color used
7) Starters: Contact kits for Size 1 motor starter	Two sets
8) Starters: Contact kits for Size 2, Size 3, and Size 4 motor starters	One set of each size

- b. Furnish a list of additional recommended spare parts for an operating period of one year. Describe each part, the quantity recommended and current unit price.

1.05 DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Packing:

- a. Inspect prior to packing to assure that assemblies and components are complete and undamaged.
- b. Protect mating connections.
- c. Indoor containers shall be bolted to skids. Breakers and accessories shall be packaged and shipped separately..
- d. Cover all openings into enclosures with-vapor inhibiting, water-repellent material.

2. Upon delivery, check materials and equipment for evidence of water that may have entered equipment during transit.

3. Handling:

- a. Lift, roll or jack motor control center equipment into locations shown.
- b. Motor control centers shall be equipped to be handled by crane. Where cranes are not available equipment shall be suitable for placement on rollers using jacks to raise and lower the groups.

B. Storage and Protection:

1. Store motor control center equipment in a clean, dry location with controls for uniform temperature and humidity. Protect equipment with coverings and maintain environmental controls.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Provide equipment by one of the following:

1. Schneider Electric/Square D Company.
2. No equal.

2.02 MATERIALS

- A. General: Motor control center lineups shall comply with NEMA ICS 18 and be provided as shown with the following ratings:

1. Service: Voltage rating and number of wires shall be as shown or indicated on the Drawings. Motor control center shall operate from a three-phase, 60 Hertz system.
2. Wiring: NEMA Class II, Type B.
3. Enclosure: NEMA 1 with gaskets on all doors.
4. Interrupting Capacity Rating: Motor control center shall have an interrupting capacity rating as shown or indicated on the Drawings. Devices shall be suitable for minimum rating indicated.
5. Motor control center lineups shall be UL-rated as suitable for service entrance where shown or indicated on the Drawings and as required.

- B. Construction: Provide equipment with the following:

1. Totally-enclosed structure, dead front, consisting of nominal 20-inch deep, 20-inch wide, 7.5-foot high vertical sections bolted together to form a unit assembly.
2. Vertical sections shall have side sheets extending the full height and depth of section.
3. Removable lifting angles for each shipping section.
4. Two removable floor sills for mounting.
5. Horizontal wireways top and bottom, isolated from horizontal bus and readily accessible.
 - a. Wireway openings between sections shall have rounded corners and rolled edges.
6. Isolated vertical wireways with cable supports, accessible through hinged doors, for each vertical section.
 - a. Wireway shall be separate from each compartment and remain intact when compartment is removed.
7. All-metal non-conducting parts electrically continuous.
8. Comply with NEMA ICS 18.

C. Bus System:

1. Rating: Bus bracing and bus current capacities as shown or indicated on the Drawings.
2. Bus bars shall be tin-plated, copper-rated, and comply with UL heat rise standards.
3. Bus bar connections shall be easily accessible with simple tools.
4. Main Horizontal Bus:
 - a. Continuous, edge-mounted, and isolated from wireways and working areas.
 - b. Mount the bus in vertical center of motor control center to provide easy access and even heat distribution.
 - c. Bus shall be supported, braced, and isolated by high-strength, non-tracking, FRP material.
5. Vertical Bus:
 - a. Continuous, and isolated by glass polyester barrier.
 - b. Rated for 300 amperes continuous minimum, and at least equal to full-load rating of all installed units in the associated stack.
6. Grounding Bus: Full length mounted across the bottom, drilled with lugs of appropriate capacity as required.
7. Neutral Bus: Insulated, continuous through control center for four-wire services, drilled with lugs of appropriate capacity as required.

D. Unit Compartments:

1. Provide individual front door for each unit compartment. Fasten door to stationary structure, instead of the unit itself, so that door can be closed when unit is removed.
2. Starter and feeder unit doors interlocked mechanically with unit disconnect device to prevent unintentional opening of door while energized and unintentional application of power while door is open, with provisions for releasing interlock for intentional access and application of power.
3. Padlocking arrangement permitting locking disconnect device in the "OFF" position with at least three padlocks with door closed or open. Equip unit disconnect devices located in the top compartment, compartment sized 12 inches or higher, with extender handle complying with UL 845. Extender handle shall allow disconnect operating handle to be located above NEC's height limitation of six-feet, seven-inches above floor.
4. Equip compartments as shown or indicated on the Drawings:
 - a. Blank compartments, unused space, and compartments shown or indicated on the Drawings as "SPACE" shall have bus covers and be complete with necessary hardware for future installation of a plug-in unit.

- b. Provide shutters for each compartment that automatically open when unit is inserted and automatically close when unit is removed.
5. Provide wiring and device identification:
- a. Identify compartment doors, devices, and field wiring in accordance with Section 16075, Identification for Electrical Systems.
 - b. Identify internal control conductors with permanent wire markers. Each wire shall be identified by a unique number attached to wire at each termination point.
 - c. Identify internal control devices with permanent markers. Each device shall be identified by a unique number attached to each device.
 - d. Numbering system for each wire and control device shall be identified on the wiring diagrams in the Shop Drawings and shall reflect the actual designations used in the Work.
6. NEMA 1 minimum motor starter size. Starter units completely draw out type in Sizes 1 and 2 and draw out type after disconnecting power leads only in Sizes 3 and 4.
7. Motor starters shall be NEMA-rated and include magnetic contactor, with encapsulated magnet coils. Wound coils are unacceptable. Control shall be 120 Vac unless indicated otherwise.
- a. Starters shall be full-voltage non-reversing unless shown or indicated otherwise on the Drawings.
 - b. Reversing Starters:
 - 1) Single-speed, full-voltage with two contactors and extra interlocking contacts.
 - c. Reduced Voltage Solid-State Starter:
 - 1) General:
 - a) Provide solid-state, step-less, current limiting, soft-start, motor controllers (RVSS) as shown or indicated on the Drawings.
 - b) RVSS shall be three-phase type and shall include an overload relay and at speed isolation contactor.
 - c) Provide NEMA rated full voltage By-Pass contactor as shown on drawings.
 - c) Provide subsystems that will protect RVSS from damage due to phase loss, over-current and over-voltage.
 - d) Current Rating: 115 percent of motor nameplate rated current, continuous, minimum.
 - 2) Required Features:

- a) Adjustable current limit of not more than 250 percent of motor nameplate full-load current throughout entire motor acceleration period including first three cycles of voltage waveform from instant start signal is engaged.
 - b) Adjustable voltage acceleration, from two to 30 seconds. Acceleration shall be continuous not in steps.
 - c) Adjustable voltage deceleration, from two to 30 seconds. Deceleration should be continuous, not in steps.
 - d) Phase loss detection.
 - e) PUSH-TO-TEST LED diagnostic indicators.
 - f) Static over-current and over-voltage trip.
 - g) Phase reversal, line or fuse loss, and under-voltage protection.
 - h) Power unit over temperature protection.
 - i) Motor inverse time overload protection.
 - j) Input line transient over-voltage protection.
- 3) Enclosure:
- a) Cooling fans, if required, shall incorporate anti-friction bearings and internal impedance type motor protection.
 - b) If cooling fans are used, enclosure for that section shall be NEMA 12 FVF, or NEMA 12 EFVFF force ventilated with filters, in accordance with NEMA ICS 1-110, installed by motor control center manufacturer.
- 4) On start-up, start driven equipment at zero current and allow driven equipment to accelerate to maximum speed without exceeding the set current limit.
- 5) On normal shutdowns, ramp driven equipment down at set deceleration rate that is non-regenerative for motor prior to shutdown.
- 6) On emergency shutdowns, remove power to motor.
- 7) Diagnostic LEDs: Provide LED (Push to Test) on unit front that indicate the following:
- a) Control power on.
 - b) Motor power on.
 - c) Motor running.
 - d) Motor fault.
 - e) High Pressure
 - f) RVSS fault.
- 8) Control Outputs:

- a) Control output shall be electrically isolated, dry, normally open SPDT contacts, rated 10 amps at 120 vac.
 - b) Provide the following control outputs:
 - i. Motor running.
 - ii. Motor stopped
 - iii. Motor fault.(Overtemp)
 - iv. High Pressure
 - v. RVSS fault.
8. Overload Relays: Provide an overload relay for each motor starter. Overload relays shall be in accordance with the following:
- a. Electronic Overload Relays: Relays shall be electronic type. Electronic relays shall be multi-function, adjustable, current sensing, type, and include overload, phase-unbalance, phase-loss, and equipment type ground fault in one package.
 - c. Each overload relay shall be manual reset type and shall include provisions for resetting by an insulating button on front of starter unit door.
 - d. Each overload relay shall include a normally-open auxiliary contact for remote alarm purposes.
 - e. Size each overload relay for full-load amperes and service factor of actual motors installed.
9. Individual control power transformers for all starters, capacity as required for all control circuit devices, 150 VA minimum, Class A insulation, two primary fuses, 120-volt secondary, one secondary fuse, and the other secondary leg grounded.
10. Motor horsepower shown are preliminary. Circuit breaker trips and starter overload heaters to be coordinated with the actual equipment installed.
11. Auxiliary contacts, relays, timers as required for specified control functions and those shown on Drawings.
12. Starter devices, including spare contacts, shall be wired to numbered terminal blocks.
13. Terminal blocks for field connections to unit compartments shall be plug-in/pull-apart type. Terminals shall be fully accessible from the front. Terminals shall be mounted near the front of vertical wireway.
14. Control devices shall be 600-volt heavy duty, NEMA A600. Relays shall have convertible contacts. Pilot devices shall be oil tight. Pilot lights shall be transformer type with six-volt secondary. .
15. Feeder Circuit Breakers: LSI adjustable electronic trip thermal magnetic type 100% Rated.
- a. Circuit breakers of 100 amp frame or less shall be 100% rated mounted in a dual mount compartment (two breakers in one space factor) or shall mount in one-half space factor, unless otherwise shown or indicated on the Drawings.
16. Motor Starter Circuit Breakers: Magnetic trip only motor circuit protectors.

17. Provide the following diagrams and tables inside of door for each compartment:
- a. Elementary wiring diagram.
 - b. Table of overload heater sizes with correct heater highlighted.
 - c. Table of motor circuit protector settings with correct setting highlighted.
18. Where shown or indicated on the Drawings incorporate solid state protective relaying package (SSPRP) into motor starter for motor protection. Unit shall incorporate the ANSI/IEEE C37.2 device function numbers and selectable indications and communication modules indicated below:
- a. Product and Manufacturer:
 - 1) GE MultiLin SR469.
 - 2) Or MCC manufacturers equal.
 - b. Motor Protection Device Functions:
 - 1) Stator winding over-temperature (Device 49).
 - 2) Short circuit (Device 50).
 - 3) Motor overload (Device 49/50/51).
 - 4) Locked rotor - multiple start (Device 48).
 - 5) Phase reversal (Device 46).
 - 6) Ground fault (Device 50G/51G).
 - 7) Mechanical jam.
 - 8) Unbalance/negative sequence currents (Device 46).
 - 9) Undercurrent (Device 37).
 - 10) Motor bearing over-temperature (Device 38).
 - 11) Thrust bearing over-temperature (Device 38).
 - 12) Over-voltage (Device 59).
 - 13) Undervoltage (Device 27).
 - 14) Voltage sequence (Device 47).
 - 15) Main trip and lockout output relay (Device 86).
 - 16) Alarm output relay (Device 74).
 - c. Selectable Indications:
 - 1) Average motor current.
 - 2) Average motor temperature.
 - 3) Motor current for each of the three phases.
 - 4) Motor temperature readout for six winding RTDs.
 - 5) Motor thrust-bearing temperature readout for two bearing RTDs.
 - 6) Ground fault current.
 - 7) Percent of motor capacity used.
 - 8) Line-to-line and line-to neutral voltages, all three phases.
 - 9) Average 15-minute kVA.
 - 10) Average 15-minute kW.
 - 11) Average 15-minute kVAR.

- 12) Maximum percent full load current since initial startup.
- 13) Hottest RTD and temperature since initial startup.
- 14) Highest percent current unbalance since initial startup.
- 15) Highest ground fault current since initial startup.
- 16) Highest motor bearing temperature since initial startup.
- 17) Highest load bearing temperature since initial startup.
- 18) Maximum line voltage since start.
- 19) Minimum line voltage since start.
- 20) Number of motor starts attempted.
- 21) Number of motor starts completed.
- 22) Hours of operation.
- 23) Number of trips from each of ten protective functions.
- 24) All measured values at the time of a motor trip.
- 25) Values that have been loaded for system inputs and trip points.

d. Communication Module: RS232 capable of uploading all the above protective function attitudes and the above-listed selectable indications upon being queried by a host PLC connected via RS232 communication port.

19. Main and Tie Circuit Breakers: 100% rated, LSIG Electronic trip, thermal magnetic, molded case type, unless shown or indicated otherwise. Mains to have maintenance switch to limit Arcflash exposure.

Where shown or indicated, equip main and tie breakers with PLC and relay interlocking. Interlocking shall allow only two of the three breakers to be closed at a time.

2.03 MAIN METERING DEVICE

A. Provide a main meter device as shown or indicated on the Drawings.

- 1. Microprocessor based monitoring device shall include complete electrical metering in one package. Device shall include self-contained potential transformers and self-protected internal fuses.
- 2. Device shall have Ethernet output capabilities for communication to SCADA. Provide all gateway equipment as necessary.
- 3. Device shall be mounted on compartment door to allow operations and maintenance personnel access to meter menu and display.
- 4. Device shall include trend analysis, event logging, and recording. Device shall also include the following direct-reading metered values:

- a. Volts: 0.2 percent accuracy.
- b. Amperes: 0.2 percent accuracy
- c. Watts, Vars and VA: 0.5 percent accuracy
- d. Power Factor: 1.0 percent accuracy
- e. Frequency: 0.05 percent accuracy
- f. Watt, and VA Hours: 0.5 percent accuracy
- g. Var Hours: 1.0 percent accuracy
- h. Watt, Var and VA Demand: 0.4 percent accuracy
- i. THD-Voltage: 50th harmonic

- j. THD-Current: 50th harmonic
- k. Individual Ampere Harmonics: 50th harmonic
- l. Individual Voltage Harmonics: 50th harmonic

- 5. Metering device shall have the following additional features:
 - a. Trend analysis that displays minimum and maximum values for each metered parameter with date and time of each occurrence.
 - b. Input range of device shall accommodate external current transformers with ranges from 100/5 to 5000/5 and potential transformers from a ratio of 120:120 to 500,000:120. Three current transformers suitably rated shall be included.
 - c. Alarm contacts rated five amps at 120 VAC.
 - d. Three analog outputs programmable to reflect the metered parameters, except kilowatt hours and kilovar hours.
 - e. Communication capability, using RS-485, Modbus RTU Protocol.
- 6. Control power shall be drawn from monitored incoming AC line. Device shall have non-volatile memory and not require battery backup. During power failure, device shall retain preset parameters.

2.04 SURGE PROTECTIVE DEVICES

- A. Provide a surge protective device in accordance with Section 16289, Surge Protective Devices, for each motor control center bus shown on the Drawings. Surge protective devices shall be included and factory-mounted within the motor control center by motor control center manufacturer. Surge protective device monitoring and display shall be visible from the motor control center front.

2.05 SOURCE QUALITY CONTROL

- A. Prior to shipping, perform factory tests on motor control centers. Tests shall include manufacturer's standard tests and the following:
 - 1. Physical inspection and checking of components.
 - 2. Mechanical operation and device functionality tests.
 - 3. Primary, control, and secondary wiring hi-pot tests.

PART 3 EXECUTION

3.01 INSPECTION

- A. Examine conditions under which 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. Install materials and equipment at locations shown or indicated on the Drawings. Install equipment on concrete bases in accordance with the Contract Documents and manufacturer's recommendations and instructions.

- B. For installations against masonry walls, provide an insulation board, 1/4-inch minimum thickness, between motor control center and wall for corrosion protection. Trim board neatly within outline of motor control center.
- C. Openings in top or side of motor control centers for other than conduit entrance are not allowed.
- D. Bundle cable circuits together within enclosures and identify with durable tag secured to cabling twine.
- E. Set motor circuit protectors at lowest setting that allows motor starting without nuisance tripping.
- F. Verify that wiring diagrams on inside of door of each compartment reflect the circuitry actually provided and that correct overload heater size and motor circuit protector setting are noted.
- G. Install in conformance with manufacturer's recommendations, Laws and Regulations, and the Contract Documents.
- H. Connections to existing facilities shall be in accordance with Section 01730, Coordination with Owner's Operations.

3.03 FIELD QUALITY CONTROL

- A. Site Tests:
 - 1. Perform field testing and inspection of motor control centers. Inspect and test each motor control center after installation. Testing and inspection shall be in accordance with the manufacturer's recommendations and the Contract Documents, and be performed by manufacturer's factory-trained representative, Inform OWNER and ENGINEER when equipment is correctly installed, prior to testing. Do not energize equipment without permission of OWNER.
 - 2. Test Equipment, Calibration and Reporting: All test equipment, instrument calibration and test reports shall be in accordance with ANSI/NETA ATS.
 - 3. Perform the following minimum tests and checks before energizing equipment:
 - a. Verify all overload and device settings.
 - b. Inspect mechanical and electrical interlocks and controls for proper operation.
 - c. Check tightness of bolted connections.
 - d. Measure insulation resistance of each bus section, phase-to-phase and phase-to-ground.
 - e. Measure insulation resistance of each starter, phase-to-phase and phase-to-ground.
 - f. Measure insulation resistance of each control circuit with respect to ground.
 - g. Perform other tests recommended by equipment manufacturer.

4. Perform acceptance testing of motor control centers. Inspect and test each motor control center. Testing and inspection shall be performed by the independent testing firm, after completion of field testing specified in Paragraph 3.3.A.3 of this Section.
 - a. Visual and Mechanical Inspection: Perform inspection of each motor control center in accordance with ANSI/NETA ATS. Inspection shall include:
 - 1) Inspect for proper anchorage, damage, and grounding.
 - 2) Verify all overload and device settings.
 - 3) Check tightness of bolted connections.
 5. Electrical Tests: Perform electrical testing of each motor control center in accordance with ANSI/NETA ATS. Testing shall include:
 - 1) Measure insulation resistance of each bus section, phase-to-phase and phase-to-ground.
 - 2) Measure insulation resistance of each starter phase-to-phase and phase-to-ground.
 - 3) Measure insulation resistance of each control circuit with respect to ground.
 - 4) Test motor overload units by current injection.
 - 5) Perform operational tests by initiating control devices for proper operation.
 - 6) Perform contact resistance test and insulation resistance test for each circuit breaker.
 - 7) Determine long-time, short-time, and instantaneous pick-up and delay as required.
- B. Manufacturer's Services: Provide a qualified, factory trained serviceman to perform the following:
1. Supervise unloading and installation of equipment.
 2. Instruct CONTRACTOR in installing equipment.
 3. Inspect, test, and adjust equipment after installation and ensure proper operation.
 4. Instruct operations and maintenance personnel in operation and maintenance of the equipment.
 5. Manufacturer's technician shall make visits to the Site as follows:
 - a. First visit shall be for supervising unloading and handling of equipment and for instructing CONTRACTOR in proper equipment installation, and assisting in installing equipment. Technician shall train installing personnel in advance in proper handling and rigging of equipment. Minimum number of hours on-Site: 2 hours.
 - b. Second visit shall be for checking completed installation, start-up of system; and performing field quality control testing. Technician shall test the system as specified in Article 3.3.A of this Section. Technician shall operate and test the system in the presence of ENGINEER and verify that equipment complies with the Contract Documents and manufacturer's requirements. Technician shall

adjust the system to initial settings as specified in Article 3.4 of this Section. Minimum number of hours on-Site: 4 hours.

- c. Third visit shall be to instruct operations and maintenance personnel.
 - 1) Furnish services of manufacturer's qualified, factory-trained specialists to instruct OWNER's operations and maintenance personnel in recommended operation and maintenance of equipment.
 - 2) Training requirements, duration of instruction and qualifications shall be in accordance with Section 01730, Instruction of Operations and Maintenance Personnel.
 - 3) Number of hours on-Site shall be in accordance with Section 01730, Instruction of Operations and Maintenance Personnel.
 - d. Technician shall revisit the Site as often as necessary until installation is acceptable.
 - e. Furnish services of manufacturer's factory-trained service technicians to correct defective Work within 72 hours of notification by OWNER during the correction period.
6. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

3.04 ADJUSTING

- A. Calibrate, set, and program all protective devices. Coordinate protective devices furnished under this Section and provide proper settings of devices in accordance with the study performed under Section 16215, Electrical Power Distribution System Studies.

3.05 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section for three (3) years from date of Substantial Completion in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16430 LOW VOLTAGE SWITCHGEAR

PART 1 GENERAL

1.01 DESCRIPTION

- A. Scope: CONTRACTOR shall provide all labor, materials, equipment, and incidentals as shown, specified, and required to furnish and install secondary unit substations.
- B. Related Sections:
 - 1. Section 16075, Identification for Electrical Systems.
 - 2. Section 16215, Electrical Power Distribution System Studies.
 - 3. Section 16289, Surge Protective Devices.

1.02 REFERENCES

- A. Standards referenced in this Section are:
 - 1. ANSI/IEEE C37.13, Definite Purpose Switching Devices for Use in Metal-Enclosed Low-Voltage.
 - 2. ANSI/IEEE C37.20 Series, comprised of ANSI/IEEE C37.20.1, Metal-Enclosed Low-Voltage Power Circuit Breaker Switchgear, ANSI/IEEE C37.20.2, Metal-Clad and Station-Type Switchgear, and ANSI/IEEE C37.20.3, Metal-Enclosed Interrupter Switchgear, and ANSI/IEEE C37.20.4, Indoor AC Switches (1 kV-28kV) for Use in Metal-Enclosed Interrupter Switchgear.
 - 3. IEEE C37.16, Preferred Ratings, Related Requirements, and Application Recommendations for Low-Voltage AC (635 V and below) and DC (3200 V and below) Power Circuit Breakers.
 - 4. ISO 9002, Quality Systems -- Model for Quality Assurance in Production, Installation and Servicing.
 - 5. UL 489, Branch Circuit Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures.
 - 6. UL 891, Safety Switchboards.
 - 7. ANSI/NETA ATS, Standard for Acceptance Testing Specifications for Electrical Power Equipment and Systems
 - 8. ANSI/NETA MTS, Standard for Maintenance Testing Specifications for Electrical Power Distribution Equipment and Systems
 - 9. UL 1066, Low Voltage Power Circuit Breakers.

1.03 QUALITY ASSURANCE

- A. Qualifications:
 - 1. Manufacturer:
 - a. Manufacturer shall have not less than five years' experience manufacturing and servicing products substantially similar to those required for the Project and,

upon request, shall submit documentation of not less than five installations in satisfactory operation for not less than five years each.

b. Manufacturer shall be ISO 9002 certified.

2. Independent Testing Firm for Field Quality Control:

a. Retain independent testing firm to perform acceptance field-testing of the equipment.

b. Testing firm shall have experience in inspecting and testing equipment of the type required and shall be a member of NETA.

c. Test Equipment, Calibration, and Reporting: Test equipment, instrument calibration, and test reports shall be in accordance with ANSI/NETA ATS.

B. Component Supply and Compatibility:

1. Obtain all materials and equipment included in this Section regardless of component manufacturer from a single secondary unit substation manufacturer.

2. Secondary unit substation 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 secondary unit substation manufacturer.

C. Regulatory Requirements: Comply with the following:

1. United States Department of Energy, 10 CFR Part 431, Energy Conservation.

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. Three-line diagrams.

b. Control schematics and elementary wiring diagrams showing numbered terminal points and interconnections to other units.

c. Construction details of enclosures with conduit entry locations and connection details between assemblies.

d. Dimensional information including front view elevation and floor plan information.

e. Components list and nameplate schedule.

- f. Summary sheets with schedules of equipment.
 - g. Key interlock scheme and sequence of operation.
 - 2. Product Data:
 - a. Manufacturer's technical information, including catalog information.
 - b. Manufacturer's technical specifications with assembly and component ratings.
 - c. Time current curves for protective devices.
 - 3. Testing Plans, Procedures, and Testing Limitations:
 - a. Not less than thirty days prior to factory testing, submit description of proposed factory testing methods, procedures, and apparatus.
 - b. Not less than thirty days prior to field testing, submit description of proposed testing methods, procedures, and apparatus.
- B. Informational Submittals: Submit the following:
 - 1. Manufacturer's Instructions:
 - a. Special shipping, storage and protection, and handling instructions.
 - b. Installation data for the equipment, including setting drawings, templates, and directions and tolerances for installing anchorage devices.
 - 2. Source Quality Control Submittals:
 - a. Report of results of testing and inspections performed at manufacturer's factory.
 - b. Factory Production Testing Reports: Submit copies of factory-certified production test reports.
 - 3. Field Quality Control Submittals:
 - a. Report of results of field-testing.
 - 4. Supplier Reports:
 - a. Submit written report of results of each visit to the 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.
 - 5. Qualifications Statements:
 - a. Manufacturer, when requested by ENGINEER.
 - b. Independent testing firm for field quality control.

C. Closeout Submittals: Submit the following:

1. Operations and Maintenance Data:
 - a. Submit in accordance with Section 01730, Operations 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.
 - c. Include record drawings of control schematics, with point-to-point wiring diagrams.

D. Maintenance Material Submittals: Furnish the following:

1. Spare Parts:
 - a. Furnish, tag, and box for shipment and long-term storage the following for each power center lineup:

Item	Quantity per Power Center Lineup
a. Feeder breakers, size as shown on Contract Drawings	As shown on the Contract Drawings
b. Spare power fuses	One per of each size and type used
c. Control power fuse	Five sets of each type and size used
d. Pilot light	Two per 10 of each type used

- b. Submit list of additional recommended spare parts for an operating period of one year. Describe each part, quantity recommended, and current unit price for each.
- c. Deliver spare parts at the same time as switchgear.

1.05 **PRODUCT DELIVERY, STORAGE, AND HANDLING**

A. Packing:

1. Shipping sections shall be designed to be shipped by truck, rail, or ship.
2. Indoor sections shall be bolted to skids.
3. Package and separately ship breakers and accessories.

B. Handling:

1. Equipment shall be equipped to be handled by crane. Where cranes are not available, equipment shall be suitable for placement on rollers using jacks to raise and lower the groups.
2. Handle equipment in accordance with manufacturer's instructions. Furnish one copy of such instructions with equipment at time of shipment.

- C. Storage:
 - 1. Store switchboards 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.

PART 2 PRODUCTS

2.01 MANUFACTURERS

- A. Manufacturers: Provide products by one of the following:
 - 1. Schneider Electric/Square D Company
 - 2. No Equal.

2.02 MANUFACTURED UNITS

- A. Low-Voltage Switchgear:
 - 1. Switchgear shall consist of individually-mounted, electrically operated, draw-out power circuit breakers complying with ANSI/IEEE C37.20 Series. Switchgear shall have ratings as follows:
 - a. 600-volt, three-phase, 60 Hertz, three-wire.
 - b. Continuous AC main bus ampacity and bracing as indicated on the Drawings.
 - c. All switch gear breakers shall be equipped with Remote Arcflash Maintenance Switches.
 - d. Breakers to be able to be remotely racked.
 - e. Provide remote racking device for breakers
 - 2. Bus System:
 - a. Power Bus: Three-phase tin-plated copper with current capacity and short circuit rating as indicated on the Contract Drawings.
 - b. Main and vertical buses shall be phase- and ground-isolated and insulated from each other.
 - c. Each circuit shall consist of necessary bus connection between section bus and breaker line side stubs. Equip load studs with load extension busses terminating in solder-less type terminals in rear cable compartment.
 - d. Ground Bus: Tin-plated copper with current capacity equal to half capacity of main power bus and drilled with lugs of appropriate capacity as required.
 - e. Incoming sections shall be configured for busway connections as shown on the Contract Drawings.
 - 3. Structure:
 - a. Each vertical steel unit shall be self-contained and self-supported structure having one or more individual breaker

or instrument compartments, centralized bus compartment, and rear cabling compartment segregated from bus sections by means of solid insulating barriers. Equip rear compartments with hinged access doors each secured with minimum of three bolts and captured nuts.

- b. Each individual breaker compartment shall be completely segregated from adjacent compartments by barriers at rear, top, bottom and sides, and equipped with draw-out rails, levering out mechanism, and primary and secondary contacts. Current transformers for instrumentation shall be located within the appropriate breaker compartment wired through shorting terminal blocks.
- c. Outgoing section and feeder circuit breakers shall be arranged for termination of steel conduit and copper cable feeders. Number of conduits and cables associated with each feeder shall be as shown or indicated on the Contract Drawings.

4. Circuit Breakers:

- a. Main, tie, and feeders shall be 600-volt AC, 60 Hertz, three-pole, electrically operated draw-out type power circuit breakers, 100-percent equipment-rated. Breakers shall include electronic microprocessor-based trip system and maintenance switch for Arcflash mitigation. Breaker frame size, sensor rating, and short-circuit rating shall be as shown or indicated on the Contract Drawings. Breakers shall comply with ANSI/IEEE C37.13, IEEE C37.16, and UL 1066.
- b. Operation: Manually-operated stored energy mechanism.
- c. Equip breaker removable elements with disconnecting contacts, wheels, and interlocks for draw-out operation. Draw-out design shall allow closure of compartment door with breaker in the "connected", "test", and "disconnected" positions. Provide mechanical interlock to prevent breaker racking while in closed position. Withdrawn position shall allow 180-degree unit rotation and provisions for padlocking provided for all positions.
- d. Electronic trip system shall include plug-in protection programmer, flux shift trip device, and current sensor package. Programmer, sensor, and flux-shifting trip device shall be constructed as integral elements of the breaker, requiring no externally mounted assemblies for proper operation.
- e. Solid-state, microprocessor-based, nine-function programmer shall provide true RMS current sensing and include adjustable continuous and instantaneous current elements with adjustable long time, short time, zero sequence ground fault pickup, and delay and zone selective interlocking. Main, tie, and feeder circuit breakers shall be connected for zone selective interlocking to allow instantaneous bus protection.

- 1) Provide trip unit with Arcflash maintenance reduction capability. Provide high quality palladium or gold plated contacts for remote maintenance arming. (Main and MCC feeder breakers). Provide unique setting ability on trip unit.
- 2) Electronic trip system shall be able to display and communicate values of amperes, each phase, voltage, power and energy. Power sources required for display or communication functions are included and shall be contained within the switchgear.

f. Accessories:

- 1) Remote Arcflash Maintenance Switch with indication on panel. (For Main and MCC Feeder Breakers)
- 2) Maintenance closing handle.
- 3) Indicating lights for circuit breaker status - red for "CLOSE", green for "OPEN" and amber for "OVER-CURRENT TRIP".
- 4) Shunt trip.
- 5) Auxilliary contacts for remote indication of circuit breaker status: open, close, and over-current trip.
- 6) Targets for overload, short circuit, and ground trip indication.
- 7) Test kit for testing of breaker trip unit.
- 8) Remote racking device.

2.03 AUTO TRANSFER CONTROL (NOT USED)

- A. Each switchgear shall include a Main-Tie-Main automatic open transition, transfer control scheme, between two normally active input supply lines. The control shall also include manual-automatic open transition, re-transfer.
- B. The control scheme shall include all protective, control and ASNI devices required and shown on the Drawings and shall include the following:
 1. Electrical interlocking of the Main and Tie circuit breakers to prevent paralleling of the two input supply lines at all times.
 2. Over-current trip lockout to prevent breaker closure into a fault.
 3. Breaker transfer adjustable time delay, 0-1minute, for residual voltage decay.
 4. Automatic transfer, to automatically open the main breaker and close the Tie circuit breaker, after an adjustable time delay, 0-5 minutes, upon detection of a loss of normal voltage on a given input supply. The voltage device shall be three phase type suitable for monitoring low or loss of voltage on each of the three phases.
 5. Automatic re-transfer, based upon the position of a master re-transfer switch. When the switch is in auto, the control shall automatically open the Tie circuit breaker, after an adjustable time delay, 0-5 minutes, upon detection of the return of the input supply

- voltage and close the Main circuit breakers after the breaker transfer delay.
6. Manual re-transfer, based upon the position of a master re-transfer switch. When the switch is in manual, breaker transfer shall be manual based upon the position of open-auto-close switches, one for each breaker.
- C. The switchgear shall include a 120 Volt source suitable for operation as required of circuit breakers, meters, status lights and the transfer control scheme. The 120 Volt source shall be derived from two control power transformers and shall include protective devices and a transfer control. The transfer control shall include contactors to automatically switch from either control power transformers should a given input supply line.
 - D. The control shall be sequenced by a programmable logic controller, PLC. The PLC provided shall be Allen Bradley ControlLogix, to match County's standards.

2.04 MAIN METERING DEVICE

- A. Provide a main meter device as shown on the Contract Drawings and Documents.
 1. Microprocessor-based monitoring device shall provide complete electrical metering in one package. Device shall include self-contained potential transformers and self-protected internal fuses.
 2. Mount device on the compartment door to allow personnel access to meter menu and display.
 3. Device shall include trend analysis, event logging, and recording, and include the following direct-reading metered values:

a.	Volts:	0.2 percent accuracy.
b.	Amperes:	0.2 percent accuracy
c.	Watts, Vars and VA:	0.5 percent accuracy
d.	Power Factor:	1.0 percent accuracy
e.	Frequency:	0.05 percent accuracy
f.	Watt and VA Hours:	0.5 percent accuracy
g.	Var. Hours:	1.0 percent accuracy
h.	Watt, Var, and VA Demand:	0.4 percent accuracy
i.	THD-Voltage:	50th harmonic
j.	THD-Current:	50th harmonic
k.	Individual Ampere Harmonics:	50th harmonic
l.	Individual Voltage Harmonics:	50th harmonic
 4. Provide metering device with the following additional features:
 - a. Trend analysis displaying minimum and maximum values for each metered parameter with date and time of each occurrence.
 - b. Input range of device shall accommodate external current transformers with ranges from 100/5 to 5000/5 and potential transformers from a ratio of 120:120 to 500,000:120.

- c. Alarm contacts rated five amps at 120 vac.
 - d. Three analog outputs programmable to reflect the metered parameters, except kilowatt hours and kilovar hours.
 - e. Direct Communication capability to Ethernet IP or provide Gateway Protocol converter for Ethernet IP.
5. Control power shall be drawn from monitored incoming AC line. Device shall have non-volatile memory and not require battery backup. During power failure, device shall retain preset parameters.

2.05 SURGE PROTECTIVE DEVICES

- A. Provide surge protective device in accordance with Section 16289, Surge Protective Devices for each switchgear bus as shown or indicated on the Drawings. Surge protective device shall be included and factory-mounted within secondary distribution equipment by secondary distribution equipment manufacturer. Surge protective device monitoring and display shall be visible from front of secondary distribution equipment.

2.06 WIRING AND DEVICE IDENTIFICATION

- A. Provide control wiring and internal device identification for each compartment, including:
- 1. Identify control conductors with permanent wire markers. Each wire shall be identified by a unique number and shall be attached to the wire at each termination point.
 - 2. Identify each control device with permanent markers. Each device shall be identified by a unique number and shall be attached to each device.
 - 3. Identify numbering system for each wire and control device on wiring diagrams and shall be the actual designations used in the Work.

2.07 FINISHING

- A. Shop Painting:
- 1. Surface Preparation: Thoroughly clean substation's metal surfaces, provide surface preparation in accordance with paint manufacturer's recommendations.
 - 2. Primer: Provide one coat of standard primer.
 - 3. Finish Coat:
 - a. Surfaces located indoors, including surfaces inside enclosure, shall receive one shop coats of standard finish.
 - b. Provide exterior surfaces located outdoors two shop coats of standard finish.
 - c. Color of finishing coats shall be ANSI No. 61, "light gray".

2.08 SOURCE QUALITY CONTROL

- A. Tests:

1. Perform factory tests on equipment prior to shipment. Testing shall consist of the manufacturer's standard tests, and at minimum shall include the following:
 - a. Physical inspection, checking of all components, and wiring checks.
 - b. Breaker operation, device functional tests, and sequencing of control circuits.
 - c. Control, and power wiring dielectric tests.

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 equipment in accordance with manufacturer's recommendations and instructions, Laws and Regulations, and the Contract Documents. Install equipment as shown on concrete bases, and on support channels in concrete in accordance with equipment manufacturer's recommendations.
- B. Install terminations, lugs, and required appurtenances to properly terminate power supplies.
- C. Install control wiring terminations and appurtenances necessary to complete the installation of control and monitoring devices.
- D. Connections to existing facilities shall be in accordance with coordination with County's Operations.

3.03 FIELD QUALITY CONTROL

- A. Site Tests:
 1. Site Testing, General:
 - a. Provide field-testing and inspection of substation equipment. After installation, inspect, adjust, and test each substation.
 - b. Testing and inspection shall be in accordance with the manufacturer's recommendations, Laws and Regulations, and the Contract Documents, and shall be performed by the manufacturer's factory-trained representative.
 - c. Through CONTRACTOR, manufacturer's representative shall inform COUNTY and ENGINEER when equipment is correctly installed.
 - d. Do not energize equipment without COUNTY's permission.

2. Perform the following tests and checks before energizing equipment:
 - a. Verify proper installation of equipment and ratings.
 - b. Inspect all mechanical and electrical interlocks and equipment for proper operation.
 - c. Check tightness of bolted connections.
 - d. Measure insulation resistance of each bus section phase-to-phase and phase-to-ground.
 - e. Measure insulation resistance of each switch, circuit breaker, and fuse pole to pole and from pole to ground.
 - f. Perform other tests and adjustments recommended by equipment manufacturer.
3. Provide testing equipment and services for testing the equipment specified.
4. Provide acceptance testing of switchgear equipment by an independent testing firm. Independent testing firm shall inspect and test each substation. Perform testing and inspection, after completing of field-testing specified in Paragraph 3.3.A.2 of this Section.
 - a. Visual and Mechanical Inspection: Perform inspection of each substation in accordance with ANSI/NETA ATS. Inspection shall include:
 - 1) Inspect for physical, electrical, and mechanical condition.
 - 2) Check for proper anchorage, required area clearances, physical damage and proper alignment.
 - 3) Inspect all connections for high resistance.
 - 4) Check all electrical and mechanical interlock systems for proper operation.
 - 5) Check blade alignment and arc interrupter operation. Check arc chutes as required.
 - 6) Inspect insulators for evidence of damage or contamination.
 - 7) Clean and lubricate as required.
 - b. Electrical Tests: Perform electrical testing of each substation in accordance with ANSI/NETA ATS. Testing shall include:
 - 1) Perform ground-resistance tests.
 - 2) Perform insulation-resistance tests on each bus section, phase-to-phase and phase-to-ground.
 - 3) Perform an over-potential test on each bus section, each phase-to-ground.
 - 4) Perform insulation-resistance tests on each switch and circuit breaker, phase-to-phase and phase-to-ground.
 - 5) Perform DC over-potential test on each switch in the closed position. Test each pole with other poles

- grounded.
- 6) Perform contact-resistance test.
- 7) Perform control and metering wiring performance test.
- 8) For each circuit breaker, determine trip characteristics by primary current injection.
- 9) For each transformer perform resistance measurements and power factor tests of all windings.

B. Manufacturer Services:

1. Unloading and Installation: Manufacturer's factory-trained representative shall be present during unloading of the equipment and installation in the equipment's final location. Representative shall train installing personnel in advance in the proper handling and rigging of the equipment. This shall be at least one eight-hour day.
2. Post-installation Check: Manufacturer's factory-trained representative shall check and approve the installation before initial operation. This shall be at least 2 eight-hour days.
3. Manufacturer's factory-trained representative shall adjust the system to initial settings as specified in Article 3.4 of this Section.
4. Testing and Start-up: Testing, checkout and start-up of the equipment shall be performed under the technical direction of the manufacturer's factory-trained representative. Representative shall operate and test the system in the presence of ENGINEER and verify that equipment complies with the Contract Documents. This shall be at least 2 eight-hour days at the Site. Do not energize system without authorization from manufacturer's representative.
5. Manufacturer's technicians and specialists shall instruct operations and maintenance personnel.
 - a. Furnish services of manufacturer's qualified, factory-trained specialists to instruct OWNER's operations and maintenance personnel in recommended operation and maintenance of equipment.
 - b. Minimum of 4 hours training at the site facility with "hands on" demonstration training at equipment
 - c. Include bond reference materials for all aspects of training as part of the training process.
 - d. Training shall include maintenance and operation of equipment including safety features and safe handling methods when working on equipment. This will be documented as part of the training materials.
6. Technician shall revisit the Site as often as necessary until installation is acceptable.
7. Provide services of manufacturer's factory-trained representatives to correct defective Work within 72 hours of notification by COUNTY during the correction period.

8. All costs, including expenses for travel, lodging, meals and incidentals, and cost of travel time, for visits to the Site shall be included in the Contract Price.

3.04 ADJUSTING

- A. Calibrate, set, and program protective devices. Coordinate protective devices furnished under this Section and provide proper settings of all devices in accordance with the findings of study specified under Section 16215, Electrical Power Distribution System Studies.

3.05 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section for three (3) years from date of Substantial Completion in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16442 PANELBOARDS

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 panelboards.

B. Related Sections:

1. Section 16050, Electrical - General Provisions.
2. Section 16075, Identification for Electrical Systems.
3. Section 16271, Dry-Type Low-Voltage Distribution Transformers
4. Section 16289, Surge Protective Devices.

1.02 REFERENCES

A. Standards referenced in this Section are:

1. NEMA PB 1, Panelboards.
2. UL 67, Panelboards.

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. Shop Drawings:

- a. Listing of panelboards to be furnished with identification of their proposed location, and all electrical characteristics, including number and rating of branch circuit breakers and enclosure type.

2. Product Data:

- a. Manufacturer's technical information for panelboards proposed for use, including product literature and specifications. Indicate options and features to be provided.

1.04 QUALITY ASSURANCE

A. Regulatory Requirements; Comply with the following:

1. NEC Article 408, Switchboards and Panelboards.

1.05 PRODUCT DELIVERY, STORAGE AND HANDLING

A. Packing, Shipping, Handling, and Unloading:

1. Packing:
 - a. Inspect prior to packing to assure that assemblies and components are complete and undamaged.
 - b. Protect mating connections.
 - c. Cover all openings into enclosures with-vapor inhibiting, water-repellent material.
2. Deliver materials and equipment to Site to ensure uninterrupted progress of the Work. Deliver anchorage materials to be embedded in concrete in ample time to prevent delaying the Work. Upon deliver, check materials and equipment for evidence of water that may have entered equipment during transit.
3. Comply with Div. 1, Product Delivery Requirements.

B. Storage and Protection:

1. Store panelboards in a clean, dry location with environmental controls for uniform temperature and humidity. Protect equipment with coverings and maintain environmental controls.
2. Comply with Section 01620, Product Storage and Handling Requirements.

PART 2 PRODUCTS

2.01 MATERIALS

A. Panelboards:

1. Manufacturers: Provide products of one of the following:
 - a. Schneider Electric/Square D Company.
 - b. No Equal
2. Rating: Voltage rating, current rating, number of phases, number of wires and number of poles as shown or indicated on the Contract Drawings.
3. Circuit Breakers: Molded case, bolt-in thermal magnetic type with number of poles and trip ratings as shown or indicated. Where indicated on the Drawings, circuit breakers shall be ground fault circuit interrupting type equipped with solid state sensing and five-milliamp sensitivity.
4. Circuit breakers for 480-volt panelboards shall have minimum interrupting rating of 14,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings. Circuit breakers for other panelboards shall have minimum interrupting rating of 10,000 ampere RMS symmetrical, unless otherwise indicated on the Drawings.

5. Bus Bars: Bus bars shall be 98 percent conductivity copper. Four-wire panelboards shall have solid neutral bar. Each panel shall have ground bus bar.
6. Main: Panelboards shall have main circuit breaker, unless the Drawings specifically indicate main lugs only.
7. Connect branch circuit breakers for sequence phasing.
8. Enclosures: Panel enclosures shall be as required for the area classifications indicated in Section 16050, General Provisions for Electrical Systems, unless otherwise indicated on the Drawings.
9. Construction: Code-grade steel, ample gutter space, flush door, flush snap latch and lock. Panelboards shall comply with NEMA PB 1 and UL 67.
10. Trim: Surface or flush as required.
11. Directory: Typed or computer-printed card, with transparent protective cover in frame on back of door giving circuit numbers and area or equipment served.
12. Identification: Identify panelboards in accordance with Section 16075, Identification for Electrical Systems. Identification shall indicate panel number and voltage.
13. Directory of Existing Panelboards: When adding or removing breakers or loads from existing panelboards, provide a new typed or computer-generated directory card, indicating the circuit numbers and equipment served.
14. Provide surge protective device in accordance with Section 16289, Surge Protective Devices, for each panelboard shown or indicated on the Drawings. Surge protective device shall be included and factory-mounted within panelboard by panelboard manufacturer. Surge protective device monitoring and display shall be visible from front of panelboard.

B. Integrated Panelboard and Transformer:

1. Products and Manufacturers: Provide products of one of the following:
 - a. Mini-Power Zone by Schneider Electric/Square D Company.
 - b. Or approved equal.
2. General: Unit shall consist of encapsulated dry-type transformer, primary and secondary main circuit breakers, and secondary panelboard all in one enclosure.
3. Transformer Rating: Transformer portion shall comply with Section 16271, Dry-type Low-Voltage Distribution Transformers. KVA, primary voltage, secondary voltage, frequency and number of phases shall be as shown or indicated on the Drawings.
4. Branch Circuits: Molded case circuit breakers, plug-in thermal magnetic type with number of poles and trip ratings as shown or indicated on the Drawings.
5. Enclosure: Enclosures shall be as required for the area classifications indicated in Section 16050, General Provisions for Electrical Systems, unless otherwise indicated on the Drawings.

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. Mounting: Install panelboards at locations shown or indicated on the Contract Drawings. Set cabinets so that top branch circuit breaker is not over six feet above the floor.
- B. Directory: Complete typewritten or computer-printed directory indicating items controlled by each circuit breaker and the size of feeder serving the panel.
- C. Arrange circuits to balance the loads on the panelboards.
- D. Identify panelboards in accordance with Section 16075, Identification for Electrical Systems.
- E. Install in accordance with NEC, and local Laws and Regulations, manufacturer's recommendations, and the Contract Documents. Verify proper installation prior to energizing panelboards.

3.03 GUARANTEES AND WARRANTIES

- A. The Contractor shall guarantee and warrant all materials and labor provided under this Section for three (3) years from date of Substantial Completion in accordance with Section 01740 and Section 16050 of these Specifications.

END OF SECTION

SECTION 16450 GROUNDING

PART 1 GENERAL

1.01 SCOPE OF WORK

- A. CONTRACTOR shall 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.
- B. Coordinate with lighting protection provider for requirements of system.

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 3/4-inch and a length of 15-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, connection 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. 4/0 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 ENGINEER 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 for three (3) years from date of Substantial Completion in accordance with Section 01740 and Section 16050 of these Specifications.

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 05500, Electrical Enclosure
2. Section 16050, Electrical - General Provisions
3. Section 16110, Conduits and Fittings
4. Section 16600, Vibration, Seismic and Wind Controls

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, Metal Fabrications, 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, Rigid Conduits.

- 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

SECTION 16600 VIBRATION SEISMIC AND WIND CONTROLS FOR ELECTRICAL SYSTEMS

PART 1 GENERAL

1.01 REQUIREMENTS

- A. Electrical installation shall meet the seismic requirements as specified by the Florida State Building Code (hereinafter referred to as the State Building Code).
- B. State Building Code states that this project is classified as Risk Category III and that all seismic restraints, connections, etc. shall be designed accordingly.
- C. Wind load design shall be for 158mph sustained.

1.02 SUBMITTALS

- A. Shop drawings and product data as described in Division 1.

PART 2 PRODUCTS

2.01 MATERIALS

- A. All free standing electrical equipment such as switchboards, motor control centers, transformers, generators, etc., shall be anchored to the structure in a manner that will satisfy the requirements of the State Building Code.
 - 1. Manufacturer of the equipment shall detail methods to be used to meet these requirements on the shop drawings of the equipment. Design calculations for the restraint methods used shall be included with the shop drawings. Drawings with these details, as well as the design calculation sheets, shall carry the seal of a registered professional engineer.
 - 2. Manufacturer shall make provisions for a field visit by his engineer to verify that the installation conforms to the design. A certifying letter shall be sent to the Electrical Engineer stating that the installation does conform to the manufacturer's design and does meet the requirements of the State Building Code.
- B. Mounting methods of internal components of manufactured equipment shall be certified by the manufacturer that the methods used meet the seismic and wind requirements of the State Building Code. Certification compliance information shall be submitted with shop drawings.
- C. Raceway, fixtures, and other hung or suspended components of the electrical installation shall be installed in compliance with the State Building Code. Seismic and wind restraint systems shall be Unistrut, Kindorf, B-Line, or approved equivalent. Seismic and wind restraint systems shall be designed by the vendor.
 - 1. Submit to the Engineer record copies of all calculations and system information. Calculations and details shall be sealed by a registered professional engineer. Where specific pre-engineered systems are not

readily available, the contractor may use the latest edition of "Seismic Restraint Manual Guidelines for Mechanical Systems" published by SMACNA for determining correct restraint systems to be used.

2. Submit SMACNA systems to be used at same time as shop drawings of other pre-engineered systems. Either the vendor or the contractor, as applicable, shall make provisions for a field visit by a registered professional engineer to verify that the installation conforms to the vendor's design or the SMACNA design, as appropriate, and that the installation meets the requirements of the State Building Code.

- D. Housekeeping pads specified for equipment shall be mechanically connected to the structural floor.

PART 3 EXECUTION

3.01 GENERAL INSTALLATION

- A. Review of the seismic and wind design and shop drawings by the Engineer shall not relieve the Contractor of his responsibility to comply with the seismic or any other requirements of the State Building Code.

END OF SECTION

CONSTRUCTION AGREEMENT

for

STIPULATED SUM

IFB16-1455OV

Replacement of Two (2) Motor Control Centers at Lake
Manatee Water Treatment Plant
Project No. 6025974 and 6025973

between

MANATEE COUNTY (AS OWNER)

and

_____ (AS CONTRACTOR)

CONSTRUCTION AGREEMENT

for

STIPULATED SUM

IFB16-1455OV

Replacement of Two (2) Motor Control Centers at Lake
Manatee Water Treatment Plant
Project No. 6025974 and 6025973

between

MANATEE COUNTY (AS OWNER)

and

_____ (AS CONTRACTOR)

**CONSTRUCTION AGREEMENT FOR
STIPULATED SUM
Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant
(IFB16-1455OV)**

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 **Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant [Project No. 6025974 and 6025973]**, the aforementioned improvements being hereinafter referred to and defined as the “Project”; and

WHEREAS, in response to Owner’s Invitation for Bid No. **16-1455OV** (the “IFB”), 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.

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, the Owner shall be entitled to retain or recover from the Contractor, as liquidated damages and not as a penalty, the sum of **\$1,742.00** 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 Owner will incur as a result 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 ten percent (10.00%). 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 ten percent (10.00%);
 - 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 shall reduce to five percent (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:

Manatee County Public Works Department
Attn: Mr. Anthony Russo, Project Manager
1022 26th Street East
Bradenton, FL 34208
Phone: (941)708-7450, Extension 7349
Email: Anthony.Russo@mymanatee.org

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. 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—Change Order
- 3—Administrative Contract Adjustment (ACA)
- 4—Certificate of Substantial Completion
- 5—Final Reconciliation / Warranty / Affidavit
- 6—Public Construction Bond Form

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: _____

Exhibit A
Title(s) of Drawings

Phase A (Raw Water #2 MCC Replacement) and Phase B (MCC-A Replacement)
Project No. 6025974 and 6025973

Dated February 2016 (16 pages)

(Drawings are referenced only – not included in this agreement)

Drawing Index

Sheet No. / Description

E-0.0	Cover & Index
E-0.1	Abbreviations, Symbols, and Legends
E-0.2	Overall Site Plan
E-1.0	Existing A – MCC 1 & 2 One Line Demolition
E-1.1	Existing A – MCC 1 & 2 Demolition Plan I
E-1.2	Existing A – MCC 1 & 2 Demolition Plan II
E-1.3	Raw Water #2 MCC Demolition
E-1-4	Raw #2 Existing & Proposed Site Plan
E-2-0	Proposed MCC-1A One Line
E-2.1	Proposed Mcc-1A Floor Plan
E-2.2	Raw Water #2 MCC One Line
E-2.3	Raw Water #2 MCC Power Plan
E-2.4	Raw Water #2 MCC Structural Site Plan
E-3.0	Control Schematics
E-3.1	Electrical Details I
E-3.2	Electrical Details II

Exhibit B
Title(s) of Specifications

Contract Documents and Technical Specifications
Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant
(326 pages)

(Specifications are referenced only – not included in this Agreement)

EXHIBIT "C"
AFFIDAVIT OF NO CONFLICT

COUNTY OF _____,

STATE OF _____,

BEFORE ME, the undersigned authority, this day personally appeared, _____, a principal with full authority to bind _____ hereinafter the "Lessee"), 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 Lessee 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 this Agreement for

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 _____

Exhibit D
Contractor's Certificate(s) of Insurance

Exhibit E
Contractor's Payment and Performance Bond

Exhibit F
Standard Forms

1. Application for Payment
2. Contract Change Order
3. Administrative Contract Adjustment (ACA)
4. Certificate of Substantial Completion
5. Final Reconciliation, Warranty Period
Declaration and Contractor's Affidavit
6. Public Construction Bond

APPLICATION FOR PAYMENT

Project: _____
 From: _____ To: _____

Request No.: _____ Project No.: _____
 Purchase Order No.: _____
 County Bid No.: _____
 Consultant: _____

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)

 Name of person authorized to sign Affidavit of Notice

 TITLE

 Contractor name, address and telephone no.:

 (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: _____

VERIFICATION, RECOMMENDATION, CONCURRENCES AND APPROVALS

(Signatures)

(Date)

Quantities verified by: _____
 Consultant/Engineer: _____
 Project Manager: _____
 Department Head: _____
 Payment approved by the
 Board of County Commissioners: _____
 Attested to by the Clerk of Circuit Court: _____

CONTRACT CHANGE ORDER		Change Order No.:	
PROJECT:		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: _____ Contractor Signature: _____ Date _____		THE NET CHANGE OF ADJUSTS THE CURRENT CONTRACT AMOUNT FROM TO	
RECOMMENDATION, CONCURRENCES AND APPROVALS			
		SIGNATURES	DATE
Consultant / Engineer		_____	_____
Project Manager:		_____	_____
Department Head:		_____	_____
Approved by the Manatee County Board of County Commissioners:		_____	_____
		Chairman	
Attest Clerk of the Circuit Court:		_____	_____

ADMINISTRATIVE CONTRACT ADJUSTMENT

Project Name: _____

Contract Adjustment No.: _____

Contract Amount: _____

Project Number: _____

ITEM	DESCRIPTION OF ITEM AND CHANGE	DECREASE	INCREASE
	BY EXECUTION OF THIS ADMINISTRATIVE CONTRACT ADJUSTMENT, THE CONTRACTOR AGREES THAT ALL CLAIMS FOR ADDITIONAL CONTRACT TIME AND FEES FOR THE ITEMS IN THIS ADMINISTRATIVE CONTRACT ADJUSTMENT HAVE BEEN SATISFIED.		

	TOTAL DECREASE:	TOTAL INCREASE:
--	------------------------	------------------------

<p>Contractor: _____</p> <p>Address: _____</p> <p>City/State: _____</p> <p>Contractor Signature: _____ Date: _____</p>	<p>THE NET CHANGE OF</p> <p>ADJUSTS THE CURRENT CONTRACT AMOUNT FROM</p> <p style="text-align: center;">TO</p> <p>CALENDAR DAYS ARE ADDED TO THE SCHEDULE WHICH CHANGES THE FINAL COMPLETION DATE</p> <p style="text-align: center;">FROM</p>
---	--

RECOMMENDATION, CONCURRENCES AND APPROVALS

	SIGNATURES	DATE
Consultant / Engineer:	_____	_____
Project Manager:	_____	_____
Division Manager:	Jeff Streitmatter III, P.E., Project Management Division Manager	_____
Department Director / Deputy Director	Sia Mollanazar, P.E., Deputy Director, Engineering Services	_____

JUSTIFICATION FOR CHANGE

Contract Adjustment No.: _____

Project Number: _____

1. Necessity for Change:

2. Does this change alter the scope of work?
(If yes, explain)

3. Effect of this change on other "Prime" contractors.

4. It is the contractor's responsibility to notify the bonding agency.

**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 _____

**MANATEE COUNTY GOVERNMENT
PUBLIC CONSTRUCTION BOND**

Bond No. _____
(Enter bond number)

BY THIS BOND, We _____, located at _____, as
(Name of Contractor) (Address)

Principal and _____, a corporation, whose address is
(Name of Surety)

_____ are bound to Manatee County, a political subdivision of the State of Florida, herein called County, in the sum of \$ _____, for payment of which we bind ourselves, our heirs, personal representatives, successors, and assigns, jointly and severally.

WHEREAS, the Contractor has entered into Contract No. 16-1455OV with the County for the project titled Replacement of Two (2) Motor Control Centers at Lake Manatee Water Treatment Plant (Project No. 6025974 and 6025973), with conditions and provisions as are further described in the aforementioned Contract, which Contract is by reference made a part hereof for the purposes of explaining this bond.

THE CONDITION OF THIS BOND is that if Principal:

1. Performs Contract No. 16-1455OV, between Principal and County for construction of

Replacement of Two (2) Motor Control Treatment Centers at Lake Manatee Water Treatment Plant (Project No. 6025974 and 6025973),

(Title of Project)

the Contract being made a part of this bond by reference, at the times and in the manner prescribed in the Contract; and

2. Promptly makes payments to all claimants, as defined in Section 255.05(1), Florida Statutes, supplying Principal with labor, materials, or supplies, used directly or indirectly by Principal in the prosecution of the Work provided for in the Contract; and

3. Pays County all losses, damages, expenses, costs, and attorney's fees, including appellate proceedings, that County sustains because of a default by Principal under the Contract; and

4. Performs the guarantee of all Work and materials furnished under the Contract for the time specified in the Contract, then this bond is void; otherwise it remains in full force.

Any action instituted by a claimant under this bond for payment must be in accordance with the notice and time limitation provisions in Section 255.05(2), Florida Statutes.

Any changes in or under the Contract documents and compliance or noncompliance with any formalities connected with the Contract or the changes does not affect Surety's obligation under this bond.

DATED ON _____.

CONTRACTOR AS PRINCIPAL

SURETY

Company Name

Company Name

Signature

Signature

Print Name & Title

Print Name & Title

(Corporate Seal)

(Corporate Seal)

AGENT or BROKER

Company Name

Address

Telephone

Licensed Florida Insurance Agent? Yes No

License #: _____

State of: _____

County of: _____

City of: _____

GENERAL CONDITIONS
of the
CONSTRUCTION AGREEMENT

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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 and Creed, Inc., located at 1365 Hamlet Avenue, Clearwater, FL 33756, a 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. Compensable Delay: Any delay beyond the control and without the fault or negligence of the Contractor resulting from Owner-caused changes in the Work, differing site conditions, suspensions of the Work, or termination for convenience by Owner.

F. Contractor's Personnel: The Contractor's key personnel designated by Contractor.

G. 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.

H. 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.

I. Construction Team: The working team established pursuant to Section 2.1.B.

J. 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.

K. 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.

L. 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).

M. Excusable Delay: Any delay beyond the control and without the negligence of the Contractor, the Owner, or any other contractor caused by events or circumstances such as, but not limited to, acts of God or of a public enemy, fires, floods, freight embargoes, acts of government other than Owner or epidemics. Labor disputes and above average rainfall shall give rise only to excusable delays.

N. 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.

O. 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.

P. Float or Slack Time: The time available in the Project Schedule during which an unexpected activity can be completed without delaying substantial completion of the Work.

Q. Force Majeure: Those conditions constituting excuse from performance as described in and subject to the conditions described in Article XII.

R. Inexcusable Delay: Any delay caused by events or circumstances within the control of the Contractor, such as inadequate crewing, slow submittals, etc., which might have been avoided by the exercise of care, prudence, foresight or diligence on the part of the Contractor.

S. Non-prejudicial Delay: Any delay impacting a portion of the Work within the available total Float or Slack Time and not necessarily preventing Substantial Completion of the Work within the Contract Time.

T. 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.

U. Owner: Manatee County, a political subdivision of the State of Florida.

V. Owner’s Project Representative: The individual designated by Owner to perform those functions set forth in Section 7.8.

W. 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.

X. 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.

Y. Prejudicial Delay: Any excusable or compensable delay impacting the Work and exceeding the total float available in the Project Schedule, thus preventing completion of the Work within the Contract Time unless the Work is accelerated.

Z. 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.

AA. 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.

BB. 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.

CC. 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.

DD. 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.

EE. 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.

FF. 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.

GG. Pre-operation Testing: All field inspections, installation checks, water tests, performance tests and necessary corrections required of Contractor to demonstrate that

individual components of the Work have been properly constructed and do operate in accordance with the Contract Documents for their intended purposes.

HH. Procurement Ordinance: The Manatee County Procurement Code, Chapter 2-26 of the Manatee County Code of Laws, as amended from time to time.

II. Punch List Completion Date: The date upon which all previously incomplete or unsatisfactory items, as identified by the Contractor, the Architect/Engineer and/or the Owner are completed in a competent and workmanlike manner, consistent with standards for Work of this type and with good building practices in the State of Florida.

JJ. 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.

KK. 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.

LL. Substantial Completion Date: The date on which the Project 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.

MM. Unit Price Work: Work to be paid for on the basis of unit prices.

NN. 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.

OO. 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 together 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 Contract, 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 Contract 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 and methods of construction.

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. The Project shall be constructed in accordance with applicable Owner design standards and guidelines. 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 Contract, 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/Engineering charges, inspection costs and Owner staff time for any overtime work which may be authorized. Such additional charges shall be a subsidiary obligation of Contractor and no extra payment shall be made by Owner on account of 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.

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 the Florida Department of Commerce Safety Regulations and any 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 in the course of 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 provisions 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. In the event that substitute materials or equipment not included as part of the Bid (or Guaranteed Maximum Price Addendum), but proposed after the effective date of the Contract Documents, 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) If a specific means, method, technique, sequence of procedure of construction is indicated in or required by the Contract Documents, Contractor may furnish or utilize a substitute means, method, sequence, technique or procedure of construction acceptable to Architect/Engineer if Contractor submits sufficient information to allow Architect/Engineer to determine that the substitute proposed is equivalent to that indicated or required by the Contract Documents.
- (2) 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.
- (3) 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 Contract Documents and all costs resulting from any delays in the Work while the substitute was undergoing review.

R. Surveys and Stakes. The Contractor shall furnish, free of charge, 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, in the course of 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 in excess of 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 as a result of any delay in excess of 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 job.

X. Weather Protection. The Contractor shall provide temporary enclosures of building areas in order 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.

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, so as 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 subsequent to the 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 under the Contract, 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 comply with the provisions of Chapter 446, Florida Statutes.

HH. Schedule of Values. Unit prices shall be established for this Contract 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 known amounts (direct, indirect and consequential) 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 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
- (3) If Contractor believes that it has incurred additional expense as a result thereof; or
- (4) If Owner believes that the quantity variation entitles it to an adjustment in the unit price; or
- (5) 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, hereinafter referred to as "liens"; 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 on account 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 either party disputes the Architect/Engineer's determination or recommendation, that party may proceed as provided in Article VIII.

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 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 Unit Prices. If unit prices are stated in the Contract Documents or subsequently agreed upon, and if the quantities originally contemplated are so changed in a proposed Change Order that application of the agreed unit prices to the quantities of Work proposed will cause substantial inequity to the Owner or Contractor, the applicable unit prices and Contract Sum shall be equitably adjusted.

5.8 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.

5.9 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.

5.10 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.

5.11 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.

5.12 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.

5.13 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 as a result 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.** On the basis of 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. In the event that 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. In the event that 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 the course of 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 of 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 constructed 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, of any nature whatsoever, 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 pursuant to Section 3 of the Agreement.

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 when the Contractor was or should have been aware of the fact that an occurrence was likely to cause delay or increased costs. 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 agree to 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 Board of County Commissioners in accordance with Section 2-26-64 of the Manatee County Code of Laws shall be the final and conclusive County 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 Contract. 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; 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 an award 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 (other than the Work itself), 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. 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. 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 the purpose of 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 in order 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 completion or termination of the Contract Documents, all records, documents, tracings, plans, specifications, maps, evaluations, reports, transcripts and other technical data, other than working papers, prepared or developed by the Contractor under the Contract Documents 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 insure 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 the Contract Documents, 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 the Contract Documents.

A. No Interest in Business Activity. By accepting award of this Contract, 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 Contract Documents. The Contractor has provided the Affidavit of No Conflict, incorporated into the Contract Documents as Exhibit "C", as a material inducement for Owner entering into the Contract Documents. 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 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 12.1.A. or as a result of an extension of time provided by Change Order, 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 on the basis of 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 on the basis of 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 that each of the following statements is presently true and accurate:

A. The Contractor is a construction company, organized under the laws of the State of _____, authorized to transact business in the State of Florida, with _____ as the primary qualifying agent. 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, governmental agencies with jurisdictional interests will have access to the Work at reasonable time 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 exclude Contractor from all or part of the site, 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 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 his obligations under the Contract Documents, including any obligation the Contractor assumes to perform Work with his 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, or the actual Cost of the Project, whichever is less, 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 as a result 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 on account of 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 as a result 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.