



Advertise Date: Tuesday, March 20, 2018

Lee County Board of County Commissioners
DIVISION OF PROCUREMENT MANAGEMENT

Invitation to Bid (B)
Construction

Solicitation No.: **B180193LAC**

Solicitation Name: **Fiesta Village WWTP Filter Controls Upgrade**

Open Date/Time: **4/25/2018** Time: **2:30 PM**

Location: **Lee County Procurement Management
1500 Monroe Street 4th Floor
Fort Myers, FL 33901**

Procurement Contact: **Lindsay Cepero** Title **Procurement Grants Supervisor**

Phone: **(239) 533-8881** Email: **LCepero@leegov.com**

Requesting Dept. Choose an item.

Pre-Bid Conference:

Type: Mandatory

Date/Time: 3/29/2018 10:30 AM

Location: 1366 San Souci Drive, Fort Myers, FL 33919

All solicitation documents are available for download at
www.leegov.com/procurement

Electronic bidding is coming! Visit www.leegov.com/bid to stay informed



LEE COUNTY
SOUTHWEST FLORIDA

Advertisement Date: 3/20/2018

Notice to Bidder
Invitation to Bid #B180193LAC, Fiesta Village WWTP Filter Controls Upgrade

Invitation to Bid (B) Construction

Lee County, Florida, is requesting bids from qualified individuals/firms for
B180193LAC, Fiesta Village WWTP Filter Controls Upgrade

Then and there to be publicly opened and read aloud for the purpose of selecting a vendor to furnish all necessary labor, services, materials, equipment, tools, consumables, transportation, skills and incidentals required for Lee County, Florida, in conformance with solicitation documents, which include technical specifications and/or a scope of work.

Those individuals/firms interested in being considered for this solicitation are instructed to submit, in accordance with specifications, their Bids, pertinent to this project prior to

2:30 PM Wednesday, April 25, 2018

to the office of the **Procurement Management Director, 1500 Monroe Street, 4th Floor, Fort Myers, Florida 33901**. The Invitation to Bid shall be received in a sealed envelope, prior to the time scheduled to receive Bid(s), and shall be clearly marked with the solicitation name, solicitation number, bidder name, and contact information as identified in these solicitation documents.

The Scope of Work/Specifications for this solicitation is available from www.leegov.com/procurement. Bidders who obtain Scope of Work/Specifications from sources other than www.leegov.com/procurement are cautioned that the solicitation package may be incomplete. The County's official bidders list, addendum(s) and information must be obtained from www.leegov.com/procurement. It is the bidder's responsibility to check for posted information. The County may not accept incomplete Bids.

A MANDATORY Pre-Bid Conference has been scheduled for the following time and location:
10:30 AM March 29, 2018 1366 San Souci Drive, Fort Myers, FL 33919

for the purpose of discussing the proposed project. Prospective bidders are encouraged to attend. All prospective bidders are encouraged to obtain and review plans, specifications, and scope of work for this bid before the pre-bid conference so that they may be prepared to discuss any question or concerns they have regarding this project. A site visit may follow the pre-bid conference. Questions regarding this solicitation are to be directed, in writing, to the individual listed below using the email address listed below or faxed to (239) 485 8383 during normal working hours.

Lindsay Cepero LCepero@leegov.com

Sincerely,

Mary G. Tucker, CPPO, FCCM, FCCN
Procurement Management Director

*WWW.leegov.Com/Procurement is the County's official posting site

Terms and Conditions
INVITATION TO BID (B)
CONSTRUCTION

1 **DEFINITIONS**

- 1.1 **Addendum/Addenda:** A written change, addition, alteration, correction or revision to a bid, proposal or contract Agreement/Contract. Addendum/Addenda may be issued following a pre-bid/pre-proposal conference or as a result of a specification or work scope change to the solicitation.
- 1.2 **Approved Alternate:** Solicitation documents may make reference of specific manufacturer(s) or product(s). These references serve only as a recommendation and a guide to minimum quality and performance. The references are not intended to exclude approved alternatives of other manufacturer(s) or product(s).
- 1.3 **Bid/Proposal Package:** A bid/proposal is a document submitted by a vendor in response to some type of solicitation to be used as a basis for negotiations or for entering into a contract.
- 1.4 **Bidder/Responder/Proposer:** One who submits a response to a solicitation.
- 1.5 **County:** Refers to Lee County Board of County Commissioners.
- 1.6 **Due Date and Time/Opening:** Is defined as the date and time upon which a bid or proposal shall be submitted to the Lee County Procurement Management Division. Only bids or proposals received prior to the established date and time will be considered.
- 1.7 **Liquidated Damages:** Damages paid usually in the form of monetary payment, agreed by the parties to a contract which are due and payable as damages by the party who breaches all or part of the contract. May be applied on a daily basis for as long as the breach is in effect.
- 1.8 **Procurement Management:** shall mean the Director of Lee County’s Procurement Management Department or designee.
- 1.9 **Responsible:** A vendor, business entity or individual who is fully capable to meet all of the requirements of the bid/proposal solicitation documents and subsequent contract. Must possess the full capability including financial and technical, to perform as contractually required. Must be able to fully document the ability to provide good faith performance.
- 1.10 **Responsive:** A vendor, business entity or individual who has submitted a bid or request for proposal that fully conforms in all material respects to the bid/proposal solicitation documents and all of its requirements, including all form and substance.
- 1.11 **Solicitation:** An invitation to bid, a request for proposal, invitation to negotiate or any document used to obtain bids or proposals for the purpose of entering into a contract.

2 **ORDER OF PRECEDENCE**

- 2.1 In resolving conflicts, errors, and discrepancies, the order of precedence of the bid document is as follows
 - 2.1.1 Florida State Law as applied to Municipal Purchasing in accordance with Title XIX, “Public Business”, Chapter 287 “Procurement of Personal Property and Services.”
 - 2.1.2 Lee County Procurement Management Manual and Ordinances
 - 2.1.3 Change Order
 - 2.1.4 Agreement
 - 2.1.5 Addenda
 - 2.1.6 Special Conditions
 - 2.1.7 General Conditions, if any
 - 2.1.8 Specifications
 - 2.1.9 Supplemental Information
 - 2.1.10 Drawings/Plans, if any
 - 2.1.11 Figure Dimensions, if any
 - 2.1.12 Scale Dimensions (Large Scale Drawings supersede Small Scale Drawings)
 - 2.1.13 Terms and Conditions

3 **RULES, REGULATIONS, LAWS, ORDINANCES AND LICENSES**

- 3.1 It shall be the responsibility of the bidder to assure compliance with all other federal, state, or county codes, rules, regulations or other requirements, as each may apply. Any involvement with the Lee County shall be in accordance with but not limited to:
- 3.1.1 Lee County Procurement Management Manual
 - 3.1.2 Pursuant to FL § Section 119.071, Public Records, General exemptions from inspection or copying of public records. Sealed bids, proposals or replies received by the agency pursuant to a solicitation are exempt from public records request (s. 119.07(1) and s. 24(a), Art. I, of the State Constitution until such time as the agency provides notice of an intended decision or until 30 days after opening the bids, proposals or final replies, whichever is earlier.
 - 3.1.3 FL § 215 regarding scrutinized companies and business operations.
 - 3.1.4 FL § 218 Public Bid Disclosure Act.
 - 3.1.5 Florida State Law as applied to Municipal Purchasing in accordance with Title XIX, “Public Business”, Chapter 287 “Procurement of Personal Property and Services.”
 - 3.1.6 FL § 337.168 Confidentiality of official estimates, identities of potential bidders, and bid analysis and monitoring system.
 - 3.1.7 FL § Section 607.1501(1) states: A foreign corporation may not transact business in the State of Florida until it obtains a certificate of authority from the Department of State.
- 3.2 **Local Business Tax Account:** As applicable, anyone providing merchandise or services to the public within the jurisdiction of Lee County must obtain a Lee County business tax account to operate unless specifically exempted.
- 3.3 **License(s):** Bidder should provide, at the time of the opening of the bid, licenses required for this product and/or service.
- 4 BID – PREPARATION OF SUBMITTAL**
- 4.1 **Sealed Bid:** Submission must be in a sealed envelope/box, and the outside of the submission must be marked with the following information (Sealed Bid Label Form is attached for your use):
- 4.1.1 Marked with the words “Sealed Bid”
 - 4.1.2 Bid Number
 - 4.1.3 Bid Title
 - 4.1.4 Bid Due Date
 - 4.1.5 Name of the firm submitting the bid
 - 4.1.6 Contact e-mail and telephone number
- 4.2 **Bid submission shall include:**
- 4.2.1 Provide two (2) hard copies. Mark each: one “Original”, one “Copy”
 - 4.2.2 Provide one (1) electronic CD ROM or flash drive set of the entire submission documents.
 - 4.2.3 Electronic submission document is to be one single Adobe PDF file in the same order as the original hard copy.
 - 4.2.4 Limit the color and number of images to avoid unmanageable file sizes.
 - 4.2.5 Use rewritable CD ROM and do not lock files.
- 4.3 **Submission Format:**
- 4.3.1 Required Forms: complete and return **all** required forms. If the form is not applicable please return with “Not Applicable” or “N/A” in large letters across the form.
 - 4.3.2 Failure to submit required or requested information may result in the bidder being found non-responsive.
 - 4.3.3 Execution of Bid: All documents must be properly signed by corporate authorized representative, witnessed, and where applicable corporate and/or notary seals affixed. All Bids shall be typed or printed in ink. The bidder may not use erasable ink. All corrections made to the bids shall be initialed.
 - 4.3.4 If a cost/bid schedule was provided in Microsoft Excel format, the returned completed schedule should be included as a Microsoft Excel File on the CD ROM or Flash drive.
 - 4.3.5 The submission should not contain links to other web pages.
 - 4.3.6 Include any information requested by the County necessary to analyze your bid, i.e., required submittals, literature, technical data, financial statements.

4.3.7 Bid Security/Bond(s), as applicable (Construction projects)

- 4.4 **Preparation Cost:** The Bidder is solely responsible for any and all costs associated with responding to this solicitation. No reimbursement will be made for any costs associated with the preparation and submittal of any bid, or for any travel and per diem costs that are incurred by any Bidder.

5 RESPONSES RECEIVED LATE

- 5.1 It shall be the Bidder's sole responsibility to deliver the bid submission to the Lee County Procurement Management Division prior to or on the time and date stated. All references to date and time herein reference Lee County, FL local time.
- 5.2 Any bids received after the stated time and date will not be considered. The bid shall not be opened at the public opening. Arrangements may be made for the unopened bid to be returned at the bidder's request and expense.
- 5.3 The Lee County Procurement Management Division shall not be responsible for delays caused by the method of delivery such as, but not limited to; internet, United States Postal Service, overnight express mail service(s), or delays caused by any other occurrence.

6 BIDDER REQUIREMENTS (unless otherwise noted)

- 6.1 **Responsive and Responsible:** Only bids received from responsive and responsible bidders will be considered. The County reserves the right before recommending any award to inspect the facilities and organization; or to take any other necessary action, such as background checks, to determine ability to perform is satisfactory, and reserves the right to reject submission packages where evidence submitted or investigation and evaluation indicates an inability for the bidder to perform.
- 6.1.1 Bids may be declared "non-responsive" due to omissions of "Negligence or Breach of Contract" on the disclosure form. Additionally, bidders may be declared "not responsible" due to past or pending lawsuits that are relevant to the subject procurement such that they call into question the ability of the bidder to assure good faith performance. This determination may be made by the Procurement Management Director, after consulting with the County Attorney.
- 6.1.2 Additional sources may be utilized to determine credit worthiness and ability to perform.
- 6.1.3 Any bidder or sub-contractor that will have access to County facilities or property may be required to be screened to a level that may include, but is not limited to fingerprints, statewide criminal. There may be fees associated with these procedures. These costs are the responsibility of the bidder or sub-contractor.
- 6.2 **BID--Past Performance:** Bidders past performance and prior dealings with Lee County (i.e., failure to meet specifications, poor workmanship, late delivery, etc.) may be reviewed. Poor or unacceptable past performance may result in bidder disqualification.
- 6.3 Submission packages, unless otherwise noted, will be considered only from bidders normally engaged in the provision of the services specified here in. The bidder shall have adequate organization, facilities, equipment, and personnel to ensure prompt and efficient service to Lee County. The County reserves the right before recommending any award to inspect the facilities and organization; or to take any other action necessary to determine ability to perform satisfactorily, and reserves the right to reject submission packages where evidence submitted or investigation and evaluation indicated an inability of the bidder to perform.

7 PRE-BID CONFERENCE

- 7.1 A pre-bid conference will be held in the location, date, and time specified on the cover of this solicitation. The cover will also note if the pre-bid conference is Non-Mandatory or Mandatory. All questions and answers are considered informal. All prospective bidders are encouraged to obtain and review the solicitation documents prior to the pre-bid conference so they may be prepared to discuss any questions or concerns they have concerning this project. All questions must be submitted formally in writing to the procurement staff noted on the first page of the bid document. A formal response will be provided in the form of an addendum (see "County Interpretation/Addendums" for additional information.) A site visit may follow the pre-bid conference, as applicable.

- 7.2 **Non-Mandatory:** Pre-bid conferences are generally non-mandatory, but it is highly recommended that prospective bidders participate.
- 7.3 **Mandatory:** Failure to attend a mandatory pre-bid conference will result in the bid being considered **non-responsive**.

8 COUNTY INTERPRETATION/ADDENDUMS

- 8.1 Each Bidder shall examine the solicitation documents and shall judge all matters relating to the adequacy and accuracy of such documents. Any inquiries, suggestions or requests concerning interpretation, clarification or additional information pertaining to the solicitation shall be **submitted in writing prior to 5:00 PM at least eight (8) calendar days prior to the date when the submission is due**.
- 8.2 Response(s) will be in the form of an Addendum posted on www.lee.gov/procurement. It is solely the bidder's responsibility to check the website for information. No notifications will be sent by Lee County Procurement Management Division.
- 8.3 All Addenda shall become part of the Contract Documents.
- 8.4 The County shall not be responsible for oral interpretations given by any County employee, representative, or others. Interpretation of the meaning of the plans, specifications or any other contract document, or for correction of any apparent ambiguity, inconsistency or error there in, shall be in writing. Issuance of a written addendum by the County's Procurement Management Division is the only official method whereby interpretation, clarification or additional information can be given.

9 QUALITY GUARANTEE/WARRANTY (as applicable)

- 9.1 Bidder will guarantee their work without disclaimers, unless otherwise specifically approved by the County, for a minimum of twelve (12) months from the date of final completion.
- 9.2 Unless otherwise specifically provided in the specifications, all equipment and materials and articles incorporated in the work covered by this contract shall be new, unused and of the most suitable grade for the purpose intended. Refurbished parts or equipment are not acceptable unless otherwise specified in the specifications. All warranties will begin from the date of final completion.
- 9.3 Unless otherwise specifically provided in the specifications, the equipment must be warranted for twelve (12) months, shipping, parts and labor. Should the equipment be taken out of service for more than forty-eight (48) hours to have warranty work performed, a loaner machine of equal capability or better shall be provided for use until the repaired equipment is returned to service at no additional charge to the County.
- 9.4 If any product does not meet performance representation or other quality assurance representations as published by manufacturers, producers or distributors of such products or the specifications listed, the vendor shall pick up the product from the County at no expense to the County. The County reserves the right to reject any or all materials, if in its judgment the item reflects unsatisfactory workmanship or manufacturing or shipping damage. The vendor shall refund, to the County, any money which has been paid for same.

10 SUBSTITUTION(S)/APPROVED ALTERNATE(S)

- 10.1 Unless otherwise specifically provided in the specifications, 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. If a bidder wishes to make a substitution in the specifications, the bidder shall furnish to the County, **no later than ten (10) business days prior to the bid opening date**, the name of the manufacturer, the model number, and other identifying data and information necessary to aid the County in evaluating the substitution. Such information is submitted through the Procurement Management Division. Any such substitution shall be subject to County approval through the issuance of a written addendum by the County's Procurement Management Division. Substitutions shall be approved only if determined by the County to be an **Approved Alternate** to the prescribed specifications.
- 10.2 A bid containing a substitution is subject to disqualification if the substitution is not approved by the County. Items bid must be identified by brand name, number, manufacturer and model, and shall include full descriptive information, brochures, and appropriate attachments. Brand names are used for descriptive purposes only. An **Approved Alternate** product or service may be used.

- 11** NEGOTIATED ITEMS
- 11.1 Any item not outlined in the Scope of Work/Specifications may be subject to negotiations between the County and the successful bidder.
- 11.2 After award of this bid the County reserves the right to add or delete items/services at prices to be negotiated at the time of addition or deletion.
- 11.3 At contract renewal time(s) or in the event of significant industry wide market changes, the County may negotiate justified adjustments such as price, terms, etc., if in its sole judgment, the County considers such adjustments to be in their best interest.
- 12** ERRORS, OMISSIONS, CALCULATION ERRORS (as applicable)
- 12.1 **Calculation Errors:** In the event of multiplication/addition error(s), the unit price shall prevail. Written prices shall prevail over figures where applicable. All bids will be reviewed mathematically and corrected, if necessary, using these standards, prior to further evaluation.
- 13** CONFIDENTIALITY
- 13.1 Bidders should be aware that all submissions provided are subject to public disclosure and will **not** be afforded confidentiality, unless provided by Chapter 119 FL §.
- 13.2 If information is submitted with a bid that is deemed “Confidential” the bidder must stamp those pages of the submission that are considered confidential. The bidder must provide documentation as to validate why these documents should be declared confidential in accordance with Chapter 119, “Public Records,” exemptions.
- 13.3 Lee County **will not reveal engineering estimates or budget amounts for a project** unless required by grant funding or unless it is in the best interest of the County. According to FL § 337.168: A document or electronic file revealing the official cost estimate of the department of a project is confidential and exempt from the provisions of s. 119.07(1) until the contract for the project has been executed or until the project is no longer under active consideration.
- 14** BID -- CONFLICT OF INTEREST
- 14.1 **Business Relationship Disclosure Requirement:** The award hereunder is subject to the provisions of Chapter 112, Public Officers and Employees: General Provisions, Florida Statutes. All bidders must disclose with their submission the name of any officer, director or agent who is also an employee of the Lee County or any of its agencies. Further, all bidders must disclose the name of any County employee who owns directly or indirectly, an interest of five percent (5%) or more in the bidder’s firm or any of its branches.
- 15** ANTI-LOBBYING CLAUSE (Cone of Silence)
- 15.1 Following FL § Section 287.057(23), Upon the issuance of the solicitation, prospective proposers/bidders or any agent, representative or person acting at the request of such proposer/bidder shall not have any contact, communicate with or discuss any matter relating in any way to the solicitation with any Commissioner, Evaluation Review Committee, agent or employee of the County other than the Procurement Management Director or their designee. This prohibition begins with the issuance of any solicitation, and ends upon execution of the final contract or when the solicitation has been cancelled. **If it is determined that improper communications were conducted, the Bidder/Proposer may be declared non-responsible.**
- 16** DRUG FREE WORKPLACE
- 16.1 Lee County Board of County Commissioners encourages Drug Free Workplace programs.
- 17** DISADVANTAGED BUSINESS ENTERPRISE (DBE)
- 17.1 The County encourages the use of Disadvantaged Business Enterprise Bidder(s) as defined and certified by the State of Florida Department of Transportation (DBE).

- 17.2 As requested in the required forms the Bidder is required to indicate whether they and/or any proposed sub-contractor(s) are Disadvantaged Business Enterprises (DBE). Lee County encourages the utilization and participation of DBEs in procurements, and evaluation proceedings will be conducted within the established guidelines regarding equal employment opportunity and nondiscriminatory action based upon the grounds of race, color, sex or national origin. Interested certified Disadvantaged Business Enterprise (DBE) firms as well as other minority-owned and women-owned firms, as defined and certified by the State of Florida Office of Supplier Diversity (Minority), are encouraged to respond.
- 18 ANTI-DISCRIMINATION/EQUAL EMPLOYMENT OPPORTUNITY**
- 18.1 The bidder agrees to comply, in accordance with FL § 287.134, 504 of the Rehabilitation Act of 1973 as amended, the Americans with Disabilities Act of 1990 (ADA), the ADA Amendments Act of 2008 (ADAAA) that furnishing goods or services to the County hereunder, no person on the grounds of race, religion, color, age, sex, national origin, disability or marital status shall be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination.
- 18.2 The bidder will not discriminate against any employee or applicant for employment because of race, religion, color, age, sex, national origin, disability or marital status. The bidder will make affirmative efforts to ensure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, age, sex, national origin, disability or marital status.
- 18.3 The bidder will include the provisions of this section in every sub-contract under this contract to ensure its provisions will be binding upon each sub-contractor. The bidder will take such actions in respect to any sub-contractor, as the contracting agency may direct, as a means of enforcing such provisions, including sanctions for non-compliance.
- 18.4 An entity or affiliate who has been placed on the State of Florida's Discriminatory Vendor List (This list may be viewed by going to the Department of Management Services website at <http://www.dms.myflorida.com>) may not submit a bid on a contract to provide goods or services to a public entity, may not submit a bid on a contract 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 award or perform work as a vendor, supplier, sub-contractor, or consultant under contract with any public entity, and may not transact business with any public entity.
- 19 SUB-CONTRACTOR**
- 19.1 The use of sub-contractors under this solicitation requires prior written authorization from the County representative.
- 20 BID - PROJECT GUIDELINES (as applicable)**
- 20.1 The County has established the following Guidelines, Criteria, Goals, Objectives, Constraints, Schedule, Budget and or Requirements which shall service as a guide to the bidder(s) in conforming to the provision of goods and/or services to be provided pursuant to this Agreement/Contract:
- 20.1.1 No amount of work is guaranteed upon the execution of an Agreement/Contract.
- 20.1.2 Rates and all other negotiated expenses will remain in effect throughout the duration of the Agreement/Contract period.
- 20.1.3 This contract does not entitle any bidder to exclusive rights to County Agreement/Contracts/contracts. The County reserves the right to perform any and all available required work in-house or by any other means it so desires.
- 20.1.4 In reference to vehicle travel, mileage and man-hours spent in travel time, is considered incidental to the work and not an extra compensable expense.
- 20.1.5 Lee County reserves the right to add or delete, at any time, and or all material, tasks or services associated with this Agreement/Contract.
- 20.1.6 Any Single Large Project: The County, in its sole discretion, reserves the right to separately solicit any project that is outside the scope of this solicitation, whether through size, complexity or the dollar value.
- 21 BID – TIEBREAKER**

- 21.1 Whenever two or more Bids, which are equal with respect to price, quality and service, are received for procurement of commodities or contractual services, from Responsive and Responsible Bidders, the following steps shall be taken to establish the Award to the lowest Bidder. This method shall be used for all ties.
- 21.1.1 Step 1 - Local Bidder: Between a Local Bidder, and a non-Local Bidder, a Contract Award, or the first opportunity to negotiate, as applicable, shall be made to the Local Bidder. **If local preference is prohibited by the funding source then step 2 will replace step 1.**
- 21.1.2 Step 2 - Drug Free Workplace: At the conclusion of step 1, if all is equal, the Bidder with a Drug Free Workplace program shall be given preference over a Bidder with no Drug Free Workplace program. The Contract Award, or the first opportunity to negotiate, as applicable, shall be made to the Bidder with the Drug Free Workplace program.
- 21.1.3 Step 3 - Coin Flip: At the conclusion of Step 1 and Step 2, if all is equal, the Contract Award, or the first opportunity to negotiate, as applicable, the final outcome shall be determined by the flip of a coin.
- 21.2 When the tie has been broken pursuant to the above procedures, the Contract Award, or the first opportunity to negotiate, as applicable, shall be furnished to the prevailing Bidder.
- 21.3 If an Award or negotiation is unsuccessful with the initial Bidder, Award or negotiations may commence with the next highest Bidder, utilizing the tiebreaker steps above to make the determination of next lowest Bidder, if necessary.
- 22 WITHDRAWAL OF BID**
- 22.1 No bid may be withdrawn for a period of **180 calendar days** after the scheduled time for receiving submissions. A bid may be withdrawn prior to the solicitation opening date and time. Withdrawal requests must be made in writing to the Procurement Management Director, who will approve or disapprove the request.
- 22.2 A bidder may withdraw a submission any time prior to the opening of the solicitation.
- 22.3 After submissions are opened, but prior to award of the contract by the County Commission, the Procurement Management Director may allow the withdrawal of a bid because of the mistake of the bidder in the preparation of the submission document. In such circumstance, the decision of the Procurement Management Director to allow the submission withdrawal, although discretionary, shall be based upon a finding that the bidder, by clear and convincing evidence, has met each of the following four tests:
- 22.3.1 The bidder acted in good faith in submitting the bid,
- 22.3.2 The mistake in bid preparation that was of such magnitude that to enforce compliance by the bidder would cause a severe hardship on the bidder,
- 22.3.3 The mistake was not the result of gross negligence or willful inattention by the bidder; and
- 22.3.4 The mistake was discovered and was communicated to the County prior to the County Commission having formally awarded the Agreement/Contract.
- 23 PROTEST RIGHTS**
- 23.1 Any bidder that has submitted a formal response to Lee County, and who is adversely affected by an intended decision with respect to the award, has the right to protest an intended decision posted by the County as part of the solicitation process.
- 23.2 “Decisions” are posted on the Lee County Procurement Management Division website. Bidders are solely responsible to check for information regarding the solicitation. (www.lee.gov/procurement)
- 23.3 Refer to the “Bid/Proposal Protest Procedure” section of the Lee County “Contracts Manual” for the complete protest process and requirements. The Manual is posted on the Lee County website or may be obtained by contacting the Procurement Management Director.
- 23.4 In order to preserve the right to protest, a written “**Notice Of Intent To File A Protest**” **must be filed with the Lee County Procurement Management Director by 4:00 PM on the 3rd working day after the decision** affecting your rights is posted on the Lee County website.
- 23.4.1 The notice must clearly state the basis and reasons for the protest.
- 23.4.2 The notice must be physically received by the Procurement Management Director with-in the required time frame. No additional time will be granted for mailing.

23.5 To secure the right to protest a “**Protest Bond**” and written “**Formal Protest**” document must be filed **within 10 calendar days** after the date of “*Notice of Intent to File a Protest*” is received by the Procurement Management Director.

23.6 **Failure to follow the protest procedures requirement within the time frames as prescribed herein and established by the Lee County Board of County Commissioners, Florida, shall constitute a waiver of the right to protest and bar any resulting claims.**

24 AUTHORITY TO UTILIZE BY OTHER GOVERNMENT ENTITIES

24.1 This opportunity is also made available to any government entity. Pursuant to their own governing laws, and subject to the Agreement/Contract of the vendor, other entities may be permitted to make purchases at the terms and conditions contained herein. Lee County Board of County Commissioners will not be financially responsible for the purchases of other entities from this solicitation.

25 CONTRACT ADMINISTRATION

25.1 **Designated Contact:**

25.1.1 The awarded bidder shall appoint a person(s) to act as a primary contact for all County departments. This person or back-up shall be readily available during normal working hours by phone or in person, and shall be knowledgeable of the terms and procedures involved.

25.1.2 Lee County requires the awarded bidder to provide the name of a contact person(s) and phone number(s) which will afford Lee County access 24 hours per day, 365 days per year, of this service in the event of major breakdowns or natural disasters.

25.2 **BID – Term:** (unless otherwise stated in the Scope of Work or Detailed Specifications)

25.2.1 Unless otherwise stated in the scope of work, specifications, or special conditions the default **contract term shall be one (1) year with three (3), one (1) year renewals for a total of four (4) years upon mutual written agreement of both parties.**

25.2.2 The County reserves the right to renew this Agreement/Contract (or any portion thereof) and to negotiate pricing as a condition for each.

25.2.3 The County’s performance and obligation to pay under this contract, and any applicable renewal options, is contingent upon annual appropriation of funds.

25.3 **BID – Basis of Award:**

25.3.1 The bid is awarded under a system of sealed, competitive bidding to the lowest responsive and responsible bidder.

25.3.2 In the event the lowest responsive and responsive bid for a project exceeds the available funds the County may negotiate an adjustment of the bid price with the lowest responsive and responsive bidder, in order to bring the total cost of the project within the amount of available funds.

25.3.3 The County reserves the right to make award(s) by individual item, group of items, all or none, or a combination thereof. The County reserves the right to reject any and all bids or to waive any minor irregularity or technicality in the bids received. Award will be made to the lowest responsive and responsive bidder(s) within the category chosen for basis of award.

25.3.4 The County reserves the right to award to one or multiple bidders at the discretion of the requesting authority and approval of the Procurement Management Director.

25.4 **Agreement/Contracts/Contracts:**

25.4.1 The awarded bidder will be required to execute an Agreement/Contract as a condition of award. A sample of this document may be viewed on-line at <http://www.leegov.com/procurement/forms>.

25.5 **Records:**

25.5.1 Retention: The bidder shall maintain such financial records and other records as may be prescribed by Lee County or by applicable federal and state laws, rules and regulations. Unless otherwise stated in the specifications, the bidder shall retain these records for a period of five years after final payment, or until they are audited by Lee County, whichever event occurs first.

25.5.2 Right to Audit/Disclosure: These records shall be made available during the term of the contract as well as the retention period. These records shall be made readily available to County personnel with reasonable notice and other persons in accordance with the Florida General Records Schedule.

Awarded Bidder/Proposer(s) are hereby informed of their requirement to comply with FL §119 specifically to:

- 25.5.2.1 Keep and maintain public records required by the County to perform the service.
- 25.5.2.2 Upon request from the County's custodian of public records, provide the County 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 or as otherwise provided by law.
- 25.5.2.3 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 County.
- 25.5.2.4 Upon completion of the contract, transfer, at no cost, to the County all public records in possession of the contractor or keep and maintain public records required by the County to perform the service. If the contractor transfers all public records to the County 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 County, upon request from the County's custodian of public records, in a format that is compatible with the information technology systems of the County.

25.5.3 Public Record: **IF THE VENDOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE VENDOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THE CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 239-533-2221, 2115 SECOND STREET, FORT MYERS, FL 33901, <http://www.leegov.com/publicrecords>.**

25.5.4 Ownership: It is understood and agreed that all documents, including detailed reports, plans, original tracings, specifications and all data prepared or obtained by the successful bidder in connection with its services hereunder, include any documents bearing the professional seal of the successful bidder, and shall be delivered to and become the property of Lee County, prior to final payment to the successful bidder or the termination of the Agreement/Contract. This includes any electronic versions, such as CAD or other computer aided drafting programs.

25.6 **Termination:**

25.6.1 Any Agreement/Contract as a result of this solicitation may be terminated by either party giving **thirty (30) calendar days advance written notice**. The County reserves the right to accept or not accept a termination notice submitted by the vendor, and no such termination notice submitted by the vendor shall become effective unless and until the vendor is notified in writing by the County of its acceptance.

25.6.2 The Procurement Management Director may immediately terminate any Agreement/Contract as a result of this solicitation for emergency purposes, as defined by the Lee County Purchasing and Payment Procedures Manual (Purchasing Manual), (also known as Appendix "D" "AC-4-1.pdf".)

25.6.3 Any bidder who has voluntarily withdrawn from a solicitation without the County's mutual consent during the contract period shall be barred from further County procurement for a **period of 180 days**. The vendor may apply to the Board for a waiver of this debarment. Such application for waiver of debarment must be coordinated with and processed by the Procurement Management Department.

25.6.4 The County reserves the right to terminate award or contract following any of the below for goods or services over \$1,000,000:

- 25.6.4.1 Contractor is found to have submitted a false certification as provided under FL § 287.135 (5);
- 25.6.4.2 Contractor has been placed on the Scrutinized Companies with Activities in Sudan List or the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List (FL §215.473);

- 25.6.4.3 Contractor has engaged in business operations in Cuba or Syria (FL § 215.471);
- 25.6.4.4 Contractor has been placed on the Scrutinized Companies that Boycott Israel List, or is engaged in a boycott of Israel. (FL § 215.4725)
- 25.6.4.5 The County reserves the right to review, on a case-by-case basis, and waive this stipulation if it is deemed to advantageous to the County.

26 WAIVER OF CLAIMS

- 26.1 Once this contract expires, or final payment has been requested and made, the awarded bidder shall have waived any claims against the County concerning this contract. After that period, the County will consider the bidder to have waived any right to claims against the County concerning this Agreement/Contract.

27 LEE COUNTY PAYMENT PROCEDURES

- 27.1 Unless otherwise noted, all vendors are requested to mail an original invoice to:
Lee County Finance Department
Post Office Box 2238
Fort Myers, FL 33902-2238
- 27.2 All invoices will be paid as directed by the Lee County payment procedure unless otherwise stated in the detailed specifications for this project.
- 27.3 Lee County will not be liable for requests for payment deriving from aid, assistance, or help by any individual, vendor, proposer, or bidder for the preparation of these specifications.
- 27.4 Lee County is generally a tax exempt entity subject to the provisions of the 1987 legislation regarding sales tax on services. Lee County will pay those taxes for which it is obligated, or it will provide a Certificate of Exemption furnished by the Department of Revenue. All bidders should include in their bids, all sales or use taxes, which they will pay when making purchases of material or sub-contractor's services.

28 SAFETY DATA SHEETS (SDS) (as applicable)

- 28.1 In accordance with Chapter 443 of the FL §, it is the vendor's responsibility to provide Lee County with Safety Data Sheets on bid materials, as may apply to this procurement.

29 DEBRIS DISPOSAL (as applicable)

- 29.1 Unless otherwise stated, the bidder shall be fully responsible for the lawful removal and disposal of any materials, debris, garbage, vehicles or other such items which would interfere with the undertaking and completion of the project. There shall not be an increase in time or price associated with such removal.

30 SHIPPING (as applicable)

- 30.1 Cost of all shipping to the site, including any inside delivery charges and all unusual storage requirements shall be borne by the bidder unless otherwise agreed upon in writing prior to service. It shall be the bidders responsibility to make appropriate arrangements, and to coordinate with authorized personnel at the site, for proper acceptance, handling, protection and storage (if available) of equipment and material delivered. All pricing to be F.O.B. destination.
- 30.2 The materials and/or services delivered under the bid shall remain the property of the seller until a physical inspection and actual usage of these materials and/or services is accepted by the County and is deemed to be in compliance with the terms herein, fully in accord with the specifications and of the highest quality.

31 BOND/SURETY (CONSTRUCTION)

- 31.1 Bonding/Surety is required for construction projects over \$100,000.00 unless otherwise noted.
- 31.2 **Bid Bond/Security:** The bidder/vendor shall submit **not less than 5% of proposed dollar amount** (including applicable alternates) as bid security. One **ORIGINAL** Bid Bond/Security is to be submitted to the County with Bid Submission. The Bid Security of the bidder/vendor will be retained until the bidder/vendor has executed the contract, whereupon the Bid security may be returned. The bid Security of the bidder/vendor whom the County believes to have a reasonable chance of receiving the award may be

retained by the County until the effective date of the Agreement/Contract, whereupon Bid Securities furnished by the bidder/vendor may be returned. The following types of Bid Security are acceptable:

- 31.2.1 **A Certified Check or a Cashier's Check** in the stated dollar amount of not less than 5% of proposed dollar amount. Any Certified Check or Cashier Check submitted in lieu of a Bid Bond Shall be drawn on a solvent bank or trust company, made payable to Lee County Board of County Commissioners and shall have all necessary documentary revenue stamps attached (if required by law); or
- 31.2.2 **A Bid Bond** may be submitted on a Lee County paper Bid Bond Form. Must be signed by all required parties, of not less than 5% of proposed dollar amount (including Alternate(s) as applicable) shall accompany each submission. The Bid Bond shall be issued by a duly authorized surety authorized to do business and in good standing with the Florida Department of state.
- 31.3 **Payment and Performance Bond:** In accordance with F.S. 255.05 and Lee County Ordinance 95-2-102, a Public Payment and Performance Bond is to be issued in a sum equal to one-hundred (100%) percent of the total awarded contract amount by a surety company considered satisfactory by Lee County and otherwise authorized to transact business in the State of Florida shall be required from the successful bidder/vendor. This shall insure the faithful performance of the obligations imposed by the resulting contract and protect the County from lawsuits for non-payment of debts incurred during the successful bidder/vendor performance under such Contract.
- 31.3.1 A public Payment and Performance bond must be properly executed, by the Surety Company and successful bidder/vendor, and recorded with the Lee County Clerk of Court, within **seven calendar days** after notification by Lee County of the approval to award the Contract.
- 31.3.2 A **Clean Irrevocable Letter of Credit or Cash Bond** may be accepted by the County in lieu of the Public Payment and Performance Bond.
- 31.4 Only Lee County form(s) may be accepted. Forms are available at <https://www.leegov.com/procurement/forms>.
- 31.5 **Personal Checks are not acceptable to Lee County as a Bid Security.**
- 31.6 **Surety:** In order to be acceptable to the County, a Surety Company issuing Evidence of Bondability, Bid Guaranty Bonds or 100% Public Payment and Performance Bonds or Letters of Credit called for herein shall meet and comply with the minimum standards set forth in as part of the Contract Documents. The surety company shall be authorized to do business and in good standing with the Florida Department of State. All such bonds shall be issued or countersigned by a local producing agent who is a Florida resident with satisfactory evidence of its authority to execute the bond being submitted.
- 32 INSURANCE (AS APPLICABLE)**
- 32.1 Insurance shall be provided by the awarded bidder/vendor. Prior to execution of the Agreement/Contract a certificate of insurance (COI) complying with the bid documents shall be provided by the bidder/vendor.

End of Terms and Conditions Section

INSURANCE GUIDE

<h2>Major Insurance Requirements</h2>

Minimum Insurance Requirements: *Risk Management in no way represents that the insurance required is sufficient or adequate to protect the Vendor's interest or liabilities. The following are the required minimums the Vendor must maintain throughout the duration of this Contract. The County reserves the right to request additional documentation regarding insurance provided.*

- a. **Commercial General Liability** - Coverage shall apply to premises and/or operations, products and completed operations, independent contractors, and contractual liability exposures with minimum limits of:

\$1,000,000 per occurrence
 \$2,000,000 general aggregate
 \$1,000,000 products and completed operations
 \$1,000,000 personal and advertising injury

- b. **Business Auto Liability** - The following Automobile Liability will be required and coverage shall apply to all owned, hired and non-owned vehicles use with minimum limits of:

\$1,000,000 combined single limit (CSL) or
 \$500,000 bodily injury per person
 \$1,000,000 bodily injury per accident
 \$500,000 property damage per accident

- c. **Workers' Compensation** - Statutory benefits as defined by Chapter 440, Florida Statutes, encompassing all operations contemplated by this Contract or Agreement to apply to all owners, officers, and employees regardless of the number of employees. Workers' Compensation exemptions may be accepted with written proof of the State of Florida's approval of such exemption. Employers' liability will have minimum limits of:

\$500,000 per accident
 \$500,000 disease limit
 \$500,000 disease – policy limit

*The required minimum limit of liability shown in a. and b. may be provided in the form of "Excess Insurance" or "Commercial Umbrella Policies," in which case, a "Following Form Endorsement" will be required on the "Excess Insurance Policy" or "Commercial Umbrella Policy."

Verification of Coverage:

1. Coverage shall be in place prior to the commencement of any work and throughout the duration of the Contract. A certificate of insurance will be provided to the Risk Manager for review and approval. The certificate shall provide for the following:

- a. The certificate holder shall read as follows:

Lee County Board of County Commissioners
 P.O. Box 398
 Fort Myers, Florida 33902

b. “*Lee County, a political subdivision and Charter County of the State of Florida, its agents, employees, and public officials*” will be named as an "Additional Insured" on the General Liability policy, including Products and Completed Operations coverage.

Special Requirements:

1. An appropriate "Indemnification" clause shall be made a provision of the Contract.
2. If applicable, it is the responsibility of the general contractor to ensure that all subcontractors comply with all insurance requirements.

End of Insurance Guide Section

SPECIAL CONDITIONS

These are conditions that are in relation to this solicitation only and have not been included in the County’s standard Terms and Conditions or the Scope of Work.

1. TERM

From the Notice to Proceed or the Purchase Order date, whichever applies: **330** calendar days to substantial completion, **35** calendar days to final completion (total days **365**).

2. LIQUIDATED DAMAGES

In accordance with the terms set forth in the Agreement, for each consecutive calendar day of delay in achieving Completion as set forth herein, the Vendor shall be liable to the County for per diem liquidated damages in the amount as specified in the below table based on the overall project costs.

Estimated Project Cost Over	Estimated Project Cost But Less than	Daily Charge Per Calendar Day
\$0.00	\$50,000.00	\$645.00
\$50,000.00	\$250,000.00	\$760.00
\$250,000.00	\$500,000.00	\$970.00
\$500,000.00	\$2,500,000.00	\$1,500.00
\$2,500,000.00	\$5,000,000.00	\$2,400.00
\$5,000,000.00	\$10,000,000.00	\$3,300.00
\$10,000,000.00	\$15,000,000.00	\$4,600.00
\$15,000,000.00	\$20,000,000.00	\$4,300.00
\$20,000,000.00 over		\$5,700.00 plus .00005

End of Special Conditions Section

GENERAL CONDITIONS

1. Administration

The Consultant is the initial interpreter of the Contract Documents but is not the Judge between the COUNTY and the CONTRACTOR. The COUNTY reserves the right to make final decisions considering the Consultant's recommendations or interpretations of the Contract Documents. The Consultant does not have authority to obligate or commit the COUNTY to fund additional expenditures or approve extensions of time over the approved Contract time or price. However, the CONSULTANT'S interpretation as to the intent of his design shall be final and not subject to interpretation by the COUNTY'S staff.

1.1. Copies of Documents

The COUNTY shall furnish to the CONTRACTOR the number of copies specified in the Supplemental Information of the Contract Documents as are reasonably necessary for the execution of the Work. Additional copies will be furnished, upon request, at the cost of reproduction which shall be paid by the CONTRACTOR.

1.2. Before Starting Construction

Before undertaking each phase of the Work, the CONTRACTOR shall carefully study and compare the Contract Documents and check and verify pertinent figures shown thereon and all applicable field measurements. The CONTRACTOR shall promptly report in writing to the OWNER'S REPRESENTATIVE any conflict, error or discrepancy which the CONTRACTOR may discover or other information known to the CONTRACTOR and shall obtain a written interpretation or clarification from the OWNER'S REPRESENTATIVE before proceeding with any Work affected thereby. If the CONTRACTOR performs any construction activity knowing it involves a recognized error, inconsistency or omission in the Contract Documents without such notice to the OWNER'S REPRESENTATIVE, the CONTRACTOR shall assume responsibility for such performance and shall share in costs associated with correction; however, the CONTRACTOR shall not be liable to the COUNTY for failure to report any conflict, error or discrepancy in the Contract Documents, unless the CONTRACTOR had actual knowledge thereof or should reasonably have known thereof.

1.2.1. Within ten calendar days after the Effective Date of the Agreement (unless otherwise specified in the Contract Documents), the CONTRACTOR shall submit to the OWNER'S REPRESENTATIVE for review:

- 1.2.1.1. An estimated progress schedule indicating the starting and completion dates of the various stages of the Work:
- 1.2.1.2. Long lead item(s) shall be identified and scheduled accordingly.
- 1.2.1.3. A preliminary schedule of Shop Drawing submission; and
- 1.2.1.4. A preliminary schedule of values for all of the Work which will include quantities and prices of items aggregating the Contract Price and will subdivide the Work into component parts in sufficient detail to serve as the basis for progress payments during construction on form No. CMO:013. Such prices will include an appropriate amount of overhead and profit applicable to each item of Work which will be confirmed in writing by the CONTRACTOR at the time of submission; and specify times for Application for Payment.
- 1.2.1.5. A plan of work for maintenance of traffic, when the Contract Documents require maintenance of traffic.
- 1.2.1.6. For informational purposes, a proposed listing of sub-contractors to be used for the project.

1.2.2. **Pre-Construction Conference**

Within fifteen calendar days after the Effective Date of the Agreement, but before the CONTRACTOR starts the Work at the site, a conference attended by the CONTRACTOR, the OWNER'S REPRESENTATIVE, the COUNTY, and Others as appropriate, will be held to discuss the items, to discuss procedures for handling Shop Drawings and other submittals and for processing Applications for Payment, and to establish an understanding among the parties as to the Work.

1.2.3 **Finalizing Schedules**

At least ten calendar days before submission of the first Application for payment, a conference attended by the CONTRACTOR, the OWNER'S REPRESENTATIVE, the COUNTY, and Others as appropriate, will be held to finalize the schedules submitted. The finalized progress schedule will be acceptable to the OWNER'S REPRESENTATIVE and the COUNTY as providing an orderly progression of the Work to completion within the Contract Time, but such acceptance will neither impose on the OWNER'S REPRESENTATIVE or the COUNTY responsibility for the progress or scheduling of the Work nor relieve the CONTRACTOR from full responsibility therefor. The finalized schedule of Shop Drawing submissions will be acceptable to the OWNER'S REPRESENTATIVE as providing a workable arrangement for processing the submissions. The finalized schedule of values will be acceptable to the OWNER'S REPRESENTATIVE and the COUNTY as to form and substance.

Definitions

The following definition of terms associated with this Contract is provided to establish a common understanding between both parties to this Contract as to the intended usage, application and interpretation of such terms pertaining to this Contract.

ADDENDUM means any additional Contract provisions in writing signed and sealed by the CONSULTANT, if applicable, issued by the COUNTY prior to the receipt of Bid which clarify, correct, change or interpret the Bidding Documents or the Contract Documents.

AGREEMENT means the written agreement between the COUNTY and the CONTRACTOR covering the Work to be performed; the Agreement is a part of the Contract Documents.

BIDDER is any individual, firm, partnership, joint venture, or corporation submitting a bid for this project, acting directly or through an authorized representative.

BID is a complete and properly signed proposal to do the Work or designated portion thereof for the sums stipulated therein, submitted in accordance with the Bidding Documents.

BID BOND is a security in the form and amount required by the COUNTY pledging that the BIDDER will enter into a Contract with the COUNTY on the terms stated in his Bid.

BID DOCUMENTS are the Invitation to Bid, the Notice to Bidders, the Invitation to Bid Terms and Conditions, sample forms, the Bid Proposal Form and the proposed Contract Documents (including all Addenda issued prior to receipt of Bids).

CHANGE ORDERS are written order to the CONTRACTOR signed by the COUNTY, issued after execution of the Contract, authorizing a change in the Work or an adjustment in the Contract price or the Contract Time. The Contract Price and the Contract Time may be changed only by a Change

Order. A Change Order signed by the CONTRACTOR indicates his agreement therewith, including the adjustment in the Contract Price or the Contract Time.

COMPLETION (FINAL) means acceptance of the Project by the COUNTY as evidenced by its signature upon a final payment Certification and approval thereof by the Board of County Commissioners or their designee. The final payment Certification shall be signed only after the COUNTY has assured itself by tests, inspections, or otherwise that all of the provisions of the Contract have been carried out as required.

COMPLETION (SUBSTANTIAL) shall mean an acceptance of the Work by the COUNTY when construction is sufficiently complete in accordance with the Contract Documents so the COUNTY can occupy or utilize the Work or designated portion thereof for the use for which it is intended. A certificate of occupancy or compliance, when applicable, issued by the Building Official is required concurrent with or prior to issuance of the Certificate of Substantial Completion.

CONSTRUCTION is the erection, fabrication, assembly, remodeling, renovation, addition, modification, repair or demolition of any building or structure or any appurtenances connected or attached to such buildings or structures. The term applies but is not limited to the repair, replacement modification or construction of roads, bridges, sidewalks, traffic devices, parking lots, drainage, underground and overhead utilities.

CONSULTANT is the person lawfully licensed to practice Architecture or Engineering and registered in the State of Florida, or an entity lawfully practicing Architecture or Engineering, identified as such in the Construction Contract, and is referred to throughout the Contract Documents as if singular in number and masculine in genre. The term CONSULTANT means the Architect or Engineer or his authorized representative.

CONTRACT DOCUMENTS consist of the Invitation to Bid, Agreement, General and Special Conditions of the Contract, Specifications, the Plans, Supplemental Information, Addenda issued prior to execution of the Contract, all written modifications issued after execution of the Contract, all provisions required by law to be inserted in this Contract whether actually inserted or not, and a Contract Number issued by the COUNTY.

A *MODIFICATION* is:

- (1) A written Amendment to the Contract.
- (2) A Change Order.
- (3) A written interpretation necessary for the proper execution or progress of the Work issued by the OWNER'S Representative.
- (4) A Field Change Order.
- (5) A Field Directive Change.

CONTRACT PRICE means the total monies payable to the CONTRACTOR under the Contract Documents.

CONTRACT TIME means the number of Calendar days stated in the Agreement for the purpose of establishing Substantial Completion and Final Completion dates.

CONTRACTOR is the person, firm, joint venture, or corporation with whom the COUNTY has contracted and who has the primary responsibility for performance of the work.

COUNTY means the Board of County Commissioners of Lee County, Florida, a political subdivision of the State of Florida, its successors and assigns. Also hereinafter referred to as OWNER.

DAYS - The term “day” as used in the Contract Documents shall mean calendar day unless otherwise specifically designated. A calendar day constitutes twenty four hours measured from midnight to the next midnight.

DEFECTIVE - An adjective which when modifying the word “Work” refers to Work that is unsatisfactory, faulty or deficient, or does not conform to the Contract Documents, or does not meet the requirements of any inspection, reference standard, test or approval referred to in the Contract Documents, or has been damaged prior to the OWNER’S REPRESENTATIVE recommendation of final payment.

EFFECTIVE DATE OF THE AGREEMENT means the date on which the agreement is signed and delivered by the latter of the two parties.

ENGINEER shall mean the Director of the Lee County Department of Transportation or his designated County Project Manager.

FIELD CHANGE ORDER is a written change order requested by the OWNER’S Representative, accepted by the CONTRACTOR, and approved by the PROJECT MANAGER for minor changes in the Work, not involving adjustments in the Contract Sum or an extension of Time, and not inconsistent with the overall intent of the Contract Documents.

FIELD DIRECTIVE CHANGE - A written directive to the CONTRACT, issued on or after the effective date of the Agreement 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 as defined elsewhere in these documents. A Field Directive Change may not change the Contract Price or the Contract Time, but is evidence that the parties expect that the change directed or documented by a Field 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 Price or the Contract Time.

FINAL ACCEPTANCE means acceptance of the Work by the COUNTY upon the expiration of the warranty period as stated in the Contract Documents.

MATERIALS - Anything used in the process of, but not limited to, constructing, demolishing, renovating or remodeling of any building, structure, road, bridge, recreational facility, transportation element and utility or any addition thereto utilized for this project.

NOTICE means written notice. Notice shall be served upon the CONTRACTOR either personally or by leaving the said Notice at his residence or with his agency in charge of the Work, or addressed to the CONTRACTOR at the residence or place of business stated in the Bid Proposal and deposited in a postpaid wrapper in any United States Mailbox.

NOTICE TO PROCEED is a written instrument issued by the COUNTY to the CONTRACTOR, authorizing the CONTRACTOR to commence Work on the Project. The NOTICE TO PROCEED shall include the effective date of Commencement.

NOTICE OF AWARD means the written Notice given by the COUNTY to the successful Bidder.

NOTICE OF TERMINATION is a written instrument issued in accordance with the Contract Documents by the COUNTY to the CONTRACTOR or by the CONTRACTOR to the COUNTY notifying the receiving party that the Contract is being terminated. The NOTICE shall clearly identify the effective date the Contract is to be terminated.

OWNER'S REPRESENTATIVE is the CONSULTANT contracted by the COUNTY for Professional Services during the construction phase of this project or a qualified person authorized as his official representative, or in the absence of such a contract, the project Manager will be considered the OWNER'S REPRESENTATIVE for the purpose of this Contract Document. The OWNER'S REPRESENTATIVE is not authorized to issue change orders to the contract sum, contract time or scope of work without express approval of the Board of County Commissioners.

PLANS AND/OR DRAWINGS are a graphic representation of the arrangement of the materials or parts of the construction of the project and are a portion of the Contract Documents.

PROCUREMENT MANAGEMENT shall mean the Director of Lee County's Procurement Management Department or designee.

PROJECT shall mean the entire improvement of which this contract forms a part.

PROJECT MANAGER is an employee of the Department or the COUNTY which requested the Contract and is a designee authorized by or for that Department who is the representative of the Board of County Commissioners in matters concerning the contractor of this project. The project manager will act as the OWNER'S REPRESENTATIVE in the absence of a contract with a CONSULTANT. The PROJECT MANAGER is not authorized to issue changes to the Contract Sum, Contract Time, or Scope of Work without express approval by the Department Director, County Manager, or Board of County Commissioners.

The PROJECT MANAGER, within the authority conferred by the Board of County Commissioners, acting as the COUNTY'S designated representative shall initiate written Change Orders, and notification to the CONTRACTOR of any and all changes approved by the COUNTY in the CONTRACTOR'S (1) compensation (2) time and/or schedule of service delivery; (3) any Amendment (s) or other change(s) relative to the WORK and ADDITIONAL SERVICES pursuant to this Contract, or AMENDMENTS, or CHANGE ORDERS pertaining thereto. Following COUNTY approval, the Project Manager shall coordinate assurance of any such documents. The PROJECT MANAGER or his designee shall be responsible for acting on the COUNTY'S behalf to administer, coordinate, interpret and otherwise manage the contractual provisions and requirements set forth in this Contract, or any AMENDMENT(S), or CHANGE ORDER(S) issued there under.

SPECIFICATIONS are written documents organized into divisions, sections, and articles which provide detailed instructions to the CONTRACTOR pertaining, but not limited to, materials, style, workmanship, fabrication, dimensions, colors, warranties, finishes, quality, manufacturer, grade and operational data of all components to be provided by the CONTRACTOR and incorporated into the Project.

SUB-CONTRACTOR is a person, firm, partnership, corporation, or entity who has a direct contract with the CONTRACTOR to perform any of the Work at the site. The term Sub-contractor does not

include those whose sole purpose is that of a supplier of materials. A supplier of materials shall be classified as a Sub-contractor if it enters into any agreement, whether written or verbal, for the installation of said materials. The term Sub-contractor means a Sub-contractor or its authorized representative.

SUPPLIER - A manufacturer, fabricator, distributor, materialmen or vendor.

SURETY is the surety company or individual that is bound by Contract bond with and for the CONTRACTOR who is primarily liable, and is responsible for CONTRACTOR'S acceptable performance of the Project and payment of all debts pertaining to the Contract Documents in accordance with Section 255.05, Florida Statutes.

UNDERGROUND FACILITIES - All pipeline, conduits, ducts, cables, wires, manholes, vaults, tanks, tunnels or other such facilities or attachments, and any encasements containing such facilities which have been installed underground to furnish any of the following services or materials: electricity, gases, steam, liquid petroleum products, telephone or other communications, cable television, sewage and drainage removal, traffic or other control systems or water.

WORK is the construction required by the Contract Documents and includes all labor necessary to produce such construction, and all materials and equipment incorporated or to be incorporated in such construction.

2. **Starting the Work**

Written Notice to Proceed is contingent upon and will be done subsequent to the CONTRACTOR fully satisfying the COUNTY'S stated insurance and Bond submittal requirements. Until the CONTRACTOR receives the COUNTY'S written Notice to Proceed, the CONTRACTOR is advised that the COUNTY will not be liable for any expenses which the CONTRACTOR may incur relative to this Contract before the written Notice to Proceed is issued.

- 2.1. The Contract time shall commence to run from the date specified in the "Notice to Proceed".
- 2.2. The CONTRACTOR is required, before commencing the Work, to deliver to the COUNTY the Public Payment and Performance Bond issued by a surety insurer authorized to do business in the State of Florida as Surety. The Bond must state the name and principal business address of both the principal and the Surety and must contain a description of the project sufficient to identify it and post in conspicuous place at the project site.
- 2.3. The COUNTY will forward to the CONTRACTOR a Notice of Commencement along with a copy of the recorded Public Payment and Performance Bond with instructions to post in a conspicuous spot on the project site.

3. **Interpretation Intent, Amending and Reuse of Contract Documents**

It is the intent of the Specifications and Plans to describe a complete Project to be constructed in accordance with the Contract Documents.

- 3.1 The Contract Documents are complementary; what is called for by one is as binding as if called for by all. If the CONTRACTOR finds a conflict, error or discrepancy in the Contract Documents, he shall immediately call it to the attention of the OWNER'S REPRESENTATIVE in writing before proceeding with the Work affected thereby.
- 3.2 Any Work that may be reasonably inferred from the specifications or Drawings as being required

to produce the intended result shall be supplied whether or not it is specifically called for.

3.3 Work, materials or equipment described in words which have a well-known technical or trade meaning, shall be deemed to refer to such recognized standards.

3.4 In resolving conflicts, errors, and discrepancies, the order of precedence of the Contract Document is as follows:

- (1) Change Order
- (2) Agreement
- (3) Addenda
- (4) Special Conditions
- (5) General Conditions
- (6) Specifications
- (7) Supplemental Information
- (8) Drawings
- (9) Figure Dimensions
- (10) Scale Dimensions (Large Scale Drawings supersede Small Scale Drawings)
- (11) Terms and Conditions

3.5 Amending and Supplementing Contract Documents

The Contract Documents may be amended to provide for additions, deletions and revisions in the Work or to modify the terms and conditions thereof in one or more of the following ways:

3.5.1 A formal Written Amendment,

3.5.2 A Change Order.

3.5.3 A Field Directive Change.

The Contract Price and the Contract Time may only be changed by a Change Order or Written Amendment.

3.6 In addition, the requirements of the Contract Documents may be supplemented and minor variations and deviations of the Work may be authorized, in one or more of the following ways:

3.6.1 A Field Change Order,

3.6.2 The OWNER'S REPRESENTATIVE approval of a Shop Drawing or sample, or

3.6.3 The OWNER'S REPRESENTATIVE written interpretation or clarification.

3.7 Reuse of Documents

Neither the CONTRACTOR nor any SUB-CONTRACTOR or Supplier or other person or organization performing or furnishing any of the Work under a direct or indirect contract with the COUNTY shall have or acquire any title to or ownership rights in any of the Drawings, Specifications or other documents (or copies of any thereof) prepared by or bearing the seal of the CONSULTANT; and they shall not reuse any of them on extensions of the Project or any other project without written consent of the COUNTY or their CONSULTANT and the specific written verification or adaptation by the CONSULTANT.

4 Availability of Lands

The COUNTY will furnish, as indicated in the Contract Documents and not later than the date when needed by the CONTRACTOR, the lands upon which the Work is to be done, rights-of-way for access

thereto, and such other lands which are designated for the use of the CONTRACTOR. Easements for permanent structures or permanent changes in existing facilities will be obtained by the COUNTY unless otherwise specified in the Contract Documents. If the CONTRACTOR believes that any delay in the COUNTY'S furnishing these lands or easements entitles him to an extension of the Contract Time, he may make a claim therefore. The CONTRACTOR will provide for all additional lands and access thereto that may be required for temporary construction facilities or storage of materials and equipment unless designated otherwise. The OWNER'S REPRESENTATIVE will, upon request, furnish to the CONTRACTOR copies of all available boundary and topographic surveys as required and sub-surface tests. The CONTRACTOR shall be responsible for staging and storing equipment or materials. All parcels utilized for staging shall be secured. All parcels utilized for staging will be kept in a neat and orderly fashion and then restored to the landowner's satisfaction upon terminating the use of the staging area or improved as noted in the plans. The CONTRACTOR shall maintain on the job site written proof of authorization for the use of any private land. The COUNTY does not condone trespass on private property and will hold the CONTRACTOR liable for any such trespass. Right-of-way maps, if available, of the lands upon which the improvements will be made shall be provided upon request from the OWNER'S REPRESENTATIVE. The CONTRACTOR may use these lands for work associated with this contract only. The CONTRACTOR shall verify the availability of these lands with the Lee County D.O.T. project manager prior to the issuance of the notice to proceed.

4.1 Physical Conditions

Explorations and Reports: Reference is made to the Supplemental Information for identification of those reports of explorations and tests of subsurface conditions at the site that have been utilized by the CONSULTANT and/or the COUNTY in preparation of the Contract Documents. These reports are not part of the contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such reports but not upon the non-technical data, interpretations or opinions contained therein for the completeness or accuracy thereof for the CONTRACTOR'S purposes of preparing or submitting a bid. Except as indicated in the immediately preceding sentence, the CONTRACTOR shall have full responsibility with respect to subsurface conditions at the site. The technical data which will be made available only at the CONTRACTOR'S request may not be sufficient for construction purposes. Additional investigations may be necessary for the purposes of carrying out the construction project.

4.2 Existing Structures: Reference is made to the Supplemental Information for identification of those drawings of physical conditions in or relating to existing surface and subsurface structures (except Underground Facilities) which are at or contiguous to the site that have been utilized by the CONSULTANT and/or the COUNTY in preparation of the Contract Documents. The CONTRACTOR may rely upon the accuracy of the technical data contained in such drawings but not for the completeness thereof for the purposes of preparing or submitting a bid. Except as indicated in the immediately preceding sentence, the CONTRACTOR shall have full responsibility with respect to physical conditions in or relating to such structures.

4.3 Unless otherwise stated, the CONTRACTOR shall be fully responsible for the removal of any materials, debris, garbage, vehicles or other such items which would interfere with the undertaking and completion of the project. By submission of a bid, the CONTRACTOR assumes full responsibility for the expenses associated with such removal. There shall not be an increase in time or price associated with such removal.

4.4 Report of Differing Conditions: If the CONTRACTOR believes that:

4.4.1.1 Any technical data on which the CONTRACTOR is entitled to is inaccurate, or

4.4.1.2 Any physical condition uncovered or revealed at the site differs materially from that indicated, reflected or referred to in the Contract Documents.

- 4.4.1.3 The CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work in connection therewith (except in an emergency as permitted) notify the OWNER'S REPRESENTATIVE in writing about the inaccuracy or difference.
- 4.5 OWNER'S REPRESENTATIVE Review: The OWNER'S REPRESENTATIVE will promptly review the pertinent conditions, determine the necessity of obtaining additional explorations or tests with respect thereto and advise the COUNTY in writing (with a copy to the CONTRACTOR) of the OWNER'S REPRESENTATIVE'S findings and conclusions.
- 4.6 Possible Document Change: If the OWNER'S REPRESENTATIVE and the COUNTY conclude that there is a material error in the Contract Documents and a change in the Contract Documents is required, a Field Directive Change, a Field Change or a Change Order will be issued as to reflect and document the consequences of the inaccuracy or difference.
- 4.7 Possible Price and Time Adjustments: In each case of a material error in the Contract Documents, an increase or decrease in the Contract Price or an extension or shortening of the Contract Time, or any combination thereof, will be allowable to the extent that they are attributable to any such inaccuracy or difference.
- 4.8 Physical Conditions - Underground Facilities
 Shown or Indicated: The information and data shown or indicated in the Contract Documents with respect to existing Underground Facilities at or contiguous to the site is based on information and data furnished to the COUNTY or the CONSULTANT by the owners of such Underground facilities or by others. Unless it is otherwise expressly provided in the Supplemental Information:
- 4.8.1 The CONTRACTOR shall have full responsibility for reviewing and checking all such information and data, for locating all Underground Facilities shown or indicated in the Contract Documents, for coordination of the Work with the owners of such Underground Facilities during construction, for the safety and protection thereof and for repairing any damage thereto resulting from the Work, the cost of all of which will be considered as having been included in the Contract Price. The CONSULTANT and COUNTY shall not be responsible for the accuracy or completeness of any such information or data.
- 4.9 Not Shown or Indicated: If an Underground Facility is uncovered or revealed at or contiguous to the site which was not shown or indicated in the Contract Documents and which the CONTRACTOR could not reasonably have been expected to be aware of, the CONTRACTOR shall, promptly after becoming aware thereof and before performing any Work affected thereby (except in an emergency as permitted) identify the owner of such Underground Facility and give written notice thereof to that owner and to the OWNER'S REPRESENTATIVE. The OWNER'S REPRESENTATIVE will promptly review the Underground Facility to determine the extent to which the Contract Documents should be modified to reflect and document the consequences of the existence of the Underground Facility, and with the COUNTY'S approval, the Contract Documents will be amended or supplemented to the extent necessary. During such time, the CONTRACTOR shall be responsible for the safety and protection of such Underground Facility. The CONTRACTOR shall be allowed an increase in the Contract Price or an extension of the Contract Time, or both, to the extent that they are attributable to the existence of any Underground Facility that was not shown or indicated in the Contract Documents and which the CONTRACTOR could not reasonably have been expected to be aware of. Locations of existing underground utilities are not field confirmed. In the case of a conflict between this or any other utility and proposed improvements, it shall be the CONTRACTOR'S duty to coordinate with all utility company relocation activities whether shown or not shown in the plans. Coordination is to

include efforts by the CONTRACTOR to minimize time lost due to unexpected utility relocation or modifications.

4.10 Reference Points

The COUNTY shall provide engineering surveys to establish reference points, as specified in the Supplemental Information, for construction which in the judgment of the COUNTY and the CONSULTANT are necessary to enable CONTRACTOR to proceed with the Work. The CONTRACTOR shall be responsible for laying out the Work (unless otherwise specified in the Technical Specifications), shall protect and preserve the established reference points and shall make no changes or relocations without the prior written approval of the COUNTY. The CONTRACTOR shall report to the OWNER'S REPRESENTATIVE whenever any reference point is lost or destroyed or requires relocation because of necessary changes in grades or locations, and shall be responsible for the accurate replacement or relocation of such reference points by professionally qualified personnel.

5 Bonds and Insurance

5.1 Public Payment and Performance Bond

The CONTRACTOR will execute the Public Payment and Performance Bonds included herein as security for the faithful performance and payment of all his obligations under the Contract Documents.

5.2 This Bond shall be in amounts at least equal to the Contract Price and in such form and with such securities as are acceptable to the COUNTY. Prior to execution of the Contract Documents, the COUNTY may require the CONTRACTOR to furnish such other bonds, in such form and with such sureties as it may require. If such bonds are required by written instructions given prior to opening of Bids, the Premiums shall be paid by the CONTRACTOR. If the Contract is increased by a Change Order, it shall be the CONTRACTOR'S responsibility to insure that the Public Payment and Performance Bond be amended accordingly and a copy of the amendment forwarded to PROCUREMENT MANAGEMENT.

5.3 If the surety on any bond furnished by the CONTRACTOR is declared bankrupt or becomes insolvent or its right to do business is terminated in the State of Florida or it ceases to meet the requirements imposed by the Contract Documents, the CONTRACTOR shall within five calendar days thereafter substitute another Bond and Surety, both of which shall be acceptable to the COUNTY.

5.4 If the CONTRACTOR cannot obtain another bond and surety within five calendar days the COUNTY will accept and the CONTRACTOR shall submit an irrevocable letter of credit drawn on a Lee County, Florida bank until the bond and surety can be obtained.

6 Qualifications of Surety Companies

In order to be acceptable to the COUNTY, a surety company issuing Bid Guaranty Bonds or 100% Public Payment and Performance Bonds, called for in these specifications, shall meet and comply with the following minimum standards:

6.1 General

All Sureties for Lee County projects must be authorized to do business in the State of Florida and shall comply with the provisions of Florida Statute 255.05.

6.2 Attorneys-in-Fact who sign bid bonds or Public Payment and Performance Bonds for Lee County projects must file with such bond a certified copy of their Power of Attorney to sign such bond.

6.3 Agents of surety companies must list their name, address, and telephone number on all bonds.

6.4 The life of all bonds provided to Lee County shall extend twelve months beyond the date of final payment and shall contain a waiver of alteration to the terms of the Contract, extensions of time

and/or forbearance on the part of the COUNTY.

- 6.5 To be acceptable to the OWNER on projects not in excess of \$500,000.00, Surety shall comply with these minimum provisions of State Statute 287.0935 as follows:
- 6.5.1 Surety must have twice the minimum surplus and capital required by Florida Insurance Code at the time of bid solicitation.
 - 6.5.2 Surety must be in compliance with all provisions of the Florida Insurance Code and hold a currently valid certificate of authority issued by the United States Department of the Treasury under SS.31 U.S.C. 9404-9308.
 - 6.5.3 Sureties on projects in excess of \$500,000.00 shall comply with the above minimum provisions as well as being rated thru A.M. Best Company and shall comply with the following provisions:
 - 6.5.4 The Surety shall be rated as “A-“ or better as to General Policyholders Rating and Class VII or better as to financial category by the most current Best’s Key Rating Guide, published by A.M. Best Company.
 - 6.5.5 Surety must have fulfilled all of its obligations on all other bonds previously given to the COUNTY.
 - 6.5.6 Surety must have a minimum underwriting limitation of \$5,000,000 published in the latest edition of the Federal Register for Federal Bonds (U.S. Dept. of Treasury).
- 6.6 Letter of Credit
- At any time during the life of the letter of credit, should the rating of financial institution fall below both of the minimum ratings as indicated in the Contract Documents, or should the financial institution become insolvent, the CONTRACTOR must, within five calendar days after notification by the COUNTY:
- 6.6.1 Replace the existing letter of credit with a replacement letter of credit from a financial institution with either of the minimum ratings as specified in the Contract Documents, or
 - 6.6.2 Have the existing letter of credit confirmed by a financial institution with either of the minimum ratings as specified in the Contract Documents.
 - 6.6.3 At the COUNTY’S option, the letter of credit may be replaced by a Public Payment and Performance Bond in accordance with the COUNTY’S existing bond policies.
- 6.7 Failure to comply with this provision may result in any or all of the following actions by the COUNTY:
- 6.7.1 Suspension of the CONTRACTOR’S right to pull building permits and schedule inspections;
 - 6.7.2 A stop work order; and/or Revocation of the Land Development Permit.
- 6.8 Financial Institutions/Letters of Credit
- In order to be acceptable to the COUNTY, a financial institution issuing 100% Letters of Credit, called for in these specifications, shall meet and comply with the following minimum standards:
- 6.8.1 General
 - The face of the letter of credit must be in a format utilizing Lee County Standard Form and indicate the following:
 - 6.8.1.1 The letter of credit is “clean” and “irrevocable”;
 - 6.8.1.2 An exact expiration date. The life of all letters of credit provided to Lee County shall extend twelve months beyond the date of final payment;
 - 6.8.1.3 Statement of the purpose or project for which the letter of credit is issued;
 - 6.8.1.4 A specific amount of the letter of credit, in U.S. dollars;
 - 6.8.1.5 The method of disbursement of draws against the letter of credit;
 - 6.8.1.6 The street address where draws against the letter of credit may be made; and

- 6.8.1.7 Venue in Lee County.
- 6.8.1.8 Verification of the status or certification of any financial institution may be made with:
Department of Insurance and Treasurer
Bureau of Collateral Securities
200 East Gaines Street
Tallahassee, FL 32377-0345
Phone (850) 922-3167

Or

Lee County Procurement Management
1500 Monroe Street, 4th Floor
Fort Myers, FL 33901
Phone (239) 533-8881

Or

Lee County Risk Management
2115 Second Street
Fort Myers, FL 33901
Phone (239) 533-2221
- 6.8.1.9 At the time of issuance of the letter of credit, the financial institution must have a minimum “peer group” rating of 50 in the latest Sheshunoff Quarterly Listing or a minimum rating of 125 in the latest IDC Bank Financial Quarterly Listing.
- 6.8.1.10 Letters of Credit from financial institutions which do not meet either of the minimum ratings indicated above must be confirmed by a financial institution with either of the minimum ratings indicated above.
- 6.8.1.11 All financial institutions which issue or confirm any Letter of Credit must be authorized by the Secretary of State to do business in the State of Florida, shall show proof of same upon request by COUNTY staff, and agree to venue in Lee County.
- 6.8.1.12 In addition to the institutions meeting the aforementioned requirements, the Federal Home Loan Bank of Atlanta is authorized to issue and confirm letters of credit which are in accordance with the provisions above and all subsequent sub-paragraphs.
- 6.8.1.13 These actions shall be in effect until a satisfactory replacement bond or letter of credit is accepted by the COUNTY. The CONTRACTOR agreement shall so provide for replacement or confirmation in accordance with this policy.

7 Contractor’s Liability Insurance

- 7.1 The CONTRACTOR will purchase and maintain such insurance as will protect him from claims under Worker’s Compensation laws, disability benefit laws or other similar employee benefit laws; from claims for damages because of bodily injury, occupational sickness or disease, or death of his employees including claims insured by usual personal injury, sickness and disease,

or death of any person other than his employees including claims insured by usual personal injury liability coverage; and from claims for injury to or destruction of tangible property including loss of use resulting there from any or all of which may arise out of or result from the CONTRACTOR'S operations under the Contract Documents, whether such operations be by himself or any Sub-contractor or anyone directly or indirectly employed by any of them or for whose acts any of them may be legally liable. This insurance shall be written for no less than the limits of liability specified in the Contract Documents or required by law, whichever is greater, and shall include contractual liability insurance. As a prerequisite to the COUNTY signing the Contract, the CONTRACTOR will file with the COUNTY certificates of such insurance, acceptable to the COUNTY; these certificates shall contain a provision for cancellation.

7.2 Insurance Requirements

7.2.1 Before final execution of the Agreement and until acceptance of the Work by the COUNTY, the CONTRACTOR shall procure and maintain insurance of the types and the limits specified by the Insurance Guide included in the Solicitation.

7.2.2 All CONTRACTOR'S Certificates of Insurance must be approved by the Lee County Risk Manager (or designee) before the final execution of the agreement by the COUNTY.

7.2.3 An Insurance Certificate shall be required from the successful BIDDER. Such form must be properly executed and submitted by an authorized representative of the insurance company and successful BIDDER within seven calendar days after notification by Lee County of the Board of County Commissioners' approval to award the contract. Such certificate of insurance state that the coverage is primary, and shall be in the types and amounts stated in the Contract Documents. Certificate should include producers' phone number and reference the name of the project.

8 Contractor's Responsibilities

8.2 Supervision and Superintendence

8.1.1 The CONTRACTOR will supervise and direct the Work efficiently. He will be solely responsible for the means, methods, techniques, sequences, safety, and procedure of construction, unless otherwise specified. The CONTRACTOR will be responsible to see that the finished Work complies with the Contract Documents.

8.1.2 The CONTRACTOR will keep on the site at all times when work is being performed, a competent, resident superintendent who shall not be replaced without prior written notice to the OWNER'S REPRESENTATIVE. The superintendent will be the CONTRACTOR'S representative at the site and shall have authority to act on behalf of the CONTRACTOR. All communications given to the superintendent shall be binding as if given to the CONTRACTOR.

9 Labor Material and Equipment

9.1 The CONTRACTOR will provide competent, suitable, qualified personnel to lay out the Work and perform construction as required by the Contract Documents. He will at all times maintain good discipline and order at the site.

9.2 The CONTRACTOR will furnish all materials, equipment, labor, transportation, construction equipment and machinery, tools, appliances, fuel, power, heat, light, telephone, water and sanitary facilities and incidentals necessary for the execution, testing, initial operation and completion of the Work unless otherwise specified. All materials and equipment such as concrete

pipe, inlets, manhole covers, etc., furnished by the CONTRACTOR shall be made by the same manufacturer, e.g., all pipe by one company, all inlets by one company, etc.

- 9.3 All materials and equipment will be new except as otherwise provided in the Contract Documents. If required by the OWNER'S REPRESENTATIVE, the CONTRACTOR will furnish satisfactory evidence as to the kind and quality of materials and equipment furnished.
- 9.4 All materials and equipment shall be applied, installed, connected, erected, used, cleaned and conditioned in accordance with the instructions of the applicable manufacturers, fabricator or processors except as otherwise provided in the Contract Documents.
- 9.5 In instances where the act is applicable due to the nature of the bid matter with which this bid package is concerned, all material, equipment, etc., as proposed and offered by CONTRACTOR must meet and conform to all O.S.H.A. requirements; the CONTRACTOR'S signature upon the bid proposal form being by this reference considered a certification of such fact.

10 Adjusting the Progress Schedule

- 10.1 The CONTRACTOR shall submit to the OWNER'S REPRESENTATIVE for acceptance of adjustments in the progress schedule to reflect the impact thereon of new developments; these will conform generally to the progress schedule then in effect and additionally will comply with any provisions of the Contract Documents applicable thereto. The COUNTY reserves the right to reject the progress schedule from the CONTRACTOR which in its judgment does not appear to devote sufficient resources of manpower to enable the timely completion of the project. If the COUNTY requests the progress schedule to be adjusted, the CONTRACTOR shall do so and perform the work according to the adjusted schedule at no additional cost to the COUNTY.

11 Substitute Materials or Equipment

- 11.1 If it is indicated in the specifications that the CONTRACTOR may furnish or use a substitute that is equal to any material or equipment specified, and if the CONTRACTOR wishes to furnish or use a proposed substitute, he will, within thirty calendar days after the award of the Contract, make written application to the OWNER'S REPRESENTATIVE for approval of such a substitute, certifying in writing that the proposed substitute will perform adequately the duties imposed by the general design, be similar and of equal substance to that specified and be suited to the same use and capable of performing the same function as that specified. No substitute shall be ordered or installed without the written approval of the COUNTY who shall be the judge of quality. Whether or not the COUNTY accepts a proposed substitute, the CONTRACTOR shall reimburse the COUNTY for any charges or cost for evaluating any proposed substitute.

12 Concerning Sub-contractors

- 12.1 The CONTRACTOR will be fully responsible for all acts and omissions of his SUB-CONTRACTORS and of persons directly or indirectly employed by them and of persons for whose acts they may be liable to the same extent that they are employed by him. Nothing in the Contract Documents shall create any contractual relationship between any SUB-CONTRACTOR and the COUNTY. The COUNTY may, upon request, furnish to any SUB-CONTRACTOR, to the extent practicable, evidence of amounts paid to the CONTRACTOR on account of specific Work done.
- 12.2 The divisions and sections of the specifications and the identifications of any Drawings shall not control the CONTRACTOR in dividing the Work among SUB-CONTRACTORS or delineating the Work to be performed by any specific trade.
- 12.3 The CONTRACTOR agrees to bind specifically every SUB-CONTRACTOR to the applicable

terms and conditions of these Contract Documents for the benefit of the COUNTY.

- 12.4 All Work performed for the CONTRACTOR by a SUB-CONTRACTOR shall be pursuant to an appropriate agreement between the CONTRACTOR and the SUB-CONTRACTOR which shall contain provisions that waive all rights the contracting parties may have against one another for damages caused by fire or perils covered by insurance, except such rights as they may have to the proceeds of such insurance held by the COUNTY as trustee.

13 Patent Fees and Royalties

- 13.1 The costs involved in fees, royalties, or claims for any patented invention, article, process or method that may be used upon, or in a manner connected with the work under this contract, shall be paid by the CONTRACTOR. The CONTRACTOR and his sureties, together with his officers, agents, and employees, shall protect and hold the COUNTY harmless against any and all demands made for such fees or claims brought or made by holder of any invention or patent. Before final payment is made on the account of this Contract, the CONTRACTOR shall, if requested by the COUNTY, furnish acceptable proof of a proper release from all such fees or claims.
- 13.2 Should the CONTRACTOR, his agent, employee, or any of them be enjoined from furnishing or using any invention, article, material or plans supplied or required to be supplied or used under this contract, the CONTRACTOR shall promptly pay such royalties and secure the requisite licenses; or, subject to acceptance by the COUNTY, substitute other articles, materials or appliances in lieu thereof which are of equal efficiency, quality, finish, suitability and market value to those planned or required under the contract. Descriptive information of these substitutions shall be submitted to the OWNER'S REPRESENTATIVE for determination of general conformance to the design concept and the construction contract. Should the COUNTY elect to use the substitution, the CONTRACTOR agrees to pay such royalties and secure such valid licenses as may be requisite for the COUNTY, his officers, agents, and employees, or any of them, to use such invention, article, material, or appliance without being disturbed or in any way interfered with by any proceeding in law or equity on account thereof.

14 Permits

- 14.1 Unless otherwise specified herein, the CONTRACTOR will secure and pay for all permits, impact fees, and licenses and will pay all governmental charges and inspections' fees necessary for the prosecution of the Work which are applicable at the time of his bid. The CONTRACTOR will also pay all public utility charges and connection fees except as provided for in the Contract Documents. Permits and licenses of regulatory agencies which are necessary to be maintained after completion of the guarantee period shall be secured and paid for by the COUNTY.
- 14.2 Pursuant to the requirements of F.S. 218.80, the following County permits and fees are required to be obtained and paid for by the CONTRACTOR.
- NONE
- 14.2 This is a disclosure of permits and fees, required by Lee County, for this project and does not relieve the contractor of its responsibility to obtain and pay for permits required by other governmental entities as specified elsewhere in this document.
- 14.3 The CONTRACTOR will give all notices and comply with all laws, ordinances, rules and regulations applicable to the Work. If the CONTRACTOR observes that the Specifications or Drawings are at a variance therewith, he will give the OWNER'S REPRESENTATIVE prompt written notice thereof, and any necessary changes shall be adjusted by an appropriate modification. If the CONTRACTOR performs any Work knowing it to be contrary to such

laws, ordinances, rules and regulations and without such notice to the OWNER'S REPRESENTATIVE, he will bear all cost arising therefrom; however, it shall not be his primary responsibility to make certain that the Drawings and Specifications are in accordance with such laws, ordinances, rules and regulations.

15 Licenses

15.1 The CONTRACTOR must be properly licensed, within the jurisdiction where the project is to be constructed, to perform the work specified in the Scope of Work at the time of bid submittal.

16 Use of Premises

16.1 The CONTRACTOR will confine his equipment, the storage of materials and equipment, and the operations of his workmen to the areas permitted by law, ordinances, permits or the requirements of the Contract Documents and shall not unreasonably encumber the premises with materials or equipment.

17 Record Drawings

17.1 The CONTRACTOR will keep one record copy of all Specifications, Drawings, Addenda, Modifications and Shop Drawings at the site in good order, and annotated to show all changes made during the construction process or addition and exact location of underground or otherwise concealed components such as, but not limited to, plumbing, air conditioning, electric, culverts, drainage structures, water main, force mains, service lines, wiring, traffic loops, pond or ditch bottoms and banks, signal poles, signs, and conduit which were not installed exactly as shown on the contract drawings. These shall be available to the OWNER'S REPRESENTATIVE and shall be verified by the OWNER'S REPRESENTATIVE at 30%, 60%, and 100% completion of the Project. The CONTRACTOR shall submit to the OWNER'S REPRESENTATIVE one complete set of all recorded changes made during Construction entitled "As-Built", and dated. Submittals shall be made in accordance with the above and shall be submitted at the time of substantial completion.

17.2 The sum of \$5,000.00 shall be withheld from the final payment until written acceptance or all of the Record Drawings by the OWNER'S REPRESENTATIVE has occurred.

17.3 Certified "as-built" information, which the CONTRACTOR must show on marked-up copies of the design drawings, prints, and other materials as specified above shall include both authorized and unauthorized changes to horizontal pavement dimensions, finish pavement grades, finish dimensions, elevations and alignment of the items noted in Article 17.1, and any modifications to material types from that specified in the bid plans and specifications. As a prerequisite to any payments, the CONTRACTOR shall make available to the Engineer all "as-built" information pertinent to the design drawings each month prior to his submission of a monthly application for payment. The CONTRACTOR shall also obtain "as-built" cross-sections of the roadway, ditches, channels, and other drainage ways as shown in the Contract Documents at intervals not to exceed 100 ft. The CONTRACTOR shall set benchmarks on or within 100 ft. of each control structure constructed as part of this project. A complete description including elevation and location of each control structure benchmark shall be provided to the Engineer as part of the "as-built" information. The elevation shall be clearly and permanently indicated on each benchmark.

17.4 "As-built" dimensions and elevations shall be obtained by a Professional Land Surveyor registered in the State of Florida pursuant to Chapter 472, Florida Statutes. The "as-built" drawings shall be signed and sealed by the CONTRACTOR'S Professional Land Surveyor in accordance with Section 472.025, Florida Statutes.

17.5 All pertinent surveyors' field survey notes containing the "as-built" data shall be sealed and submitted to the Engineer for review and acceptance prior to authorization of the final payment.

17.6 "As-built" data shall be secured and the accuracy of measurements shall be 0.01 ft.

- 17.7 All sub-surface improvements considered part of the Work as shown in the Contract Documents shall be “as-built” by the CONTRACTOR prior to backfilling.
- 17.8 A final bench level circuit shall be secured indicating accuracy of vertical closure and a copy of these field notes shall be submitted to the Engineer before final acceptance of the project.
- 17.9 The CONTRACTOR shall annotate and show all “as-built” information on 11” x 17” prints of the bid plans during the course of the construction process. Upon completion of all contract work, but prior to authorization of the final payment by the Engineer, the CONTRACTOR shall deliver one (1) set of such annotated, in neat draftsman-like manner, “as-built” 11” x 17” prints to the Engineer for approval. Upon approval of such “as-built” plans, the CONTRACTOR shall forthwith provide two (2) sets of these drawings containing all “as-built” information, a CD of the “as-built” electronic files in AutoCAD or MicroStation format and data which have been sealed by a Professional Land Surveyor by the CONTRACTOR at the CONTRACTOR’S cost and forthwith become the property of the COUNTY.
- 17.10 The cost of preparing, maintaining, and providing “as-built” plans and documents as specified in this Article must be included in the Lump Sum payment for mobilization for each part of the Bid Schedule providing for Mobilization.
- 17.11 Shop drawing submittals processed by the Engineer shall not be construed as Change Orders; the purpose of a shop drawing is to demonstrate to the Engineer that the CONTRACTOR understands the design concept, and that his understanding is demonstrated by indicating the equipment and material to be furnished and installed. Corrections or changes indicated by the Engineer in the shop drawings do not constitute authorization to perform extra work.
- 17.12 The review of shop drawings and schedules shall be considered general and shall not be construed as permitting any departures from the contract requirements. The design drawings and contract specifications shall take precedence over the shop drawings in the event of deviations, discrepancy, or conflict.

18 Safety and Protection

- 18.1 The CONTRACTOR will be responsible for initiating, maintaining and supervising all safety precautions and programs in connection with the Work. He will take all necessary precautions for the safety of and will provide the necessary protection to prevent damage, injury or loss to:
- 18.1.1 All employees on the Project and other persons who may be affected thereby;
- 18.1.2 All the Work and all materials or equipment to be incorporated therein, whether in storage on or off the site; and
- 18.1.3 Other property at the site or adjacent thereto including trees, shrubs, lawns, walks, pavements, roadways, structures and utilities not designated for removal, relocation or replacement in the course of construction.
- 18.1.4 The CONTRACTOR will comply with all applicable laws, ordinances, rules, regulations and orders of any public body having jurisdiction for the safety of persons or property or to protect them from damage, injury or loss. He will erect and maintain, as required by the conditions and progress of the Work, all necessary safeguards for safety and protection and, in addition, he will comply with all applicable recommendations of the "Manual of Accident Prevention in Construction" published by the Associated General Contractors of America, Inc.; "Roadway and Traffic Design Standards" latest edition published by the Florida Department of Transportation, specifically Index 600-650; and Occupational Safety and Health Administration published by the United States Department of Labor. He will notify owners of adjacent utilities when prosecution of the Work may affect them. All damage, injury or loss to any property caused directly or indirectly, in whole or in part by the CONTRACTOR, any SUB-CONTRACTOR, anyone directly or indirectly employed by any of them, or anyone for whose acts any of them may be

liable will be remedied by the CONTRACTOR; except any damage or loss attributable to the fault of the Drawings or the Specifications or to the acts or omissions of the COUNTY, and not attributable, directly or indirectly, in whole or in part, to the fault of negligence of the CONTRACTOR.

- 18.1.5 The CONTRACTOR will designate a member of his organization whose responsibility will be to plan for the prevention of accidents at the site. This person shall be the CONTRACTOR'S Superintendent unless otherwise designated in writing by the CONTRACTOR to the OWNER'S REPRESENTATIVE.

19 Emergencies

- 19.1 In emergencies affecting the safety of persons, the Work or property at the site or adjacent thereto, the CONTRACTOR, without special instruction or authorization from the COUNTY, is obligated to act at his discretion to prevent threatened damage, injury or loss. He will give the OWNER'S REPRESENTATIVE prompt written notice of any significant changes in the Work or deviations from the Contract Documents caused thereby. If the COUNTY and the OWNER'S REPRESENTATIVE determine that a change to the Contract Documents is required because of the action taken in response to an emergency, a Field Directive Change or Change Order shall thereupon be issued covering the changes and deviations involved.

20 Shop Drawings and Samples

- 20.1 After checking and verifying all field measurements, the CONTRACTOR will submit to the OWNER'S REPRESENTATIVE for approval, in accordance with the acceptable schedule of Shop Drawing submission, five copies (or at the option of the OWNER'S REPRESENTATIVE, one reproducible copy) of all Shop Drawings, which shall have been checked by and stamped with the approval of the CONTRACTOR and identified as the OWNER'S REPRESENTATIVE may require. The data shown on the Shop Drawings will be complete with respect to dimensions, design criteria, materials of construction and the like to enable the OWNER'S REPRESENTATIVE to review the information as required.
- 20.2 The CONTRACTOR will also submit to the OWNER'S REPRESENTATIVE for approval with such promptness as to cause no delay in the Work, all samples required by the Contract Documents. All samples will have been checked by and stamped with the approval of the CONTRACTOR, identified clearly as to material, manufacturer, any pertinent numbers and the use for which intended.
- 20.3 At the time of each submission, the CONTRACTOR will in writing call the OWNER'S REPRESENTATIVE'S attention to any deviations that the Shop Drawing or sample may have from the requirements of the Contract Documents and, in addition, shall cause a specific notation to be made on each shop drawing submitted for review and approval of each such variation.
- 20.4 The OWNER'S REPRESENTATIVE will review and approve with reasonable promptness Shop Drawings and Samples, but its review and approval shall be only for conformance with the design concept of the Project and for compliance with the information given in the Contract Documents. The approval of a separate item as such will not indicate approval of the assembly in which the item functions. The CONTRACTOR will make any corrections required by the OWNER'S REPRESENTATIVE and will return the required number of corrected copies of Shop Drawings and re-submit new samples until approved. All cost incurred by the COUNTY for the review of a shop drawing in excess of two reviews shall be the CONTRACTORS responsibility. The CONTRACTOR'S stamp of approval on any Shop Drawing or sample shall constitute a representation to the OWNER'S REPRESENTATIVE that the CONTRACTOR has either determined and verified all quantities, dimensions, field construction criteria, materials, catalog numbers and similar data or he assumes full responsibility for doing so, and that he has reviewed or coordinated each Shop Drawing or sample with the requirements of the Work and

the Contract Document.

- 20.5 No work requiring a Shop Drawing or sample submissions shall be commenced until the submission has been approved by the OWNER'S REPRESENTATIVE. Any related Work performed prior to review and approval by the COUNTY of the pertinent submission will be the sole expense and responsibility of the CONTRACTOR. A copy of each approved Shop Drawing and each approved sample shall be kept in good order by the CONTRACTOR at the site and shall be available to the OWNER'S REPRESENTATIVE.
- 20.6 The OWNER'S REPRESENTATIVE approval of Shop Drawings or samples shall not relieve the CONTRACTOR from his responsibility for any deviations from the requirements of the Contract Documents, unless the CONTRACTOR has in writing called the OWNER'S REPRESENTATIVE attention to such deviation at the time of submission and the COUNTY and the OWNER'S REPRESENTATIVE have given written approval to the specific deviation; nor shall any approval by the OWNER'S REPRESENTATIVE relieve the CONTRACTOR from responsibility for errors or omissions in the Shop Drawings.
- 20.6.1 The CONTRACTOR shall, upon completion of the work, furnish to the Engineer two (2) complete sets of prints, neatly bound together, and in good condition, of all the CONTRACTOR'S, Subcontractors' and manufacturers' drawings as finally checked and reviewed by the Engineer with all modifications accepted by the Engineer subsequent thereto, showing the work as actually completed. Such "as-built" information for bridges, culverts, and similar structures shall also be provided by the CONTRACTOR.

21 Indemnification

- 21.1 The CONTRACTOR shall indemnify, save harmless and defend the COUNTY and all of its officers, agents, consultants and employees from and against all losses, claims, demands, payments, suits, actions, recoveries and judgments of every nature and description brought or recoverable against it or them by reason of any act or omission of the CONTRACTOR, his agent, consultants, employees, sub-contractors etc., in the execution of the work or in consequence of any negligence or carelessness in guarding the same and agrees to assume any related cost.
- 21.2 The CONTRACTOR shall assume all risk and bear any loss or injury to property or persons occasioned by neglect or accident during the progress of work until the same shall have been completed and accepted. The CONTRACTOR agrees to repair, restore or rebuild any damages he causes to any property of the COUNTY. He shall also assume all blame or loss by reason of neglect or violation of any state or federal law or municipal rule, regulation or order. The CONTRACTOR shall give to the proper authorities all required notices relating to the work, obtain all official permits and licenses and pay all proper fees. He shall repair any damage that may have occurred to any adjoining building, structure, utility or private property in the course of this work.

22 Cleaning Up

- 22.1 The CONTRACTOR will keep the premises free from accumulations of waste materials, rubbish and other debris resulting from the Work; at the completion of the Work he will remove all waste materials, rubbish and debris from and about the premises as well as all tools, construction equipment and machinery, and surplus materials, and will leave the site clean and ready for occupancy by the COUNTY. The CONTRACTOR will restore to their original condition those portions of the site not designated for alteration by the Contract Documents.
- 22.2 If the CONTRACTOR fails to clean up as provided in the Contract Documents, the COUNTY may do so and the cost thereof shall be deducted from the final retainage due the

CONTRACTOR.**23 Continuing the Work**

23.1 The CONTRACTOR shall carry on the Work and adhere to the progress schedule during all disputes and disagreements with the COUNTY. No work shall be delayed or postponed pending resolution of any disputes or disagreements, except as permitted (The COUNTY May Stop Work) or as the CONTRACTOR and the COUNTY may otherwise agree in writing.

24 Anti-Discrimination

24.1 The CONTRACTOR for itself, its successors in interest, and assignees, as part of the consideration thereof covenant and agree that:

24.2 In the furnishing of services to the COUNTY hereunder, no person on the grounds of race, religion, color, age, sex, national origin, handicap or marital status shall be excluded from participation in, denied the benefits of, or otherwise be subjected to discrimination.

24.3 The CONTRACTOR will not discriminate against any employee or applicant for employment because of race, religion, color, age, sex, national origin, handicap or marital status. The CONTRACTOR will make affirmative efforts to insure that applicants are employed and that employees are treated during employment without regard to their race, religion, color, age, sex, national origin, handicap or marital status. Such action shall include, but not be limited to, acts of employment, upgrading, demotion or transfer; recruitment advertising; layoff or termination, rates of pay or other forms of compensation and selection for training, including apprenticeships.

24.4 CONTRACTOR agrees to post in a conspicuous place, available to employees and applicants for employment, notices setting forth the provisions of this anti-discrimination clause.

24.5 CONTRACTOR will provide all information and reports required by relevant regulations and/or applicable directives. In addition, the CONTRACTOR shall permit access to its books, records, accounts, other sources of information, and its facilities as may be determined by the COUNTY to be pertinent to ascertain compliance. The CONTRACTOR shall maintain and make available relevant data showing the extent to which members of minority groups are beneficiaries under these contracts.

24.6 Where any information required of the CONTRACTOR is in the exclusive possession of another who fails or refuses to furnish this information, the CONTRACTOR shall so certify to the COUNTY its efforts made toward obtaining said information. The CONTRACTOR shall remain obligated under this paragraph until the expiration of three years after the termination of this CONTRACT.

24.7 In the event of breach of any of the above anti-discrimination covenants, the COUNTY shall have the right to impose sanctions as it may determine to be appropriate, including withholding payment to the CONTRACTOR or canceling, terminating or suspending this CONTRACT, in whole or in part.

24.8 Additionally, the CONTRACTOR may be declared ineligible for further COUNTY contracts by rule, regulation or order of the Board of County Commissioners of Lee County, or as otherwise provided by law.

24.9 The CONTRACTOR will send to each labor union, or representative of workers with which the CONTRACTOR has a collective bargaining agreement or other contract of understanding, a notice informing the labor union or worker's representative of the CONTRACTOR'S commitments under this assurance, and shall post copies of the notice in conspicuous places available to the employees and the applicants for employment.

24.10 The CONTRACTOR will include the provisions in every sub-contract under this contract to insure its provisions will be binding upon each Sub-contractor. The CONTRACTOR will take

such action with respect to any Sub-contractor, as the contracting agency may direct, as a means of enforcing such provisions, including sanctions for non-compliance.

25 Work by Others

- 25.1 The COUNTY may perform additional Work related to the Project by itself, or it may let other direct contracts which shall contain General Conditions similar to these.
- 25.2 The CONTRACTOR will afford the other Contractors who are parties to such direct contracts (or the COUNTY, if it is performing the additional Work itself), reasonable opportunity for the introduction and storage of materials and equipment and the execution of the Work, and shall properly connect and coordinate his work with theirs. Should the Contract entail relocation of facilities not a part of this Contract, the CONTRACTOR will coordinate and cooperate with the applicable entity responsible for this portion of the Work.
- 25.3 Water lines, gas lines, wire lines, service connections, water and gas meter boxes, water and gas valve boxes, light standards, cableways, signals, and all other utility appurtenances within the limits of the proposed construction which are to be relocated or adjusted are to be moved by the owners at their expense, unless otherwise provided in the Contract. It is understood and agreed that the CONTRACTOR has considered in his bid all of the permanent and temporary utility appurtenances in their present or relocated positions as shown on the plans and that no additional compensation will be allowed for any delays, inconveniences, or damage sustained to him due to any interference from the said utility appurtenances or the operation of moving them. If any part of the CONTRACTOR'S work depends (for proper execution) upon the Work of any such other Contractor (or the COUNTY), the CONTRACTOR will inspect and promptly report to the OWNER'S REPRESENTATIVE in writing, any defects, deficiencies or delays in such Work that render it unsuitable for such proper execution and results. His failure to report shall constitute an acceptance of the Work, except as to defects, deficiencies and delays which may appear in the other Work after the execution of his Work.
- 25.4 The CONTRACTOR will do all cutting, fitting and patching of his Work, which is consistent with the Contract Documents that may be required to make its several parts come together properly and fit it to receive or be received by such other Work. The CONTRACTOR will not endanger any Work of others by cutting, excavating or otherwise altering such other Work and will only cut or alter such other work with the written consent of the OWNER'S REPRESENTATIVE.
- 25.5 If the performance of additional Work by other Contractors or the COUNTY is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof shall be given to the CONTRACTOR prior to starting any such additional Work.
- 25.6 The CONTRACTOR shall be responsible for coordination with all activities with adjacent projects.

26 Owner's Representative Status During Construction

- 26.1 County's Representatives
- 26.1.1 The COUNTY shall issue all communications to the CONTRACTOR through the OWNER'S REPRESENTATIVE.
- 26.2 Clarifications and Interpretations
- 26.2.1 The OWNER'S REPRESENTATIVE will issue with reasonable promptness, through the COUNTY, such written clarifications or interpretations of the requirements of the Contract Documents (in the form of Drawings or otherwise) as the COUNTY may determine necessary, which shall be consistent with or reasonably inferable from the overall intent of the Contract Documents. If the CONTRACTOR believes that a written clarification or interpretation justifies an

increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree to the amount or extent thereof, the CONTRACTOR may make a claim.

26.3 Authorized Variations in Work

26.3.1 The OWNER'S REPRESENTATIVE may authorize, with prior approval from the COUNTY minor variations in the Work from the requirements of the Contract Documents which do not involve an adjustment in the Contract Price or the Contract Time and are consistent with the overall intent of the Contract Documents. These may be accomplished by a Field Change Order and the CONTRACTOR shall perform the Work involved promptly. If the CONTRACTOR believes that a Field Change Order justifies an increase in the Contract Price or an extension of the Contract Time and the parties are unable to agree as to the amount or extent thereof, the CONTRACTOR may make a claim.

27 Changes in Work

- 27.1 Without invalidating the Agreement, the COUNTY may unilaterally and at any time or from time to time order additions, deletions or revisions in the Work; these will be authorized by Change Orders or Field Directive Change. Upon receipt of a Change Order or Field Directive Change, the CONTRACTOR will proceed with the Work involved.
- 27.2 All such Work shall be executed under the applicable conditions of the Contract Documents.
- 27.3 If any Change Order or Field Directive Change causes an increase or decrease in the Contract Price or any extension or shortening of the Contract Time, an equitable adjustment will be made.
- 27.4 Additional Work performed by the CONTRACTOR without written authorization of a change in the form of an approved Change Order will not entitle him to an increase in the Contract Price or any extension of the Contract Time, except in the case of an emergency.
- 27.5 It is the CONTRACTOR'S responsibility to notify the Surety of any changes affecting the general scope of the Work or change of the Contract Price and the amount of the applicable Bonds shall be adjusted accordingly. The Surety's Acceptance must be submitted to the OWNER'S REPRESENTATIVE, by the CONTRACTOR, within ten calendar days of the initiation of the change.

28 Change of Contract Price

- 28.1 The Contract Price constitutes the total compensation payable to the CONTRACTOR for performing the Work. All duties, responsibilities and obligations assigned to or undertaken by the CONTRACTOR shall be at his expense without change in the Contract Price.
- 28.2 The Contract Price may only be changed by a Change Order. Any claim for an increase or decrease in the Contract Price shall be in writing and delivered to the OWNER'S REPRESENTATIVE within fifteen calendar days of the occurrence of the event giving rise to the claim and stating the general nature of the claim. Notice of the amount of the claim with supporting data shall be delivered within sixty calendar days after such occurrence (unless COUNTY allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the CONTRACTOR'S written statement that the amount claimed covers all known amounts (direct, indirect, and consequential) to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. No claim for an adjustment in the Contract Price will be valid if not submitted in accordance. All claims for adjustment in the Contract Price shall be reviewed by the OWNER'S REPRESENTATIVE. Any change in the Contract Price shall be incorporated in a Change Order and approved by the COUNTY. No claim by the CONTRACTOR for an

- equitable adjustment hereunder shall be allowed if asserted after final payment under this Contract.
- 28.3 Where the Work involved is covered by unit prices contained in the Contract Documents or subsequently agreed upon, by application of unit prices to the quantities of the items involved.
- 28.4 By mutual acceptance of a lump sum properly itemized and supported by sufficient substantiating data to permit evaluation.
- 28.5 By cost of the Work and mutually acceptable fixed amount for overhead and profit agreed upon by the parties.
- 28.6 If none of the above methods is agreed upon, the value shall be determined by the COUNTY on the basis of cost of the Work and a percentage for overhead and profit. Cost shall only include labor (payroll, payroll taxes, fringe benefits, worker's compensation, etc.), materials, equipment, and other incidentals directly related to the Work involved.
- 28.7 In such cases the CONTRACTOR will submit in the form prescribed by the COUNTY an itemized cost breakdown together with supporting data. The amount of credit to be allowed by the CONTRACTOR to the COUNTY for any such change which results in a net decrease in cost will be the amount of the actual net decrease as determined by the COUNTY. When both additions and credits are involved in any one change, the combined overhead and profit shall be figured on the basis of the net decrease, if any.

29 Cash Allowance

- 29.1 It is understood that the CONTRACTOR has included in the Contract Price any allowances so named in the Contract Documents and shall cause the Work so covered to be done by such materialmen, suppliers, or SUB-CONTRACTORS and for such sums within the limit of the allowances as the COUNTY may approve. Upon final payment, the Contract Price shall be adjusted as required and an appropriate Change Order issued. The CONTRACTOR agrees that the original Contract Price includes such sums as he deems proper for cost and profit on account of cash allowances. No demand for an additional sum for overhead or profit in connection therewith will be allowed.
- 29.2 Unit Price Work
- 29.2.1 Where the Contract Documents provide that all or part of the Work is to be Unit Price Work, the Contract Price will be deemed to include for all Unit Price Work an amount equal to the sum of the established unit prices for each separately identified item of Unit Price Work times the estimated quantity of each item as indicated in the Agreement. The estimated quantities of items of Unit Price Work are not guaranteed and are solely for the purpose of comparison of Bids and determining an initial Contract Price.
- 29.2.2 Each unit price will be deemed to include an amount considered by the CONTRACTOR to be adequate to cover the CONTRACTOR'S overhead and profit for each separately identified item.
- 29.2.3 The unit price of an item of Unit Price Work shall be subject to revaluation and adjustment under the following conditions:
- 29.2.3.1 If the total cost of a particular item of Unit Price Work amounts to 5% or more of the Contract Price and the variation in the quantity of that particular item of Unit Price Work performed by the CONTRACTOR differs by more than 15% from the estimated quantity of such item indicated in the Agreement; and,
- 29.2.3.2 If there is no corresponding adjustment with respect to any other item of Work; and

- 29.2.3.3 If the CONTRACTOR believes that it has incurred additional expense as a result thereof; or
- 29.2.3.4 If the COUNTY believes that the quantity variation entitles it to an adjustment in the unit price, either the COUNTY or the CONTRACTOR may make a claim for an adjustment in the Contract Price if the parties are unable to agree as to the effect of any such variations in the quantity of Unit Price Work performed.

30 Change of Contract Time

- 30.1 The Contract Time may only be changed by a Change Order. Any claim for an extension in the Contract Time shall be in writing and delivered to the OWNER'S REPRESENTATIVE within fifteen calendar days of the occurrence of the event giving rise to the claim and stating general nature of the claim. Notice of the extent of the claim with supporting data (analysis and documentation) shall be delivered within sixty calendar days after such occurrence (unless the OWNER'S REPRESENTATIVE allows an additional period of time to ascertain more accurate data in support of the claim) and shall be accompanied by the CONTRACTOR'S written statement that the adjustment claimed is the entire adjustment to which the CONTRACTOR has reason to believe it is entitled as a result of the occurrence of said event. If adverse weather conditions are the basis for a claim for additional time, such claim shall be documented by data substantiating that weather conditions were abnormal for the period of time and could not have been reasonably anticipated, and that the weather conditions had an adverse effect on the scheduled construction. No claim by the CONTRACTOR under this provision shall be allowed unless the CONTRACTOR has given the notice and the analysis and documentation required in this paragraph. All claims for adjustment in the Contract Time shall be determined by the OWNER'S REPRESENTATIVE. Any change in the Contract Time resulting from any such claim shall be incorporated in a Change Order.
- 30.2 The COUNTY shall not be responsible for any delay in the completion of the project where the delay is beyond the control or without fault or negligence on behalf of the COUNTY. The COUNTY shall not be held accountable for extra compensation or an extension of time due to default by the CONTRACTOR, SUB-CONTRACTORS, or suppliers in the furnishing of labor or materials for the project, or having to replace defective materials.
- 30.3 The CONTRACTOR shall be entitled to a claim for an extension of time when a delay or hindrance is caused by an act of God, or any act or omission on the part of the COUNTY, provided the CONTRACTOR gives notice to the OWNER'S REPRESENTATIVE within fifteen calendar days of the occurrence of the event giving rise to the claim and having stated the general nature of the claim. The CONTRACTOR'S sole remedy shall be an extension of Contract Time.
- 30.4 No extension of Contract Time or increases in Contract Price shall be granted for any delay caused either by (1) inadequate crewing, default or bankruptcy of lower tier contract, slow submittals, etc., or (2) by severe though not unusual weather conditions (other than hurricanes and tornadoes) or (3) any delay impacting a portion of the Work within the available total float or slack time and not necessarily preventing completion of the Work within the Contract Time unless otherwise agreed to by the COUNTY in its sole discretion or (4) for any delay which is caused by the CONTRACTOR having to replace defective material or equipment or (5) delays attributable to the lack of performance by Sub-contractors regardless of the reasons.
- 30.5 All time limits stated in the Contract Documents are of the essence of the Agreement. Shall not exclude recovery for damages (including but not limited to fees and charges of engineers,

architects, attorneys and other professionals and court cost) for delay by either party.

31 Warranty and Guarantee: Acceptance of Defective Work

31.1 Warranty and Guarantee

31.1.1 The CONTRACTOR warrants and guarantees to the COUNTY that all materials and equipment will be new unless otherwise specified and that all Work will be of good quality, free from faults or defects and in accordance with the requirements of the Contract Documents and any inspections, test or approvals referred to in this Article. All unsatisfactory Work, all faulty Work, and all Work not conforming to the requirements of the Contract Documents or such inspections, tests or approvals shall be considered defective. Prompt notice of all defects shall be given to the CONTRACTOR. All defective Work, whether or not in place, may be rejected, corrected or accepted as provided herein. Contractor is to assign any and all warranties or guarantees on equipment, materials, etc. to the COUNTY.

31.2 Tests and Inspections

- 31.2.1 If the Contract Documents, laws, ordinances, rules, regulations or order of any public authority having jurisdiction require any Work to specifically be inspected, tested or approved by someone other than the CONTRACTOR, the CONTRACTOR will give the OWNER'S REPRESENTATIVE forty-eight (48) hours' notice of readiness therefore. The CONTRACTOR will furnish the OWNER'S REPRESENTATIVE with the required certificates of inspection, testing or approval. All such tests will be in accordance with the methods prescribed by the American Society for Testing and Materials or such other applicable organizations as may be required by law or the Contract Documents. If any such Work required to be inspected, tested or approved is covered without written approval of the OWNER'S REPRESENTATIVE, it shall, if requested by the OWNER'S REPRESENTATIVE, be uncovered for observation at the CONTRACTOR'S expense. The cost of all such inspections, tests and approvals shall be borne by the CONTRACTOR unless otherwise provided.
- 31.2.2 Project field testing of materials required by the specifications or the OWNER'S REPRESENTATIVE shall be provided by and at the expense of the COUNTY. The CONTRACTOR shall coordinate and schedule the required testing. The Contractor shall pay for all retests when the initial test result reveals that the materials failed to meet the requirements of the specifications. The CONTRACTOR shall notify the OWNER'S REPRESENTATIVE twenty-four (24) hours prior to conducting any test so the OWNER's REPRESENTATIVE may be present.
- 31.2.3 The OWNER'S REPRESENTATIVE shall have the right to require all materials to be submitted to tests prior to incorporation in the Work. In some instances, it may be expedient to perform these tests at the source of supply, and for this reason, it is required that the CONTRACTOR furnish the OWNER'S REPRESENTATIVE with the information concerning the location of his source before incorporating material into the Work. This does not in any way obligate the OWNER'S REPRESENTATIVE to perform tests for acceptance of material and does not relieve the CONTRACTOR of his responsibility to furnish satisfactory material. The CONTRACTOR shall furnish manufacturer's certificates of compliance with these specifications covering manufactured items incorporated in the Work.
- 31.2.4 Neither observations by the OWNER'S REPRESENTATIVE, nor inspections, tests or approvals by persons other than the CONTRACTOR shall relieve the CONTRACTOR from his obligations to perform the Work in accordance with the requirements of the Contract Documents.

31.2.5 Testing/Permits: The CONTRACTOR shall be responsible for performing any testing and the cost for all items that may be required as part of the NPDES, FDEP, USACOE and SFWMD permits.

32 Close Out Procedure

32.1 General Operating/Maintenance Instructions & Manuals

32.1.1 The CONTRACTOR shall organize maintenance operating manual information into four suitable sets of manageable size, and bind into individual binders properly identified and indexed (thumb-tabbed). Emergency instructions, spare parts listing, warranties, wiring diagrams, recommended "turn around" cycles, inspection procedures, shop drawings, product data, and similar acceptable information shall be included. The CONTRACTOR shall bind each manual of each set in a heavy duty, 3-ring vinyl covered binder, and include pocket folders for folded sheet information. Mark identification on both front and spine of each binder.

32.1.2 Arrange for each installer of work requiring continuing maintenance (by the OWNER) or operation, to meet with the OWNER'S personnel, at the project site, to provide basic instructions needed for proper operation and maintenance of the entire work. Include instructions by manufacturer's representatives where installers are not expert in the required procedures. Review maintenance manuals, record documentation, tools, spare parts and materials, lubricants, fuels, identification system, control sequences, hazards, cleaning and similar procedures and facilities. For operational equipment, demonstrate start-up, shut-down, emergency operations, noise and vibration adjustments, safety, economy/efficiency adjustments, and similar operations. Review maintenance and operations in relation with applicable guaranties, warranties, agreements to maintain, bonds, and similar continuing commitments.

33 Access to the Work

33.1 The COUNTY and the OWNER'S REPRESENTATIVE shall at all times have access to the Work. The CONTRACTOR shall provide proper facilities for such access and observation of the Work and also for any inspection or testing thereof by others.

34 Uncovering the Work

34.1 If any work has been covered which the OWNER'S REPRESENTATIVE has not specifically requested to observe prior to its being covered, or if the OWNER'S REPRESENTATIVE considers it necessary or advisable that covered Work be inspected or tested by others, the CONTRACTOR, at the OWNER'S REPRESENTATIVE'S request, will uncover, expose or otherwise make available for observation, inspection or testing as the OWNER'S REPRESENTATIVE may require, that portion of the Work in question, furnishing all necessary labor, material and equipment. If it is found that such Work is defective, the CONTRACTOR will bear all the expense of such uncovering, exposure, observation, inspection and testing, and of satisfactory reconstruction. If, however, such Work is not found to be defective, the CONTRACTOR will be allowed an increase in the Contract Price or an extension of the Contract Time, or both, directly attributable to such uncovering, exposure, observation, inspection, testing and reconstruction, if he makes a claim therefore.

35 County May Stop Work

35.1 If the Work is defective, if the CONTRACTOR fails to supply sufficient skilled workmen or suitable materials or equipment, or if the CONTRACTOR fails to make prompt payments to

SUB-CONTRACTORS for labor, materials or equipment: the COUNTY may order the CONTRACTOR to stop the Work, or any portion thereof, until the cause for such order has been eliminated; however, this right of the COUNTY to stop the work shall not give rise to any duty on the part of the COUNTY to exercise this right for the benefit of the CONTRACTOR or any other party.

- 35.2 Notwithstanding Paragraph 35.1, the COUNTY may also issue a Stop Work Order for the following reasons:
- 35.2.1 Insufficient Maintenance of Traffic practices.
 - 35.2.2 Failure to comply with permits regarding pollution control.
 - 35.2.3 Insufficient construction materials or methods.
 - 35.2.4 Failure to provide a safe working environment in accordance with the US Department of Labor Occupational Safety and Health Administration (OSHA).
- 35.3 Upon notice of the Stop Work Order, the CONTRACTOR shall cease all contracted work except for the activities required to correct the problem and as directed by the COUNTY.
- 35.4 If the CONTRACTOR fails to correct the problem causing the Stop Work Order and there is immediate threat to the public's health, safety, or environmental protection, the COUNTY may perform any remedial activities necessary to protect the public and environment. Any costs incurred by the County in the performance of this work shall be deducted from monies due the Contractor or paid by the Contractor to the County.
- 35.5 No increase in the Contract Price or extension of the Contract Time will be granted for any delays or loss of time due to a Stop Work Order.

36 Correction or Removal of Defective Work

- 36.1 If required by the OWNER'S REPRESENTATIVE prior to approval of final payment, the CONTRACTOR will, promptly, without cost to the COUNTY and as specified by the OWNER'S REPRESENTATIVE, either correct any defective Work whether or not fabricated, installed or completed or, if the Work has been rejected by the OWNER'S REPRESENTATIVE, remove it from the site and replace it with non-defective Work. If the CONTRACTOR does not correct such defective Work or remove and replace such rejected Work within ten calendar days, all as specified in a written notice from the OWNER'S REPRESENTATIVE, the OWNER'S REPRESENTATIVE may have the deficiency corrected or the rejected Work removed and replaced. All direct or indirect costs of such correction or removal and replacement shall be paid by the CONTRACTOR. The CONTRACTOR will also bear the expense of making good all Work of others destroyed or damaged by his correction, removal or replacement of his defective Work.

37 One Year Correction Period

- 37.1 If, after the approval of the final payment and prior to the expiration of one year after the date of Final Completion or such longer period of time as may be prescribed by law or by the terms of any applicable special guarantee required by the Contract Documents, any Work is found to be defective, the CONTRACTOR will promptly, without cost to the COUNTY, and in accordance with the OWNER'S REPRESENTATIVE'S written instructions, either correct such defective Work or, if it has been rejected by the OWNER'S REPRESENTATIVE, remove it from the site and replace it with non-defective Work. If, within seven calendar days, the CONTRACTOR does not comply with the terms of such instructions, the Bonding Company shall be notified of default and requested to make repairs or replacement, the COUNTY may have the defective Work corrected or the rejected Work removed and replaced. All direct and indirect costs of such removal and replacement shall be paid by the

CONTRACTOR.**38 Acceptance of Defective Work**

- 38.1 If, instead of requiring correction or removal and replacement of defective Work, the COUNTY prefers to accept it, the COUNTY may do so. In such case, if acceptance occurs prior to approval of final payment, a Change Order shall be issued incorporating the appropriate revisions to the Contract Documents including an appropriate reduction in the Contract Price. If the acceptance occurs after approval of the final payment, an appropriate amount shall be paid by the CONTRACTOR to the COUNTY.

39 Neglected Work By Contractor

- 39.1 If the CONTRACTOR should neglect to prosecute the Work in accordance with the Contract Documents, including any requirements of the progress schedule, the COUNTY may, after three calendar days written notice to the CONTRACTOR and without prejudice to any other remedy it may have, make good such deficiency and the cost thereof shall be charged against the CONTRACTOR. A Change Order shall be issued incorporating the appropriate revision to the Contract Documents including an appropriate reduction in the Contract Price. If the payments then or thereafter due the CONTRACTOR are not sufficient to cover such amount, the CONTRACTOR shall pay the difference to the COUNTY.

40 Payment and Completion**40.1 Schedule of Values**

- 40.1.1 Within ten (10) calendar days after the effective date of the Agreement, the CONTRACTOR must submit a schedule of values of the Work including quantities and unit prices totaling to the Contract Price. This schedule shall be satisfactory in form and substance to the COUNTY and shall subdivide the Work into sufficient detail to serve as the basis for progress payments during construction. Upon approval of the schedule of values by the OWNER'S REPRESENTATIVE, it shall be incorporated into the Estimate and Requisition for Payment prescribed by the COUNTY. Unit Price Contracts shall have the bid proposal prices incorporated into the Estimate and Requisition for Payment.

40.2 Application for Progress Payment

- 40.2.1 Bid proposal units and unit prices shall serve as the basis for progress payments during construction. The bid proposal process shall be incorporated into the Estimate and Requisition for Payment Form No. CSD:505(4) prescribed by the COUNTY.
- 40.2.2 Not more often than once a month, nor less often than specified in the approved payment schedule, and on a date established at the Project Pre-Construction Conference, the CONTRACTOR will submit to the OWNER'S REPRESENTATIVE for review the Estimate and Requisition for Payment form filled out and signed by the CONTRACTOR covering the Work completed as of the date of the Application and supported by such data as the OWNER'S REPRESENTATIVE may reasonably require. Also, if payment is requested on the basis of materials and equipment not incorporated in the Work but delivered and suitably stored at the site or at another location agreed to in writing, the Application for Payment shall also be accompanied by such supporting data, satisfactory to the OWNER'S REPRESENTATIVE, as will establish the COUNTY'S title to the material and equipment and protect its interest therein, including applicable insurance. All progress payments will be subject to the retainage percentage specified in the Contract Documents. Such retainage shall be paid and will be issued in the final payment after acceptance by the COUNTY of the

Work.

41 Contractor's Warranty of Title

- 41.1 The CONTRACTOR warrants and guarantees that title to all Work, materials and equipment covered by an application for progress payment, whether incorporated in the Project or not, will be passed to the COUNTY prior to the next making of application for progress payment, free and clear of all liens, claims, security interest and encumbrances; and that no Work, materials or equipment covered by an Application for Payment will have been acquired by the CONTRACTOR or by any other person performing the Work at the site or furnishing materials and equipment for the Project subject to an agreement under which an interest therein or encumbrance thereon is retained by the seller or otherwise imposed by the CONTRACTOR or such other person.

42 Approval of Payments

- 42.1 The OWNER'S REPRESENTATIVE will, within ten calendar days after receipt of each Application for Payment, either indicate his approval of payment and deliver the application to the COUNTY or return the Application to the CONTRACTOR indicating in writing the reason for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and re-submit the Application. The COUNTY will, within five calendar days after receipt of each approved application for payment, either indicate their approval of payment, and within fifteen calendar days pay the CONTRACTOR the amount approved, or return the application to the CONTRACTOR thru the OWNER'S REPRESENTATIVE indicating in writing the reason for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the application to the OWNER'S REPRESENTATIVE.
- 42.2 The OWNER'S REPRESENTATIVE'S approval of any payment requested in an Application for Payment shall constitute a representation by him to the COUNTY, based on the OWNER'S REPRESENTATIVE'S on-site observations of the Work in progress and on his review of the Application for Payment and the supporting data that the CONTRACTOR is entitled to payment of the amount approved.
- 42.3 The OWNER'S REPRESENTATIVE'S approval of final payment shall constitute an additional representation by him to the COUNTY that the conditions precedent to the CONTRACTOR'S being entitled to final payment as set forth have been fulfilled.
- 42.4 The OWNER'S REPRESENTATIVE may refuse to approve the whole or any part of any payment if in his opinion; he is unable to make such representations to the COUNTY. He may then refuse to approve any such payment because of subsequently discovered evidence or the results of subsequent inspections or test, nullify any such payment previously approved, to such extent as may be necessary in his opinion to protect the COUNTY from loss because:
- 42.4.1 The Work is defective;
 - 42.4.2 A portion of such payment is the subject of a dispute or claim that has been filed;
 - 42.4.3 The Contract Price has been reduced because of Modifications;
 - 42.4.4 The COUNTY has been required to correct defective Work or complete the Work, or of unsatisfactory prosecution of the Work, including failure to clean up as required.

43 Substantial Completion

- 43.1 Prior to final payment, the CONTRACTOR shall, in writing to the OWNER'S REPRESENTATIVE, certify that the entire Project is substantially complete and request that the OWNER'S REPRESENTATIVE issue a Certificate of Substantial Completion. Within

fourteen calendar days thereafter, the OWNER'S REPRESENTATIVE and the CONTRACTOR will make an inspection of the Project to determine the status of completion. If the COUNTY does not consider the Project substantially complete, it will notify the CONTRACTOR in writing giving the reasons therefore. If the COUNTY considers the Project substantially complete, a Certificate of Substantial Completion will be issued. This certificate shall fix the date of Substantial Completion and the responsibilities between the COUNTY and the CONTRACTOR for maintenance, heat and utilities. The Certificate of Substantial Completion will also include a punch list of items to be completed or corrected, said time to be within the Contract Time. The COUNTY shall have the right to exclude the CONTRACTOR from the Project after the date of Substantial Completion but the COUNTY will allow the CONTRACTOR reasonable access to complete items on the punch list.

44 Partial Utilization

44.1 Prior to final payment, the OWNER'S REPRESENTATIVE may request the CONTRACTOR to permit the use of a specified part of the Project which the COUNTY believes it may use without significant interference with construction of the other parts of the Project. If the CONTRACTOR agrees, he will certify to the OWNER'S REPRESENTATIVE that said part of the Project is substantially complete and request the OWNER'S REPRESENTATIVE to issue a Certificate of Substantial Completion for that part of the Project. Within fourteen calendar days thereafter, the OWNER'S REPRESENTATIVE and the CONTRACTOR will make an inspection of that part of the Project to determine its status of completion. If the COUNTY considers that part of the Project to be substantially complete, the OWNER'S REPRESENTATIVE will deliver to the CONTRACTOR a certificate to that effect, fixing the date of Substantial Completion as to that part of the Project, and listing the punch list of items to be completed or corrected before final payment and fixing the responsibility between the COUNTY and the CONTRACTOR for maintenance, heat and utilities as to that part of the Project. The COUNTY shall have the right to exclude the CONTRACTOR from any part of the Project which is so certified to be substantially complete but the COUNTY will allow the CONTRACTOR reasonable access to complete or correct items on the punch list.

45 Final Inspection

45.1 Upon written notice from the CONTRACTOR that the Project is complete, the OWNER'S REPRESENTATIVE will make a final inspection with the CONTRACTOR and will notify the CONTRACTOR in writing of any particulars which this inspection reveals that the Work is defective. The CONTRACTOR shall immediately make such corrections as are necessary to remedy the defects within a reasonable time.

46 Final Inspection for Payment

46.1 After the CONTRACTOR has completed any such corrections to the satisfaction of the OWNER'S REPRESENTATIVE and delivered all maintenance and operating instructions, schedules, guarantees, bonds, Certificates of Inspection and other documents as required by the Contract Documents, he may make application for final payment following the procedure for progress payments. The final Application for Payment shall be accompanied by legally effective final releases or waivers of liens from the CONTRACTOR and all SUB-CONTRACTORS which performed services for the CONTRACTOR pursuant to the Contract Documents and the consent of surety, if applicable to final payment.

47 Approval of Final Payment

- 47.1 If, on the basis of its observations and review of the Work during construction, its final inspection and its review of the final Estimate and Requisition for Payment, all as required by the Contract Documents, the OWNER'S REPRESENTATIVE is satisfied that the Work has been completed and the CONTRACTOR has fulfilled all of his obligations under the Contract Documents, it will, within ten calendar days after receipt of the final Application for Payment, indicate in writing its approval of payment and deliver the application to the COUNTY. Otherwise, it will return the Application to the CONTRACTOR, indicating in writing its reason for refusing to approve final payment, in which case the CONTRACTOR will make the necessary corrections and re-submit the Application. The COUNTY will, within fifteen calendar days after receipt of approved application for final payment, either indicate their approval of the estimate and requisition application for payment and within fifteen calendar days pay the CONTRACTOR the amount approved by the COUNTY and issue a Certificate of Final Completion or return the application thru the OWNER'S REPRESENTATIVE indicating in writing the reason for refusing to approve payment. In the latter case, the CONTRACTOR may make the necessary corrections and resubmit the application to the OWNER'S REPRESENTATIVE.
- 47.2 If, after substantial Completion of the Work, final completion is materially delayed through no fault of the CONTRACTOR, and the OWNER'S REPRESENTATIVE so confirms, the COUNTY shall and without terminating the Agreement, make payment of the balance due for that portion of the Work fully completed and accepted. If the remaining balance for Work not fully completed or corrected is less than the retainage stipulated in the Agreement, and if bonds have been furnished as required, the written consent of the Surety to the payment of the balance due for that portion of the Work fully completed and accepted shall be submitted by the CONTRACTOR to the OWNER'S REPRESENTATIVE, prior to certification of such payment. Such payment shall be made under the terms and conditions governing final payment, except that it shall not constitute a waiver of claims.
- 47.3 If liquidated damages are to be deducted from the final payment, the COUNTY shall so notify the CONTRACTOR in writing at least seven calendar days prior to the COUNTY'S submittal to Finance.
- 47.4 The Contractor will be required to submit with his final payment documents a DBE Participation Certification, indicating all DBE sub-contractor(s) and amount(s) utilized for the project.
- 47.5 If the CONTRACTOR did not utilize the DBE firm(s) listed on the Bid Proposal, a letter of justification, as to why shall be submitted along with the DBE Participation Certification.
- 47.6 At the final completion of the construction project if the county project manager experienced problems with the CONTRACTOR the project manager will prepare a Contractor Performance Evaluation, and forward to the Contractor for review, comment and signature.
- 47.7 Upon receipt of the Contractor Performance Evaluation the CONTRACTOR will have seven calendar days, from the date received, to review, comment, sign and return back to the project manager. If the evaluation has not been received back from the CONTRACTOR within the seven calendar days, the COUNTY will assume the CONTRACTOR fully agrees with and has no comments to the evaluation. The evaluation will then be placed on file with Lee County Procurement Management.

48 Contractor's Continuing Obligation

- 48.1 The CONTRACTOR'S obligation to perform the Work and complete the Project in accordance with the Contract Documents shall be absolute. Neither approval of any progress or final payment by the COUNTY, the issuance of the Certificates of Completion, any payment by the COUNTY to the CONTRACTOR under the Contract Documents, any use or

occupancy of the Project or any part thereof by the COUNTY, any act of acceptance by the COUNTY, any failure to do so, nor any correction of defective Work by the COUNTY shall constitute an acceptance of Work not in accordance with the Contract Documents.

49 Waiver of Claims

49.1 The making and acceptance of final payment shall constitute:

49.1.1 A waiver of all claims by the COUNTY against the CONTRACTOR other than those arising from unsettled liens, from defective Work appearing after final payment or from failure to comply with the requirements of the Contract Documents, or from the terms of any special guarantees specified therein, and,

49.1.2 A waiver of all claims by the CONTRACTOR against the COUNTY other than those previously made in writing and still unsettled.

50 Suspension of Work and Termination

50.1 County May Suspend Work

50.1.1 The COUNTY may at any time and without cause suspend the Work or any portion thereof for a period of not more than ninety calendar days by notice in writing to the CONTRACTOR. The COUNTY shall fix the date on which Work shall be resumed and the CONTRACTOR will resume the Work on the date so fixed. The CONTRACTOR will be allowed an increase in the Contract Price, an extension of the Contract Time or both, if such increases are justified and directly attributable to any COUNTY suspension and if he makes a claim thereof.

51 County May Terminate

51.1 If the CONTRACTOR is adjudged bankrupt or insolvent, if he makes a general assignment for the benefit of his creditors, if a trustee or receiver is appointed for the CONTRACTOR or for any of his property, if he files a petition to take advantage of any debtor's act or reorganizes under the bankruptcy or similar laws, if he repeatedly fails to supply sufficient skilled workmen or suitable materials or equipment, if he repeatedly fails to make prompt payments to SUB-CONTRACTORS for labor, materials or equipment, if he disregards laws, ordinances, rules, regulations or orders of any public body having jurisdiction, if he disregards the authority of the OWNER'S REPRESENTATIVE, or if he otherwise substantially violates any provisions of the Contract Documents, then the COUNTY may, without prejudice to any other right or remedy and after giving the CONTRACTOR and his surety seven (7) calendar days' written notice, terminate the services of the CONTRACTOR and take possession of the Project and all materials, equipment, tools, construction equipment and machinery thereon owned by the CONTRACTOR and finish the Work by whatever method the COUNTY may deem expedient or arrange with the Surety to complete the project. The CONTRACTOR, if notified by the COUNTY to do so, shall promptly remove any part of his equipment and supplies from the property of the COUNTY; failing, the COUNTY shall have the right to remove such equipment and supplies at the expense of the CONTRACTOR.

51.2 In such case the CONTRACTOR shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Price exceeds the direct and indirect cost of completing the Project, including compensation for additional professional services, such excess shall be paid to the CONTRACTOR. If such cost exceeds such unpaid balance, the CONTRACTOR will pay the difference to the COUNTY. Such cost incurred by the COUNTY will be determined by the COUNTY and incorporated in a Change Order.

51.3 Where the CONTRACTOR'S services have been so terminated by the COUNTY, said

termination shall not affect any rights of the COUNTY against the CONTRACTOR then existing or which may thereafter accrue.

- 51.4 If so terminated, any retention or payment of monies by the COUNTY due the CONTRACTOR will not release the CONTRACTOR from liability accruing under this Contract.
- 51.5 If after notice of termination of the CONTRACTOR'S right to proceed under the provisions of this clause, it is determined for any reason that the CONTRACTOR was not in default under the provisions or that the delay was excusable, the rights and obligations of the parties shall be the same as if the notice of termination had not been issued.
- 51.6 Upon thirty (30) calendar days' written notice to the CONTRACTOR, the COUNTY may without cause and without prejudice to any other right or remedy elect to abandon the Project and terminate the Agreement. In such case the CONTRACTOR shall be paid for all Work executed and any expense sustained plus a reasonable profit.

52 Contractor May Stop Work or Terminate The Contract

- 52.1 If through no fault of the CONTRACTOR, or a Sub-contractor, or their agents or employees or any other persons performing portions of the Work under Contract with the CONTRACTOR, the WORK is suspended for a period of more than ninety calendar days by the COUNTY or under an order of court or other public authority, or the OWNER'S REPRESENTATIVE has not issued a certificate for payment and has not notified the CONTRACTOR of the reason for withholding certification or because the COUNTY has not made payment on a certificate for payment within the time stated in the Contract Documents, then the CONTRACTOR may, upon seven calendar days written notice to the COUNTY and the OWNER'S REPRESENTATIVE, terminate the Agreement and recover from the COUNTY payment for all Work executed and proven loss with respect to materials, equipment, tools and construction equipment and machinery, including reasonable overhead, profit and damages.
- 52.2 In addition and in lieu of terminating the Agreement, if the OWNER'S REPRESENTATIVE has failed to act on an application for payment or the COUNTY has failed to make any payment as aforesaid, the CONTRACTOR may upon seven calendar days written notice to the COUNTY and the OWNER'S REPRESENTATIVE stop the Work until payment of all amounts then due. The provisions of this paragraph shall not relieve the CONTRACTOR of the obligation to carry on the Work in accordance with the progress schedule and without delay during disputes and disagreements with the COUNTY.

53 Miscellaneous

53.1 General

- 53.1.1 All Specifications, Drawings and copies thereof furnished by the COUNTY, to the CONTRACTOR, shall remain the COUNTY'S property. They shall not be used on another Project.
- 53.1.2 The duties and obligations imposed by these General Conditions and the rights and remedies available hereunder, and, in particular but without limitation, the warrants, guarantees and obligations imposed upon the CONTRACTOR and the rights and remedies available to the COUNTY thereunder shall be in addition to and not a limitation of any otherwise imposed or available by law, by special guarantee or other provisions of the Contract Documents.
- 53.1.3 Should the COUNTY or the CONTRACTOR suffer injury or damage to its person or property because of any error, omission or act of the other or any of his employees, agents, or others for whose acts he is legally liable, claim should be made in writing

- to the other party within seven calendar days of the first observance of such injury or damage.
- 53.1.4 The Contract Documents shall be governed by the laws of the State of Florida, the County of Lee, and the municipality in which the project is being done.
- 53.2 Right-of-Way Station Boards: The CONTRACTOR must establish and maintain throughout construction the right-of-way station boards at every even station within ten (10) days after the Notice to Proceed to assist and expedite construction and utility coordination. No additional compensation or separate pay item will be made for this work.
- 53.3 Abbreviations: Reference in the technical specifications to the specifications or requirements of technical societies, associated organization, or bodies shall mean their most current specifications. These groups are identified in the technical specifications.
- 53.4 Use of Public Streets: The use of public streets and roads shall be such as to minimize any inconvenience to the public and to other traffic. Any earth or other excavation materials spilled from trucks shall be removed by the CONTRACTOR and the streets and roads shall be cleaned by the CONTRACTOR to the satisfaction of the COUNTY.
- 53.5 Damage to Existing Property, Structures and Utilities: The CONTRACTOR shall be held responsible for and shall repair all damage to pavement beyond the limits of the contract or outside the right-of-way. Also, the CONTRACTOR shall repair if damaged buildings, telephone or other cables, poles, signs, mailboxes, irrigation piping, water pipes, sanitary pipes, or other structures which may be encountered, whether or not they are shown on the Drawings. Information shown on the Drawings as to the location of existing utilities has been prepared from the most reliable data available to the Engineer. However, this information is not guaranteed, and it shall be the CONTRACTOR'S responsibility to determine the location, character, and depth of any existing utilities. The CONTRACTOR shall assist the utility companies, by every means possible, to determine said locations. The CONTRACTOR shall exercise extreme caution to eliminate any possibility of any damage to utilities resulting from his activities.
- 53.5.1 At least two (2) business days prior to excavating any section of the Work, the CONTRACTOR shall call the utility companies noted on the plans and inform them that Work on the specific section is about to commence and request that they field locate their underground utilities.
- 53.5.2 When proceeding with the Work, the CONTRACTOR shall exercise due caution to protect all underground and overhead utilities and existing structures from damage. In keeping with the Trench Safety Act, the CONTRACTOR shall provide all sheeting, shoring, and bracing that may be required to properly protect adjacent property, structures and people. The CONTRACTOR shall repair, to the satisfaction of the OWNER, any surface or subsurface Improvement damaged during the course of the Work (unless such improvement is shown to be abandoned or removed) whether or not such improvement is shown on the Drawing. Should any utilities be encountered that are not shown on the Drawing, the CONTRACTOR shall immediately notify the OWNER'S REPRESENTATIVE and shall take all due caution necessary to protect the utility.
- 53.6 Adjustment of Grades: Adjustments of grades shown on Drawings may be necessary to conform to actual field conditions or to maintain cover under proposed future grades. Such adjustments shall be considered part of the job conditions and no extra compensation will be allowed for such changes, except where specifically otherwise noted in the plans or specifications. Such adjustments must be approved by the OWNER'S REPRESENTATIVE prior to being made.
- 53.7 Existing Drainage: Existing drainage shall be maintained at all times and drainage under

construction shall be left open so as not to cause flooding due to blockage. Any damage to construction caused by this requirement shall be the responsibility of the CONTRACTOR.

53.8 Reference to Other Specifications

53.8.1 Reference to FDOT Specifications shall mean the State of Florida Department of Transportation Standard Specifications for Road and Bridge Construction dated July 2016 and supplements thereto unless specifically stated otherwise in the Contract Documents. Where an FDOT Specification section cites or contains references to other sections, they shall also be included as though cited herein. Where FDOT Specifications refer to the “Engineer”, “Engineer of Test” or “Division of Test”, it shall be understood to mean the OWNER’S REPRESENTATIVE or his designee. Where FDOT Specifications refer to the “Department”, it shall mean the Department of Transportation of Lee County, Florida.

53.8.2 In case of conflict between the referenced FDOT Specifications and the Contract Documents, the Contract Documents shall govern.

53.8.3 Reference to AASHTO and ASTM are to the latest editions of published text of the American Association of Highway and Transportation Officials and the American Society for Testing and Materials, respectively.

53.9 Shoring

53.9.1 Unless trench banks are cut back on a stable slope, sheet and brace trenches shall be used as necessary to prevent caving or sliding, to provide protection for workmen and the pipe, and to protect adjacent structures and facilities. The CONTRACTOR shall not brace sheeting against the pipe, but shall brace it so that no concentrated loads of horizontal thrust are transmitted to the pipe. If portable metal box is used for bracing the slopes, the CONTRACTOR shall take care not to disturb the pipe when the box is removed.

53.9.2 The CONTRACTOR must comply with the Trench Safety Act, Florida Statutes Sections 553.60 – 553.64. Cost of compliance is not a separate pay item. Costs shall be included in the cost of pipe placement.

53.10 Dewatering: Dewatering of excavations, trenches, structures and utilities may be required. The CONTRACTOR shall be responsible for obtaining water use permits for dewatering operations, as necessary, from the South Florida Water Management District. No separate payment will be made for dewatering operations or procurement of dewatering permits. Costs shall be included in the cost of items as included in the Bid Form.

53.11 Excess Excavated Material: Unless otherwise specified, all excavated material in excess of the needs for backfill and area fill shall become the property of the CONTRACTOR, and the CONTRACTOR shall remove same from the project.

53.12 Asphalt Paving Conference: A pre-paving conference shall be held prior to any asphalt placement. The conference is intended to closely coordinate the CONTRACTOR’S plant and site personnel with the COUNTY’S plant and field inspectors and establish expected quality assurance procedures. The CONTRACTOR shall not perform any paving prior to this conference.

53.13 Rock Excavation: All excavations for the installation of pipes, structures, foundations, or other contract items shall be unclassified and no additional or separate payment for rock excavation shall be provided nor shall additional or separate payment be made for backfill required to compensate for excavated rock material that cannot be reused as backfill.

53.14 Permits

53.14.1 Copies of permits for this project other than for dewatering or NPDES will be provided by the COUNTY.

53.14.2 The CONTRACTOR shall abide by all conditions, statutes, and regulations issued by

the jurisdiction authorities, boards and agencies of the COUNTY, State and Federal Governments. The CONTRACTOR shall be fully responsible for the execution and adherence to all directives, instructions, conditions, issuance of notices, special conditions, and limiting conditions contained in permits specifically issued for this project and which pertain to or affect the construction phase of this project. Except as may be provided elsewhere in these documents, the cost of materials, supplies, labor testing, permit fees and other direct or indirect expenses required to abide by or execute conditions of the permits shall be paid for by the CONTRACTOR. There is no direct or specific payment item in the bid for cost due to compliance with said permits. The CONTRACTOR'S reimbursement for said costs shall be distributed within the various items of work and materials associated with the construction of the project.

- 53.15 Field Office: CONTRACTOR is not required to provide a field office within the project limits as long as CONTRACTOR has a field office within Lee, Collier or Charlotte County prior to bidding. If CONTRACTOR does not have an established office within Lee, Collier or Charlotte County, then the CONTRACTOR shall provide and staff a field office within the project limits for the entire project duration, per FDOT requirements. This item shall be compensated under the mobilization item and no separate payment will be made. The CONTRACTOR shall coordinate the location of this field office with the Lee County Project Manager prior to the issuance of the Notice to Proceed.

54 Computation of Time

- 54.1 When any period of 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 on a day made a legal holiday by the law of the applicable jurisdiction, such day will be omitted from the computation.

55 Maintenance of Records

- 55.1 The CONTRACTOR shall keep adequate records and supporting documents applicable to this contractual matter. Said records and documentation will be retained by the CONTRACTOR for a minimum of five years from the date of termination of this Contract. The COUNTY and its authorized agents shall have the right to audit, inspect and copy records and documentation as often as the COUNTY deems necessary during the period of this Contract and during the period of five years thereafter; provided, however, such activity shall be conducted only during normal business hours. The COUNTY, during the period of time expressed by the preceding sentence, shall also have the right to obtain a copy of, and otherwise inspect, any audit made at the direction of the CONTRACTOR as concerns the aforesaid records and documentation.
- 55.2 Vendor specifically acknowledges its obligations to comply with §119.0701, F.S., with regard to public records, and shall:
- 55.2.1 keep and maintain public records that ordinarily and necessarily would be required by the County in order to perform the services required under this Agreement;
 - 55.2.2 provide the public with access to public records on the same terms and conditions that the County would provide the records and at a cost that does not exceed the cost provided in Chapter 119, Florida Statutes, or as otherwise provided by law;
 - 55.2.3 ensure that public records that are exempt or confidential and exempt from public records disclosure requirements are not disclosed, except as authorized by law; and
 - 55.2.4 meet all requirements for retaining public records and transfer, at no cost to the County, all public records in possession of Vendor upon termination of this Agreement and destroy any duplicate public records that are exempt or confidential and exempt from public records disclosure requirements. All records stored

electronically must be provided to the County in a format that is compatible with the information technology system of the County.

55.3 **IF THE VENDOR HAS QUESTIONS REGARDING THE APPLICATION OF CHAPTER 119, FLORIDA STATUTES, TO THE VENDOR'S DUTY TO PROVIDE PUBLIC RECORDS RELATING TO THE CONTRACT, CONTACT THE CUSTODIAN OF PUBLIC RECORDS AT 239-533-2221, 2115 SECOND STREET, FORT MYERS, FL 33901, <http://www.leegov.com/publicrecords>.**

56 Federal Requirements

56.1 In the event this Contract is paid in whole or in part from any Federal Governmental agency or source, the specific terms, regulations and requirements governing the disbursement of these funds are incorporated by reference and made a part of this Contract as if attached hereto and become a part of this clause.

End of General Conditions Section

SCOPE OF WORK AND SPECIFICATIONS

1. GENERAL SCOPE OF WORK

- 1.1 Lee County Board of County Commissioners and the Utilities Department seek to contract with a qualified Contractor to provide necessary services to complete the upgrading of the Programmable Logic Controller (PLC), replace valves and actuators and install access platforms for the Fiesta Village Waste Water Treatment Plant (WWTP) Filter Area. Included in this scope is the demolition of the existing PLC panel, fiber optic cable, valve control panels and valves and actuators. Additionally, included is all PLC and Human-Machine Interface (HMI) programming, testing, commissioning and training required for proper operation of the filters.
- 1.2 All programming shall be completed in PLC ladder logic; no other language will be accepted unless written approval is provided by the County sponsoring Department.
- 1.3 The scope of work is further defined and detailed within the attached specifications package titled *Contract Documents and Technical Specifications* affixed to this solicitation package as well as within the plans associated with this project. Bidders are responsible for reviewing all documentation associated with this project.

2. AWARD

- 2.1 The basis of award shall be determined by the lowest *Project Total Bid* of the most responsive, responsible, and qualified Bidder meeting all bid specifications.
- 2.2 The County reserves the right to award to the contractor whose prices, in its sole judgment, are the most realistic in terms of provision of the best services and in the best interest of the County. Additionally, the County reserves the right to reject any and all bids at any time, unconditionally, and without cause.
- 2.3 The County reserves the right to reject any bids or portion of the bid with just cause, which shall include, but not be limited to an “unbalanced bid”, to the detriment of the County. An “unbalanced bid” shall include: excessive unit pricing, other unfair pricing for materials or labor, or a disproportionate allocation of cost to the County for the actual construction performed.

End of Scope of Work and Specifications Section

SUPPLEMENTAL INFORMATION

None.

End of Supplemental Information Section

REQUIRED FORMS

INVITATION TO BID

These forms are required and should be submitted with all submissions. If it is determined that forms in this selection are not applicable to your company or solicitation they should be marked “N/A or Not Applicable” across the form in large letters and returned with your submission package. **Note:** If submitting via hard copy the original must be a manually signed original. Include additional copies, if specified, in the Solicitation documents.

Form # Title/Description

1 Solicitation Response Form

All signatures must be by a corporate authorized representative, witnessed, and corporate and/or notary seal (as applicable.) The corporate or mailing address must match the company information as it is listed on the Florida Department of State Division of Corporations. Attach a copy of the web-page(s) from <http://www.sunbiz.org> as certification of this required information. Sample attached for your reference.

Verify that all addenda and tax identification number have been provided.

1a Bid/Proposal Form

This form is used to provide itemization of project cost. A more detailed “schedule of values” may be requested by the County

1b Business Relationship Disclosure Requirement (as applicable)

Sections 112.313(3) and 112.313(7), FL §, prohibit certain business relationships on the part of public officers and employees, their spouses, and their children. If this **disclosure is applicable request form “INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS” (Required by 112.313(12)(b), FL § (1983))** to be completed and **returned with solicitation response. It is the Bidder’s responsibility to request form and disclose this relationship, failure to do so could result in being declared non-responsive.**

NOTICE: UNDER THE PROVISIONS OF FL § 112.317 (1983), A FAILURE TO MAKE ANY REQUIRED DISCLOSURE CONSTITUTES GROUNDS FOR AND MAY BE PUNISHED BY ONE OR MORE OF THE FOLLOWING: IMPEACHMENT, REMOVAL OR SUSPENSION FROM OFFICE OR EMPLOYMENT, DEMOTION, REDUCTION IN SALARY, REPRIMAND, OR A CIVIL PENALTY NOT TO EXCEED \$5,000.00.

2 Affidavit Certification Immigration Laws

Form is acknowledgement that the Bidder is in compliance in regard to Immigration Laws.

3 Reference Survey

Provide this form to reference respondents. For Bids, this form will be requested from the apparent low Bidder prior to the award. (not required to submit with bid)

1. **Section 1:** Bidder/Proposer to complete with reference respondent’s information prior to providing to them for their response. (This is **not** the Bidder/Proposer’s information.)
2. **Section 2:** Enter the name of the Bidder/Proposer; provide the project information in which the reference respondent is to provide a response.
3. The reference respondent should complete “**Section 3.**”
4. **Section 4:** The reference respondent to print and sign name
5. **Reference responses** are to be provided upon request.
6. Failure to obtain reference surveys may make your company non-responsive.

4 *Negligence or Breach of Contract Disclosure Form*

The form may be used to disclose negligence or breach of contract litigation that your company may have been a part of over the past ten (10) years. You may need to duplicate this form to list all history. If the Bidder has more than ten (10) lawsuits, you may narrow them to litigation of the company or subsidiary submitting the Solicitation Response. Include, at a minimum, litigation for similar projects completed in the State of Florida. Final outcome should include in whose favor the litigation was settled and whether a monetary amount was awarded. The settlement amount may remain anonymous. If you have **no litigation**, enter **“None”** in the first **“type of incident”** block of the form. Please do not write N/A on this form.

5 *Affidavit Principal Place of Business*

Certifies Bidder’s location information.

6 *Sub-Contractor List* (as applicable)

To be completed and returned when sub-contractors are to be utilized and are known at the time of the submission.

7 *Public Entity Crime Form*

Any person or affiliate as defined by statute who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid or a contract to provide any goods or services to the County; may not submit a bid on a contract with the County for the construction or repair of a public building or a public work; may not submit bids or leases of real property to the County; may not be awarded or perform works as a contractor, supplier, subcontractor, or consultant under a contract with the County, and may not transact business with the County in excess of \$25,000.00 for a period of 36 months from the date of being placed on the convicted vendor list.

8 *Trench Safety*

Self explanatory.

9 *Bid Bond* (as applicable)

Self explanatory

10 *Minimum Qualifications Form*

11 *Signing Authority*

Bid/Proposal Label

Self explanatory. Please affix to the outside of the sealed submission documents.

Include any licenses or certifications requested (as applicable)

Local Business Tax Account (as applicable) issued by City and/or County entity. This is necessary for all Florida vendors.

It is the Bidder’s responsibility to insure the Solicitation Response is mailed or delivered in time to be received no later than the specified opening date and time. (If solicitation is not received prior to deadline it cannot be considered or accepted.)



LEE COUNTY PROCUREMENT MANAGEMENT
SOLICITATION RESPONSE FORM

Date Submitted: _____ Deadline Date: 4/25/2018

SOLICITATION IDENTIFICATION: B180193LAC

SOLICITATION NAME: Fiesta Village WWTP Filter Controls Upgrade

COMPANY NAME: _____

NAME & TITLE: (TYPED OR PRINTED) _____

BUSINESS ADDRESS: (PHYSICAL) _____

CORPORATE OR MAILING ADDRESS: _____

[] SAME AS PHYSICAL

ADDRESS MUST MATCH SUNBIZ.ORG

E-MAIL ADDRESS: _____

PHONE NUMBER: _____ FAX _____

NOTE REQUIREMENT: IT IS THE SOLE RESPONSIBILITY OF THE BIDDER/PROPOSER TO CHECK LEE COUNTY PROCUREMENT MANAGEMENT WEB SITE FOR ANY ADDENDA ISSUED FOR THIS PROJECT. THE COUNTY WILL POST ADDENDA TO THIS WEB PAGE, BUT WILL NOT NOTIFY.

By responding to this sealed solicitation, the Bidder/Proposer makes all representations required by the instructions and further warrants and represents that: Bidder/Proposer has examined copies of all the solicitation documents and of the following addenda:

No. _____ Dated: _____ No. _____ Dated: _____ No. _____ Dated: _____
No. _____ Dated: _____ No. _____ Dated: _____ No. _____ Dated: _____

Tax Payer Identification Number: _____

(1) Employer Identification Number -OR- (2) Social Security Number:

** Lee County collects your social security number for tax reporting purposes only

Please submit a copy of your registration from the website www.sunbiz.org establishing your firm as authorized (including authorized representatives) to conduct business in the State of Florida, as provided by the Florida Department of State, Division of Corporations. (a sample is attached for your reference)

1 Collusion Statement: Lee County, Florida The undersigned, as Bidder/Proposer, hereby declares that no person or other persons, other than the undersigned, are interested in this solicitation as Principal, and that this solicitation is submitted without collusion with others; and that we have carefully read and examined the specifications or scope of work, and with full knowledge of all conditions under which the services herein is contemplated must be furnished, hereby bid/propose and agree to furnish this service according to the requirements set out in the solicitation documents, specifications or scope of work for said service for the prices as listed on the county provided price sheet or (CCNA) agree to negotiate prices in good faith if a contract is awarded.

2 Scrutinized Companies Certification: Section 287.135, FL §, "Prohibition against contracting with scrutinized companies." Prohibits agencies from contracting with companies, for goods or services over \$1,000,000, that are on the Scrutinized Companies with Activities in Sudan List, the Scrutinized Companies with Activities in the Iran Petroleum Energy Sector List, Scrutinized Companies that Boycott Israel List, have been engaged in a boycott of Israel, or been engaged in business operations in Cuba or Syria. The County reserves the right to review, on a case-by-case basis, and waive this stipulation if it is deemed to advantageous to the County. As the person authorized to sign on behalf of Respondent, I hereby certify that the company identified above is in compliance with Section 287.135, FL §. I understand that submission of a false certification may subject company to contract termination, civil penalties, attorney's fees, and/or costs.

Form#1 – Solicitation Form, Page 2

3 Business Relationship Disclosure Requirement: Sections 112.313(3) and 112.313(7), FL §, prohibit certain business relationships on the part of public officers and employees, their spouses, and their children. See Part III, Chapter 112, FL §, and/or the brochure entitled "A Guide to the Sunshine Amendment and Code of Ethics for Public Officers, Candidates and Employees" for more details on these prohibitions. However, Section 112.313(12), FL § (1983), provides certain limited exemptions to the above-referenced prohibitions, including one where the business is awarded under a system of sealed, competitive bidding; the public official has exerted no influence on bid negotiations or specifications; and where disclosure is made, prior to or at the time of the submission of the bid, of the official's or his spouse's or child's interest and the nature of the intended business. The Commission on Ethics has promulgated this form for such disclosure, if and when applicable to a public officer or employee.

If this disclosure is applicable request form "INTEREST IN COMPETITIVE BID FOR PUBLIC BUSINESS" (Required by 112.313(12)(b), FL § (1983)) to be completed and returned with solicitation response. It is the bidder/proposer's responsibility to disclose this relationship, failure to do so could result in being declared non-responsive.

Business Relationship Applicable (request form) **Business Relationship NOT Applicable**

4 Disadvantaged Business Enterprise (DBE) bidder/proposer? If yes, please attach a current certificate. Yes No

ALL SUBMISSIONS MUST BE EXECUTED BY AN AUTHORIZED AUTHORITY OF THE BIDDER/PROPOSER, WITNESSED AND SEALED (AS APPLICABLE)

Company Name <i>(Name printed or typed)</i>	<div style="border: 1px solid black; width: 100%; height: 100%;"></div>
Authorized Representative Name <i>(printed or typed)</i>	(Affix Corporate Seal, as applicable)
Authorized Representative's Title <i>(printed or typed)</i>	Witnessed/Attested by: <i>(Witness/Secretary name and title printed or typed)</i>
Authorized Representative's Signature	Witness/Secretary Signature

Any blank spaces on the form(s), qualifying notes or exceptions, counter offers, lack of required submittals, or signatures, on County's Form may result in the submission being declared non-responsive by the County.

Detail by Entity Name

Florida Profit Corporation

Bill's Widget Corporation

Filing Information

Document Number 655555
 FE/EIN Number 5111111111
 Date Filed 09/22/1980
 State FL
 Status ACTIVE
 Last Event AMENDED AND RESTATED ARTICLES
 Event Date Filed 07/25/2006
 Event Effective Date NONE

Principal Address

555 N Main Street
 Your Town, USA 99999
 Changed 02/11/2012

Verify either Principal or Mailing address is on Form 1

Mailing Address

555 N Main Street
 MYour Town, USA 99999
 Changed 02/11/2012

Registered Agent Name & Address

My Registered Agent
 111 Registration Road
 Registration, USA 99999
 Name Changed: 12/14/2006
 Address Changed: 12/14/2006

Officer/Director Detail

Name & Address

Title P
 President, First
 555 AVENUE
 Anytown, USA 99999
 Title V
 President, Second
 555 AVENUE
 Anytown, USA 99999

IMPORTANT:

For corporations, ALL documents must be signed by the president of the company or an authorized individual. For any individual other than the president, we will need one of the following to confirm their authority to sign:

1. a corporate resolution by the Board of Directors, or
2. an extract of minutes, or
3. an extract of Vote by the Board of Directors

If the company's articles of incorporation identify additional positions that have the power to bind the corporation, we will accept the articles of incorporation with verification from the president that a certain individual serves in that role (e.g., the president confirms that John Doe is the CEO, and the articles of incorporation provide that the CEO has the power to bind the company).

With respect to an LLC, the authority to bind a limited liability company is controlled by Florida statutes. Managers or managing members have inherent authority to bind an LLC.

If the president of a corporation or a manager/managing member of an LLC delegates their authority, such delegation must be sent to us on company letterhead with the President's or manager's/managing member's original, wet signature.

v01/03/2018



Company Name: _____

Solicitation # B180193LAC Solicitation Name Fiesta Village WWTP Filter Controls Upgrade

This page serves as a header/placeholder only. Please refer to the Excel document provided with the solicitation for the complete Bid Schedule. The Excel document contains formulas for convenience, however it is the Contractor’s responsibility to verify all pricing and calculations are CORRECT. Lee County is not responsible for errors in formulas or calculations contained within Excel document(s).

REMINDERS:

In the event there is a discrepancy between the total quoted amount or the extended amounts and the unit prices quoted, the unit prices will prevail and the corrected sum will be considered the quoted price. Unit prices shall be rounded to the nearest whole penny.

The County will only accept bids submitted on bid forms provided by the County. Bids submitted on other forms, other than those provided by the County, will deem Bidder as non-responsive and ineligible for award.

Bidders may not adjust or modify data provided within the Bid Schedule. Bids received with modified data may deem the Bidder as non-responsive and ineligible for award.

PLEASE ENSURE you have provided a printed copy of the Bid Schedule with your hard copy submission packages and provided the excel version with your digital submission package.

Pricing shall be inclusive of all labor, equipment, supplies, overhead, profit, materials, and any other incidental costs required to perform and complete all work as specified herein.



LEE COUNTY
S O U T H W E S T F L O R I D A

AFFIDAVIT CERTIFICATION IMMIGRATION LAWS

SOLICITATION NO.: B180193LAC SOLICITATION NAME: Fiesta Village WWTP Filter Controls Upgrade

LEE COUNTY WILL NOT INTENTIONALLY AWARD COUNTY CONTRACTS TO ANY CONTRACTOR WHO KNOWINGLY EMPLOYS UNAUTHORIZED ALIEN WORKERS, CONSTITUTING A VIOLATION OF THE EMPLOYMENT PROVISIONS CONTAINED IN 8 U.S.C. SECTION 1324 a(e) {SECTION 274A(e) OF THE IMMIGRATION AND NATIONALITY ACT (“INA”).

LEE COUNTY MAY CONSIDER THE EMPLOYMENT BY ANY CONTRACTOR OF UNAUTHORIZED ALIENS A VIOLATION OF SECTION 274A(e) OF THE INA. **SUCH VIOLATION BY THE RECIPIENT OF THE EMPLOYMENT PROVISIONS CONTAINED IN SECTION 274A(e) OF THE INA SHALL BE GROUNDS FOR UNILATERAL CANCELLATION OF THE CONTRACT BY LEE COUNTY.**

BIDDER/PROPOSER ATTESTS THAT THEY ARE FULLY COMPLIANT WITH ALL APPLICABLE IMMIGRATION LAWS (SPECIFICALLY TO THE 1986 IMMIGRATION ACT AND SUBSEQUENT AMENDMENTS).

Company Name: _____

Signature	Title	Date

STATE OF _____
COUNTY OF _____

The foregoing instrument was signed and acknowledged before me this _____ day of _____
20____, by _____ who has produced
(Print or Type Name)
_____ as identification.
(Type of Identification and Number)

Notary Public Signature

Printed Name of Notary Public

Notary Commission Number/Expiration

The signee of this Affidavit guarantee, as evidenced by the sworn affidavit required herein, the truth and accuracy of this affidavit to interrogatories hereinafter made. **LEE COUNTY RESERVES THE RIGHT TO REQUEST SUPPORTING DOCUMENTATION, AS EVIDENCE OF SERVICES PROVIDED, AT ANY TIME.**



Lee County Procurement Management

REFERENCE SURVEY

Solicitation # B180193LAC

Fiesta Village WWTP Filter Controls Upgrade

Section 1	Reference Respondent Information	Please return completed form to:	
FROM:	_____	Bidder/Proposer:	
COMPANY:	_____	Due Date:	
PHONE #:	_____	Total # Pages:	1
FAX #:	_____	Phone #:	Fax #:
EMAIL:	_____	Bidder/Proposer E-Mail:	

Section 2	Enter Bidder/Proposer Information , as applicable Similar Performed Project (Bidder/Proposer to enter details of a project performed for above reference respondent)		
Bidder/Proposer Name:	_____		
Reference Project Name:	Project Address:	Project Cost:	
Summarize Scope:	_____		

You as an individual or your company has been given as a reference on the project identified above. Please provide your responses in section 3 below.

Section 3	Indicate: "Yes" or "No"
1. Did this company have the proper resources and personnel by which to get the job done?	
2. Were any problems encountered with the company's work performance?	
3. Were any change orders or contract amendments issued, other than owner initiated?	
4. Was the job completed on time?	
5. Was the job completed within budget?	
6. On a scale of one to ten, ten being best, how would you rate the overall work performance, considering professionalism; final product; personnel; resources. Rate from 1 to 10. (10 being highest)	
7. If the opportunity were to present itself, would you rehire this company?	
8. Please provide any additional comments pertinent to this company and the work performed for you:	

Section 4

Reference Name (Print Name) _____

Please submit non-Lee County employees as references

Reference Signature _____



**ALLEGED NEGLIGENCE OR BREACH OF CONTRACT
DISCLOSURE FORM**

Please fill in the form below. Provide each incident in regard to alleged negligence or breach of contract that has occurred over the past 10 years.

Please complete in chronological order with the most recent incident on starting on page 1.

Company Name: _____

Type of Incident <i>Alleged Negligence or Breach of Contract</i>	Incident Date And Date Filed	Plaintiff <i>(Who took action against your company)</i>	Case Number	Court <i>County/State</i>	Project	Claim Reason <i>(initial circumstances)</i>	Final Outcome <i>(who prevailed)</i>

Make as many copies of this sheet as necessary in order to **provide a 10 year history** of the requested information. If there is no action pending or action taken in the last 10 years, complete the **company name** and write **“NONE”** in the first **“Type of Incident”** box of this page and return with your submission package. This form should also include the primary partners listed in your submission. Do not include litigation with your company as the plaintiff. Final outcome should include who prevailed and what method of settlement was made. If a monetary settlement was made the amount may remain anonymous. **Please do not modify this form (expansion of spacing allowed) or submit your own variation.**

Page Number: _____ Of _____ Total pages

Update the page number to reflect the current page and the total number of pages. Example: Page 3, of 5 total submitted pages of this form.



LEE COUNTY

SOUTHWEST FLORIDA

AFFIDAVIT PRINCIPAL PLACE OF BUSINESS

Instructions: Please complete all information that is applicable to your firm

Company Name: _____

Printed name of authorized signer _____

Title _____

⇒
Authorized Signature _____

Date _____

The signee of this Affidavit guarantee, as evidenced by the sworn affidavit required herein, the truth and accuracy of this affidavit to interrogatories hereinafter made. **LEE COUNTY RESERVES THE RIGHT TO REQUEST SUPPORTING DOCUMENTATION, AS EVIDENCE OF SERVICES PROVIDED, AT ANY TIME.**

Notary:

State of _____

County of _____

The foregoing instrument was signed and acknowledged before me this _____ day of _____

20 _____, _____ who has produced

_____ as identification (or personally known)
Type of ID and number

⇒
Notary Public Signature _____

Notary Commission Number and expiration _____

1. Principal place of business is located within the boundaries of: _____ Lee County
_____ Collier County
_____ Non-Local

Local Business Tax License # _____

2. Address of Principal Place of Business: _____

3. Number of years at this location _____ years

4. Have you provided goods or services to Lee County on a regular basis within the past 3 consecutive years _____ Yes* _____ No *If yes, attach contractual history for past 3 consecutive years

5. Number of available employees for this contract _____

6. Does your company have a Drug Free Workplace Policy _____ Yes _____ No

This form must be signed and sworn to in the presence of a notary public or other officer authorized to administer oaths.

1. This sworn statement is submitted to _____
(Print name of the public entity)

by _____
(Print individual's name and title)

for _____
(Print name of entity submitting sworn statement)

whose business address is _____

(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: On the attached sheet.) Required as per IRS Form W-9.

2. I understand that a "public entity crime" as defined in Paragraph 287.133(1) (g), Florida Statutes, means a violation of any state or federal law by a person with respect to and directly related to the transaction of business with any public entity or with an agency or political subdivision of any other state or with the United States, including but not limited to, and bid or contract for goods or services to be provided to any public entity or agency or political subdivision or any other state or of the United States, and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.

3. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1) (b), Florida Statutes, means a finding of guilt or a conviction of a public entity crime, with or without an adjudication of guilt, in any federal or state trial court of record relating to charges brought by indictment or information after July 1, 1989, as a result of a jury verdict, nonjury trial, or entry of a plea of guilty or nolo contendere.

4. I understand that "affiliate" as defined in Paragraph 287.133(1)(a), Florida Statutes, means:
1. A predecessor or successor of a person convicted of a public entity crime:
or:
2. An entity under the control of any natural person who is active in the management of the entity and who has been convicted of a public entity crime. The term "affiliate" includes those offices, directors, executives, partners, shareholders, employees, members and agents who are active in the management of the affiliate. The ownership by one person of shares constituting a controlling interest in another person, or a pooling of equipment or income among persons when not fair market value under an arm's length Agreement/Contract, shall be a facie case that one person controls another person. A person who knowingly enters into a joint venture with a person who has been convicted of a public entity crime in Florida during the preceding 36 months shall be considered an affiliate.

5. I understand that a "person" as defined in Paragraph 287.133(1) (c), Florida Statutes, means any natural person or entity organized under the laws of any state or of the United States with the legal power to enter a binding contract and which bids or applies to bid on contracts for the provision of goods or services let by a public entity, or which otherwise transacts or applies to transact business with a public entity. The term "person" includes those officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of the entity.

6. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting those sworn statement. (Please indicate which statement applies.)

_____ Neither the entity submitted this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, and agents who are active in management of an entity nor affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989.

Public Entity Crime Form

_____ The entity submitting this sworn statement, or one or more of the officers, directors, executives, partners, shareholders, employees, member, or agents who are active in management of the entity, or an affiliate of the entity have been charged with and convicted of a public entity crime subsequent to July 1, 1989.

_____ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, member, or agents who are active in management of the entity, or an affiliate of the entity has been charged with and convicted of a public entity crime subsequent to July 1, 1989. However, there has been subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearing and the Final Order entered by the Hearing Officer determined that it was not in the public interest to place the entity submitting this sworn statement on the convicted vendor list. (Attach a copy of the final order)

I UNDERSTAND THAT THE SUBMISSION OF THIS FORM TO THE CONTRACTING OFFICER FOR THE PUBLIC ENTITY IDENTIFIED IN PARAGRAPH 1 (ONE) ABOVE IS FOR THAT PUBLIC ENTITY ONLY AND, THAT THIS FORM IS VALID THROUGH DECEMBER 31 OF THE CALENDAR YEAR IN WHICH IS FILED. I ALSO UNDERSTAND THAT I AM REQUIRED TO INFORM THE PUBLIC ENTITY PRIOR TO ENTERING INTO A CONTRACT IN EXCESS OF THE THRESHOLD AMOUNT PROVIDED IN SECTION 287.017, FLORIDA STATUTES, FOR CATEGORY TWO OR ANY CHANGE IN THE INFORMATION CONTAINED IN THIS FORM.

(Signature)

(Date)

STATE OF _____
COUNTY OF _____

PERSONALLY APPEARED BEFORE ME, the undersigned authority, _____

(Name of individual signing)

who, after first being sworn by me, affixed his/her signature in the space provided above on this _____ day of _____, 2_____.

(NOTARY PUBLIC)

My Commission Expires: _____

TRENCH SAFETY

Contractor/Vendor acknowledges that included in the appropriate solicitation items of the solicitation and in the Total solicitation price are costs for complying with the Florida Trench Safety Act (90-96, Laws of Florida) effective October 1, 1990. The contractor/vendor further identifies the costs of such compliance to be summarized below:

Trench Safety Measure (Description)	Units of Measure (LF, SF)	Unit (Quantity)	Unit Cost	Extended Cost
.....				
A. _____	_____	_____	_____	_____
B. _____	_____	_____	_____	_____
C. _____	_____	_____	_____	_____
D. _____	_____	_____	_____	_____
TOTAL \$ _____				

If applicable, the contractor/vendor certifies that all trench excavation done within his control in excess of five (5') feet in depth shall be in accordance with the Florida Department of Transportation's Special Provisions Article 125-1 and Sub-article 125-4.1 (TRENCH EXCAVATION SAFETY SYSTEM AND SHORING, SPECIAL-TRENCH EXCAVATION).

Failure to complete the above may result in the solicitation being declared non-responsive.

(Signature)

(Company Name)

STATE OF _____
COUNTY OF _____

The foregoing instrument was acknowledged before me this ____ day of _____ by _____ (*name and title of corporate officer*) of _____ (*name of corporation*), a _____ (*state or place of incorporation*) corporation, on behalf of the corporation. He/she is personally known to me or has produced _____ (*type of identification*) as identification.

(signature line for notary public)

(name of notary typed, printed or stamped)

(title or rank)

My commission expires: _____
_____ (*serial number, if any*)

BID BOND

Complete EITHER Lee County Paper Bid Bond OR provide cashier's check

KNOW ALL MEN BY THESE PRESENTS, that we

_____ as Principal, and
(BIDDER'S Name)
_____ a Corporation licensed to do
(Surety's Name)

business under the laws of the State of Florida as a Surety, are held and firmly bound unto LEE COUNTY BOARD OF COUNTY COMMISSIONERS, LEE COUNTY, FLORIDA, a Political Subdivision of the State of Florida,
in the SUM OF _____
for the payment whereof, well and truly to be made, we bind ourselves, our heirs, successors, personal representatives and assigns, jointly and severally, firmly, by these presents.

SIGNED AND SEALED this _____ day of _____, _____

WHEREAS, said Principal is herewith submitting a Bid/Proposal for the project known as:

B180193LAC, Fiesta Village WWTP Filter Controls Upgrade

NOW, THEREFORE, the condition of the above obligation is such that if said Principal shall be awarded the Contract upon said Bid/Proposal within the specified time and shall enter into a written Contract, satisfactory in form, provide an acceptable Public Payment & Performance Bond from a Surety acceptable to the COUNTY and provide other Insurance as may be required to the COUNTY within seven (7) calendar days after the written Notice of Award date, or within such extended period as the COUNTY may grant, then this obligation shall be null and void; otherwise said Principal and Surety shall pay to said COUNTY in money the difference between the amount of the Bid of said Principal and the amount for which said COUNTY may legally contract with another party to perform said work, if the latter amount be in excess of the former, together with any expenses and reasonable attorney's fees incurred by said COUNTY if suit be brought here on, but in no event shall said Surety's liability exceed the penal sum hereof plus such expenses and attorney's fees. For purposes of unsuccessful bid protests filed by the Principal herein, this obligation shall bind the Surety to pay costs and damages associated with the bid protest or delays to the project upon a finding from the Board of County Commissioners for Lee County that the bid protest was frivolous and/or lacked merit. The liability of the Surety shall not exceed the penal sum of the bid bond.

Witness as to Principal: _____ (SEAL)
(Principal)

(By) Printed Name

Witness as to Surety: _____ (SEAL)
(Surety's Name)

(By-As Attorney-in-Fact, Surety)

Affix Corporate Seals and attach proper Power of Attorney for Surety.

Form 10: Minimum Qualifications Requirements



MINIMUM QUALIFICATION REQUIREMENTS
FOR
B180193LAC, Fiesta Village WWTP Filter Controls Upgrade

Bidder(s)/Proposer(s) must meet the minimum qualification requirements as specified in the following form to qualify for consideration of award. This form must be completed and returned with the proposal submittal along with any supporting documentation where requested and/or indicated herein.

The County reserves the right, in their sole judgment, to determine to its satisfaction whether the Bidder(s)/Proposer(s) has met the minimum qualification requirements as specified herein. The determination shall be based upon the examination of the Minimum Qualification Requirements form and associated supportive documentation (if any requested).

An affirmative determination shall be a prerequisite for award of the contract to the Bidder(s)/Proposer(s). A negative determination shall result in disqualification of the proposal, in which event the County shall exclude the proposal from the evaluation or consideration process and therefore deeming the Bidder(s)/Proposer(s) ineligible for award.

1. CRITERIA 1 – Citect Certified SCADA Engineer (CCSE): Prime Contractor must have at least one staff personnel assigned to this project that is a Citect Certified SCADA Engineer (CCSE) through the Schneider Electric Certified Expert Program.

Does your Firm have at have at least one staff personnel assigned to this project that is a Citect Certified SCADA Engineer (CCSE) through the Schneider Electric Certified Expert Program?

_____ **YES** _____ **NO**

If YES, provide details as requested below:

- Provide name and a copy of the personnel’s valid CCSE certification.
 - o Failure to provide evidence of valid CCSE certification may deem your firm as non-responsive.

Name of CCSE Certified personnel assigned to project: _____

Authorized Bidder/Proposer Signature

Date:

Authorized Bidder/Proposer Name (Print or Type)

Form 11: Signatory Authorization Affidavit



Lee County Procurement Management Signatory Authorization Affidavit

Date: April 25, 2018 Solicitation No.: B180193LAC

Solicitation Name: Fiesta Village WWTP Filter Controls Upgrade

AUTHORIZATION: The following individuals are hereby authorized, as representatives of the Bidder/Proposer, identified below, to execute legally binding documents on behalf of the Bidder/Proposer. The signee of this Affidavit guarantees, as evidenced by the sworn affidavit required herein, the truth and accuracy of this affidavit to interrogatories hereinafter made. Lee County reserves the right to request supporting documentation, as evidence of services provided, at any time.

INSTRUCTIONS: This Authorization Affidavit shall only be executed by the following:

- Corporation: President
• LLC: Managing Member
• Sole Proprietor: Owner

Attach corporate designation documentation, if applicable.

Bidder/Proposer:

Table with 2 columns: Authorized Signatory Name, Title. Three empty rows for entry.

By execution of this document, I hereby authorize the individuals shown above to execute legally binding documents on behalf of the Bidder/Proposer. I further acknowledge that it shall be my responsibility to provide an updated Signatory Authorization Affidavit upon any change in authorization to the Lee County Procurement Management Department, Attention: Procurement Management Director, 1500 Monroe Street, 4th Floor, Fort Myers, FL 33901.

Signature Title Date

STATE OF
COUNTY OF

The foregoing instrument was signed and acknowledged before me this day of 20 who produced the following as identification

(type Identification and number or personally known)

Notary Public Signature Printed Name of Notary Public Commission Number/Expiration

Page ___ of ___ *Duplicate this page for additional names. An original signature is required on each page.

Sealed Bid Label

Cut along the outer border and affix this label to your sealed solicitation envelope to identify it as a "Sealed Bid".

SEALED BID DOCUMENTS • DO NOT OPEN	
BID NO.:	B180193LAC
BID TITLE:	Fiesta Village WWTP Filter Controls Upgrade
DATE DUE:	Wednesday, April 25, 2018
TIME DUE:	Prior to: 2:30 PM
SUBMITTED BY:	_____ (Name of Company)
e-mail address	Telephone
DELIVER TO:	Lee County Procurement Management 1500 Monroe 4 th Floor Fort Myers FL 33901
<i>Note: submissions received after the time and date above will not be accepted.</i>	



Lee County Procurement Management
1500 Monroe Street, 4th Floor
Fort Myers, FL 33901
(239) 533-8881
www.leegov.com/procurement

PLEASE PRINT CLEARLY

CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

LEE COUNTY FIESTA VILLAGE WWTP FILTER PLC UPGRADE ENGINEERING

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

COUNTY CONTRACT NO.: 7283



ISSUE FOR BID

AUGUST 2016

Prepared by



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

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LEE COUNTY FIESTA VILLAGE WWTP FILTER PLC UPGRADE
ISSUE FOR BID SUBMITTAL
COUNTY PROJECT NO. CN140182

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END TOC

SECTION 00005 – CERTIFICATION PAGES

PROFESSIONAL ENGINEER’S CERTIFICATION FOR G. MICHAEL STOUP, P.E.

PROJECT NAME: LEE COUNTY FIESTA VILLAGE WWTP FILTER PLC UPGRADE

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

01010 Summary of Work
01025 Payments
01026 Measurement and Payment
01030 Lead Abatement
01035 Change Order and Directive Change Procedures
01040 Project Meetings
01041 Project Coordination
01045 Cutting and Patching
01051 Lines and Grades
01090 Reference Standards
01092 Abbreviations
01300 Submittals
01310 Progress Schedule
01400 Quality Control
01500 Construction Facility and Temporary Controls
01570 Traffic Regulation
01600 Material and Equipment
01670 Training
01710 Cleaning
01720 Contract Closeout
01730 Operations and Maintenance Data
01740 Warranties & Bonds
01900 Permits

DIVISION 2 - SITEWORK

02050 Demolition
02630 Ductile Iron Pipe and Fittings
02676 Leakage Tests
02999 Miscellaneous Work and Cleanup

DIVISION 9 - FINISHES

09900 Painting and Coatings

DIVISION 13 - SPECIAL CONSTRUCTION

- 13300 Instrumentation and Controls, General Requirements
- 13330 Instrumentation and Controls, Control Panels
- 13350 Instrumentation and Controls, Fiber Optic Communication System
- 13360 Instrumentation and Controls, Function Descriptions

DIVISION 15 - MECHANICAL

- 15100 Valves and Appurtenances



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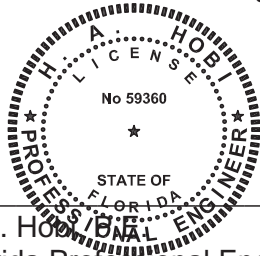
PROFESSIONAL ENGINEER'S CERTIFICATION FOR H.A. HOBI, P.E.

PROJECT NAME: LEE COUNTY FIESTA VILLAGE WWTP FILTER PLC UPGRADE

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 5 – METALS

- 05510 Metal Stairs, Ladders and Railings
- 05521 Aluminum Handrails and Railings
- 05530 Metal Grating, Trench Covers and Floor Plates



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

PROJECT NAME: LEE COUNTY FIESTA VILLAGE WWTP FILTER PLC UPGRADE

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

DIVISION 16 - ELECTRICAL

- 16050 Electrical – General Provisions
- 16110 Conduits and Fittings
- 16120 Wires and Cables – 600 Volts and Below
- 16142 Snap Switches
- 16150 Electrical Requirements for Shop Assembled Equipment
- 16195 Electrical Identification
- 16450 Grounding
- 16950 Electrical Testing Requirements



Digitally signed by Aubrey
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END OF SECTION

SECTION 01010
SUMMARY OF WORK

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description of Work
- B. CONTRACTOR's Use of Site
- C. Work Sequence
- C. Owner Occupancy

1.2 DESCRIPTION OF WORK

A. General: The Work to be done under this Contract consists of but not limited to: TO UPGRADE THE PLC, REPLACE VALVES AND ACTUATORS AND INSTALL ACCESS PLATFORMS FOR THE FIESTA VILLAGE WWTP FILTER AREA. INCLUDED IN THIS SCOPE IS THE DEMOLITION OF THE EXISTING PLC PANEL, FIBER OPTIC CABLE, VALVE CONTROL PANELS AND VALVES AND ACTUATORS. ALSO INCLUDED IS THE PROCUREMENT, FABRICATION AND INSTALLATION OF A NEW PLC PANEL, PROCUREMENT AND INSTALLATION OF NEW FIBER OPTIC CABLE IN EXISTING CONDUITS, PROCUREMENT AND INSTALLATION OF NEW VALVES AND ACTUATORS AND PROCUREMENT, FABRICATION AND INSTALLATION OF ACCESS PLATFORMS; PROCUREMENT, INSTALLATION AND CALIBRATIN OF A FLOAT SWITCH IN THE GALLEY. ALL WIRE WILL BE REPLACED. ADDITIONALLY, ALL PLC AND HMI PROGRAMMING, TESTING, COMMISSIONING AND TRAINING REQUIRED FOR PROPER OPERATION OF THE FILTERS IS INCLUDED IN THIS SCOPE OF WORK. COORDINATION OF THE OUTAGE SEQUENCE FOR EXECUTION OF THE PROJECT WILL BE WITH LEE COUNTY UTILITIES.

B. The Work includes:

1. Furnishing of all labor, material, superintendence, plant, power, light, heat, fuel, water, tools, appliances, equipment, supplies, services and other means of construction necessary or proper for performing and completing the Work.
2. Sole responsibility for adequacy of plant and equipment.
3. Maintaining the Work area and site in a clean and acceptable manner.
4. Maintaining existing facilities in service at all times except where specifically provided for otherwise herein.

5. Protection of finished and unfinished Work.
 6. Repair and restoration of Work damaged during construction.
 7. Furnishing as necessary proper equipment and machinery, of a sufficient capacity, to facilitate the Work and to handle all emergencies normally encountered in Work of this character.
 8. Furnishing, installing, and protecting all necessary guides, track rails, bearing plates, anchor and attachment bolts, and all other appurtenances needed for the installation of the devices included in the equipment specified. Make anchor bolts of appropriate size, strength and material for the purpose intended. Furnish substantial templates and shop drawings for installation.
- C. Implied and Normally Required Work: It is the intent of these Specifications to provide the OWNER with complete operable systems, subsystems and other items of Work. Any part or item of Work which is reasonably implied or normally required to make each installation satisfactorily and completely operable is deemed to be included in the Work and the Contract Amount. All miscellaneous appurtenances and other items of Work incidental to meeting the intent of these Specifications are included in the Work and the Contract Amount even though these appurtenances may not be specifically called for in these Specifications.
- D. Quality of Work: Regard the apparent silence of the Contract Documents 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 as meaning that only the best general practice is to prevail and that only materials and workmanship of the best quality are to be used. Interpretation of these specifications will be made upon this basis.

1.3 CONTRACTOR'S USE OF SITE

- A. In addition to the requirements of the General Conditions, limit use of site and premises for work and storage to allow for the following:
1. Coordination of the Work under this CONTRACT with the work of the other contractors where Work under this CONTRACT encroaches on the Work of other contractors.
 2. OWNER occupancy and access to operate existing facilities.
 3. Coordination of site use with ENGINEER.
 4. Responsibility for protection and safekeeping of products under this CONTRACT.
 5. Providing additional off site storage at no additional cost to OWNER as needed.

1.4 WORK SEQUENCE

- A. Construct Work in stages to accommodate OWNER's use of premises during construction period and in accordance with the limitations on the sequence of construction specified. Coordinate construction schedules and operations with ENGINEER.
- B. Coordinate Work of all subcontractors.

1.5 OWNER OCCUPANCY

- A. OWNER will occupy premises during entire period of construction in order to maintain normal operations. Cooperate with OWNER's representative in all construction operations to minimize conflict, and to facilitate OWNER usage.
- B. Conduct operations so as to inconvenience the general public in the least.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

- A. Starting Work: Start Work within 10 days following the date stated in the Notice to Proceed and execute with such progress as may be required to prevent delay to other contractors or to the general completion of the project. Execute Work at such items and in or on such parts of the project, and with such forces, material and equipment, as to complete the Work in the time established by the Contract. At all times, schedule and direct the Work so that it provides an orderly progression to completion within the specified time for completion.

END OF SECTION

SECTION 01025

PAYMENTS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Schedule of Values
- B. Application for Payment

1.2 SCHEDULE OF VALUES

- A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the General Conditions. Submit preliminary schedule of values within 10 calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the General Conditions.
- B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification section. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR'S overhead and profit.
- C. Revisions: With each Application for Payment revise schedule to list approved Change Orders.

1.3 APPLICATION FOR PAYMENT

- A. Required Copies: Submit three copies of each application on EJCDC Form No. 1910-8-E (1990) or approved equal. Present required information in typewritten form or on electronic media printout.
- B. Execute certification by signature of authorized officer.
- C. Use data from approved Schedule of Values.

<p>NOTE: Include provisions for payment for stored materials in Supplementary Conditions.</p>

- D. Stored Materials: When payment for materials stored is permitted, submit a separate schedule for Materials Stored showing line item, description, previous value received, value incorporated into the Work and present value.

- E. Change Orders: List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.
- F. Final Payment: Prepare Application for Final Payment as required in the General Conditions.
- G. Submit an updated construction schedule with each Application for Payment.
- H. Submit application for payment to ENGINEER on, or before, the _____ of each _____.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01026
MEASUREMENT AND PAYMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Explanation and Definitions
- B. Measurement
- C. Payment
- D. Schedule of Values
- E. Application for Payment

1.2 EXPLANATION AND DEFINITIONS

- A. The following explanation of the Measurement and Payment for the bid form items is made for information and guidance. The omission of reference to any item in this description shall not, however, alter the intent of the bid form or relieve the CONTRACTOR of the necessity of furnishing such as a part of the Contract.

1.3 MEASUREMENT

- A. The quantities set forth in the bid form are approximate and are given to establish a uniform basis for the comparison of bids. The OWNER reserves the right to increase or decrease the quantity of any class or portion of the work during the progress of construction in accord with the terms of the Contract.

1.4 PAYMENT

- A. Payment shall be made for the items listed on the Bid Form on the basis of the work actually performed and completed, such work including but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, clean up, restoration of disturbed areas, and all other appurtenances to complete the construction and installation of the work as shown on the drawings and described in the specifications.
- B. Unit prices are used as a means of computing the final figures for bid and Contract purposes, for periodic payments for work performed, for determining value of additions or deletions and wherever else reasonable.

1.5 SCHEDULE OF VALUES

- A. Approval of Schedule: Submit for approval a preliminary schedule of values, in duplicate, for all of the Work. Prepare preliminary schedule in accordance with the General Conditions. Submit preliminary schedule of values within 10

calendar days after the Effective Date of the Agreement. Submit final schedule of values in accordance with the General Conditions.

- B. Format: Utilize a format similar to the Table of Contents of the Project Specifications. Identify each line item with number and title of the major specification. Identify site mobilization, bonds and insurance. Include within each line item, a direct proportional amount of CONTRACTOR's overhead profit.
- C. Revisions: With each Application for Payment, revise schedule to list approved Change Orders.

1.6 APPLICATION FOR PAYMENT

- A. Required Copies: Submit three copies of each application on EJCDC Form No. 1910-8-E (1990) or approved equal. Present required information in typewritten form or on electronic media printout.
- B. Execute certification by signature of authorized officer. C. Use data from approved Schedule of Values.
- C. Stored Materials: When payment for materials stored is permitted, submit a separate schedule for Materials Stored showing line item, description, previous value received, value incorporated into the Work and present value.
- D. Change Orders: List each authorized Change Order as an extension on continuation sheet, listing Change Order number and dollar amount as for an original item of work.
- E. Final Payment: Prepare Application for Final Payment as required in the General Conditions.
- F. Submit an updated construction schedule for each Application for Payment.
- G. Submit application for payment to ENGINEER on, or before, the of each

PART 2 EXECUTION

2.1 MEASUREMENT AND PAYMENT

- A. Payment shall be made on the basis of work actually performed completing each item in the Bid, such work including, but not limited to, the furnishing of all necessary labor, materials, equipment, transportation, cleanup, and all other appurtenances to complete the construction and installation of the work to the configuration and extent as shown on the drawings and described in the specifications. Payment for each item includes compensation for cleanup and restorations. Cleanup and surface restorations (including pavement replacement) will be considered as ten percent (10%) of each pay item and complete payment will not be made until cleanup, restorations and as-builts are completed.

1. Mobilization: Payment for mobilization will be made for at the Contract lump sum price.
2. Performance and Payment Bond Premiums and Insurance:
3. Access Platforms: Payment for furnishing and installing the access platforms will be made at the Contract price. This item includes all necessary fittings, connections to existing structures, labor, equipment and materials for the furnishing and installing of the platforms and stairs.
4. Demo the PLC and Valve Control Panels: Payment for demolition of the PLC and Valve Control Panels will be made at the contract price for each panel acceptably removed. This item includes all necessary labor, materials and equipment for removal of each panel and all connected conduit and wires and repair of the concrete slab.
5. Furnish and Install PLC Panel: Payment for furnishing and installing the PLC Panel will be made at the contract price for the panel acceptably installed. This item includes all necessary labor, materials and equipment for installation of the PLC Panel not including the installation of conduits and wire.
6. Furnish and Install Valve and Actuator Assemblies: Payment for furnishing and installing valve and actuator assemblies will be made at the appropriate Contract unit price per assembly acceptably installed. This item includes the valve assembly and all necessary labor, materials and equipment for installation not including the conduit and wire.
7. Furnish and Install Conduit and Wire: Payment for the furnishing and installing of the conduit and wire will be made at the Contract unit price per linear foot for conduit and wire acceptably installed. This item includes all fittings, brackets and wiring connections, labor, equipment and material for the furnishing and installing of the conduit and wire.
8. Furnish and Install Fiber Optic Cable: Payment for the furnishing and installing of the fiber optic will be made at the Contract price for fiber optic cable acceptably installed. This item includes all cables, jumpers, fiber connections, testing, labor, equipment and material for the furnishing and installing of the fiber optic cable.
9. PLC and HMI Programming: Payment for providing the PLC and HMI programming will be made at the appropriate Contract price for acceptable program installation as determined by the commissioning process. This item includes all testing, labor, equipment and materials for a completed acceptable commissioned system.
10. Shop Drawings: Payment for furnishing shop drawings will be made at the contract price for the drawings acceptably submitted. This item includes all necessary labor, materials and equipment for development of the required shop drawings.

11. Allowance for Conduit Replacement: Payment for furnishing and installing conduit deemed to be unusable as determined by the Owner.

END OF SECTION

SECTION 01030
LEAD ABATEMENT

PART 1 GENERAL

1.1 SUMMARY

- A. This specification details the requirements for worker protection, containment, environmental protection, and waste disposal for the removal of lead paint when required by the Contract Documents before repainting or recoating. The CONTRACTOR shall implement programs and procedures which comply with the requirements of the specification and all applicable Federal, State and Local OSHA and EPA Standards and regulations. The CONTRACTOR shall perform the work with a minimal impact on the environment and protect all workers, OWNER and ENGINEER from lead and other safety and health hazards.

- B. The CONTRACTOR shall obtain the services of a Certified Industrial Hygienist (CIH) certified by the American Board of Industrial Hygiene in comprehensive practice. The Certified Industrial Hygienist shall:
 - 1. Certify training.
 - 2. Review and approve lead-containing paint removal plan for conformance to the applicable referenced standards
 - 3. Inspect lead-containing paint removal work for conformance with the approved plan
 - 4. Direct monitoring
 - 5. Ensure work is performed in strict accordance with specifications and applicable codes and regulations at all times.
 - 6. Ensure hazardous exposure to personnel and to the environment are adequately controlled at all times.

1.2 REFERENCES

A. AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- 1. ANSI Z88.2 1980 Respiratory Protection

B. CODE OF FEDERAL REGULATIONS

- 1. 29CFR 1910.134 Respiratory Protection
- 2. 29CFR 1910.1025 Lead
- 3. 29CFR 1910.1200 Hazard Communication
- 4. 29CFR 1926.55 Gases, Vapors, Fumes, Ducts, and Mists
- 5. 29CFR 1926.62 Lead Construction Industry Standard
- 6. 40CFR 260 Hazardous Waste Management Systems: General

7. 40CFR 261 Identification and Listing of Hazardous Waste
8. 40CFR 262 Regulations for Hazardous Waste Generators
9. 40CFR 263 Regulations for Hazardous Waste Transporters
10. 40CFR 264 Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
11. 40CFR 265 Interim Status Standards for Owner's and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities
12. 40CFR 266 Standards for the Management of Specific Hazardous Waste and Specific types of Hazardous Waste Management Facilities

C. RESOURCE AND RECOVERY ACT (RCRA)

1. Hazardous Waste Characterization
2. Toxic Characteristic Leaching Procedure (TCLP)

D. NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY & HEALTH (NIOSH):

1. NIOSH Method 7082
2. NIOSH 81-123, Occupational Health Guidelines for Chemical Hazards

E. OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION (OSHA):

1. OSHA CPL 2-2.20A, Chapter VIII: Sampling for Surface Contamination
2. OSHA Pub 3126 Working with Lead in the Construction Industry

F. STEEL STRUCTURES PAINTING COUNCIL (SSPC)

1. Guide 5 Guide to Maintenance Painting Programs
2. Guide 61 (CON) Guide for containing Debris Generated During Paint Removal Operation
3. Guide 71 (DIS) Guide for the Disposal of Lead Containment Surface Preparation Debris.

1.3 SUBMITTALS

- A. PRE-JOB SUBMITTALS: These submittals shall be made at least two (2) weeks before the start of any field work. Approval of the plan must be obtained prior to the start of any paint removal work.
- B. LEAD CONTAINING PAINT REMOVAL PLAN: Submit a detailed job-specific plan of the work procedures to be used in the removal of lead-containing paint. Obtain approval of the plan prior to the start of paint removal work. Prior to beginning work, the CONTRACTOR and CIH shall meet with the OWNER's representative to discuss in detail the lead containing paint removal plan, including work procedures and precautions. The plan shall include:

1. location, size, and details of lead control area.
 2. location and details of decontamination rooms, change rooms, shower facilities and mechanical ventilation system.
 3. eating, drinking, smoking and restroom procedures, interface of trades.
 4. sequencing of lead related work,
 5. collected wastewater and paint debris disposal plan
 6. air sampling plan
 7. respirators, protective equipment
 8. a detailed description of the method of containment of the operation to ensure that airborne lead concentrations of 30 micrograms per cubic meter of air are not exceeded outside of the lead control area.
 9. air sampling, training and strategy, sampling methodology, frequency, duration of sampling, and qualifications of air monitoring personnel in the air sampling portion of the plan.
- C. CONTRACTOR'S TEST LABORATORY: Submit name, address and telephone number of the CONTRACTOR's testing laboratory selected to analyze the representative samples of wash water and debris by TCLP as required. This submittal must be approved by the ENGINEER prior to the start of lead removal work.
- D. HAZARDOUS WASTE MANAGEMENT PLAN: Submit a Hazardous Waste Management Plan for OWNER's approval. The Hazardous Waste Management Plan shall comply with applicable requirements of federal, state, and local hazardous waste regulations and address:
1. Identification of hazardous wastes associated with the work.
 2. Estimated quantities of wastes to be generated and disposed of.
 3. Names and qualifications of each contractor that will be transporting, storing, treating, and disposing of the wastes. Include the facility location and a 24-hour point of contact. Furnish two copies of EPA, state hazardous waste permits and EPA Identification numbers.
 4. Names and qualifications (experience and training) of personnel who will be working on-site with hazardous wastes.
 5. List of waste handling equipment to be used in performing the work, to include cleaning, volume reduction, and transport equipment.
 6. Spill prevention, containment, and cleanup contingency measures to be implemented.
 7. Work plan and schedule for waste containment, removal and disposal. Wastes shall be cleaned up and containerized daily.
 8. Cost for hazardous waste disposal according to this plan.
- E. MEDICAL EXAMINATION: Before exposure to lead-contaminated dust, provide workers with a comprehensive medical examination as required by 29 CFR 1910.1025 and 29 CFR 1910.1200. The examination will not be required if adequate records show that employees have been examined as required by 29 CFR 1910.1025 within the last year. Maintain complete and accurate medical records of employees

for a period of at least 40 years or for the duration of employment plus 20 years, which ever is longer.

F. STATEMENTS:

1. Qualifications of CIH
2. Lead containing paint removal plan
3. Hazardous waste management plan

G. POST JOB SUBMITTALS:

1. Completion Date and Certificate of Completion.
2. Hazardous waste manifests (within 20 days of shipment offsite).
3. Employee Listings: An alphabetical listing of each employee used on this project and the dates that each employee worked on this project.
4. Employee Air Monitoring Results: A notarized copy of employee air monitoring results relative to OSHA respiratory level compliance.
5. Daily Sign In/Out Logs: Copies of logs showing each person who entered the work area. These logs shall contain the date, name, social security number, company represented and reason for entry into the work area.

H. SOIL TESTING

1. Soil samples shall be taken at the site before any work is started. Four (4) samples shall be given to the OWNER, and four (4) to the CONTRACTOR for lead analysis. Following the abrasive blast cleaning and painting operations, four (4) additional soil samples shall be taken and analyzed for lead content. The ENGINEER shall determine the location of the soil samples. Soil samples shall be analyzed for lead content by a laboratory approved by the State of Florida and the ENGINEER. The cost of testing and analysis shall be borne by the CONTRACTOR including sampling and transporting.
2. Sampling and analysis shall be performed in accordance with a Florida Department of Environmental Protection approved comprehensive quality assurance plan.

I. DEFINITIONS

1. OSHA Occupational Safety and Health Administration.
2. NIOSH National Institute of Occupational Safety and Health.
3. CIH Certified Industrial Hygienist.
4. EPA United States Environmental Protection Agency
5. NESHAPS National Emissions Standard for Hazardous Air Pollutants.
6. TCLP Toxic Characteristic Leaching Procedure.
7. PEL Permissible Exposure Limit
8. *Abate or Abatement.* The elimination of exposure to lead-based substances that may result in lead toxicity or poisoning, by the removal of or encapsulation of

- lead-containing substances, by thorough cleanup procedures, and by post-cleanup treatment of surfaces.
9. *Area Monitoring:* The sampling of airborne lead concentrations within the lead control area and outside the exclusion boundary which may reach the breathing zone of CONTRACTOR employees or other personnel.
 10. *CONTRACTOR:* Any business entity, public unit, or person performing the actual abatement for a lead abatement project.
 11. *Containment System:* A containment system includes the tarps, screens, supports, shrouds and scaffold utilized to enclose a paint removal tool or enclose the entire worksite. Ground covers are also utilized as part of a containment system. When an existing floor, concrete slab, or the ground serves as the base of the containment, it shall be completely covered with impervious material such as solid panels of plywood or flexible materials such as tarpaulins. The materials shall be maintained throughout the project to avoid loosing debris through rips, tears, or breaks in the coverings. When the structure being prepared serves as the floor (e.g. bottom interior of tank), it shall remain uncovered to provide access for surface preparation and painting. The purpose is to minimize or prevent abrasive blast debris from entering into the environment and contain the blast debris within for collection and proper disposal.
 12. *Decontamination Unit:* A series of connected rooms, with curtained doorways between any two adjacent rooms, for the decontamination of workers or of materials and equipment. For the purposes of this project, a decontamination unit shall consist of a free-standing enclosed room with hot and cold or warm running water suitably arranged for complete showering during decontamination which is in close proximity to the work area(s).
 13. *Equipment Decontamination Enclosure System:* A decontamination enclosure system for materials and equipment, typically consisting of a washroom, an airlock, and a holding area.
 14. *Enclosure:* Procedures necessary to completely enclose material containing lead-based paint behind airtight, impermeable, permanent barriers.
 15. *Equipment Decontamination Enclosure System:* A decontamination enclosure system for materials and equipment, typically consisting of a washroom, an airlock, and a holding area.
 16. *Equipment Room:* A contaminated area or room which is part of the worker decontamination enclosure system, with provisions for storage of contaminated clothing and equipment.
 17. *HEPA filter:* A High Efficiency Particulate Absolute (HEPA) filter capable of trapping and retaining 99.97 percent of non-dispersed particles greater than 0.3 microns in diameter.
 18. *HEP Vacuum Equipment:* Vacuuming equipment equipped with a HEPA-filtration system.
 19. *Lead Abatement Project:* Any work performed in order to abate the presence of a lead-containing substance.
 20. *Lead-Containing Substance:* Any paint, or other surface coating material containing more than 0.06 percent lead by weight calculated as lead metal in the dried solid.

21. *Lead Control Area:* An area where lead paint removal operations are performed which is isolated by physical boundaries to prevent unauthorized entry of personnel thereby preventing the exposure to, or spread of lead. Physical boundaries shall be established and located such that the level of airborne lead shall not exceed 30 micrograms per cubic meter of air outside of the established boundary at any time.
22. *Lead Permissible Exposure Limit:* The exposure limit as required by 29 CFR 1910.1026 or 29 CFR 1926.55, as applicable.
23. *Removal:* The act of removing lead containing or contaminated materials from the structure under properly controlled conditions to a suitable disposal site.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 CONTRACTOR OPERATIONS

- A. The CONTRACTOR will carry out the lead paint removal operations in strict accordance with the approved lead removal plan and the requirements of this contract.

3.2 TRAINING

- A. CONTRACTOR and CONTRACTOR employees will be trained by the Certified Industrial Hygienist in the proper handling of lead; health hazardous and risks involved, including the illness possible from exposure to lead; use and limits of the respiratory equipment to be used; and the importance of engineering and other hazard control techniques and procedures used during lead removal. Personnel who will perform CONTRACTOR's personnel air monitoring required by this Contract shall be trained and qualified by the CIH to perform such monitoring.

- B. Only properly trained personnel shall be permitted to enter the containment area.

3.3 WARNING AND CAUTION SIGNS

- A. The CONTRACTOR shall provide signs posted at approaches to lead control areas. These signs shall be posted at such a distance that they may be read and necessary precautions taken prior to entering the control areas. Caution labels shall also be posted on lead waste disposal containers.
- B. Warning signs shall comply to 29CFR 1910.145 paragraph (d) (4) and shall display the following legend:

WARNING
LEAD WORK AREA
POISON
NO SMOKING, EATING OR DRINKING

3.4 DISPOSAL OF USED ABRASIVE:

- A. Test used abrasive in accordance with 40 CFR 261 to determine if it is a hazardous waste. Handle and dispose of hazardous waste in accordance with local State rules and regulations for Hazardous Waste Generation, Transportation, Treatment, Storage and Disposal, 40 CFR 260, 261, 262, 263, 264, 265, and 266.

3.5 DISPOSAL OF WASH WATER

- A. Residual water from pressure washing operations shall be collected and filtered with a two stage filter. The first filter stage being a 100 micron unit and the second, a 1 micron unit. The filtered water shall be tested and disposed of properly according to the test results. The filtered out paint chips and debris shall be tested and disposed of as specified in section 3.4.

END OF SECTION

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SECTION 01035

CHANGE ORDER AND FIELD DIRECTIVE CHANGE PROCEDURES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Definitions
- B. Change Orders
- C. Field Directive Change

1.2 DEFINITIONS

- A. Change Order: Refer to the Change Order definition in Article 2 of the General Conditions.
- B. Field Directive Change: Field Directive Change is a written directive to the CONTRACTOR issued on or after the effective date of the agreement; signed by the OWNER, recommended by the ENGINEER ordering an addition, deletion, or revision in the Work. A Field Directive Change will subsequently be followed by the issuance of a Change Order.
- C. Overhead: Overhead is defined as the cost of administration, field office and home office costs, general superintendence, office engineering and estimating costs, other required insurance, materials used in temporary structures (not including form work), additional premiums on the performance bond of the CONTRACTOR, the use of small tools, scheduling costs, and all other costs incidental to the performance of the change or the cost of doing business.

1.3 CHANGE ORDERS

- A. Initiation of Proposals:
 - 1. From time to time, the OWNER or the ENGINEER may issue a Request for a Change Order Proposal. The Request will contain a description of the intended change with supplementary or revised Drawings and Specifications as applicable, and the projected time for accomplishing the change.
 - 2. The CONTRACTOR may propose a change in the Work by submittal of a Change Order Request to the ENGINEER describing the proposed change with a statement of the reason for the change and the effect on the Contract time and price, along with supporting documentation.

B. Execution of Change Order Proposal:

1. When a Proposal is requested for changed work, submit proposal within 15 days following receipt of the Request from OWNER or ENGINEER. State the increase or decrease, if any, in Contract Completion time and Contract Price.
2. Explain proposal in sufficient detail to permit review by OWNER.
3. For Omitted Work the decrease in the Contract Price will be determined by the ENGINEER and will include appropriate amounts for profit and overhead.
4. The OWNER and ENGINEER will review the Proposal and may request additional information and documentation. Provide these items upon request.
5. If the OWNER decides to proceed with the change, the OWNER will issue a Change Order for signature first by the CONTRACTOR and then by the OWNER.
6. The CONTRACTOR will promptly complete the approved change in the Work on receipt of the executed Change Order.
 - a. Failure to sign the Change Order does not relieve the CONTRACTOR from performing the Work if the Change Order is signed by the OWNER.

C. Compute the cost of both additive and deductive changes in the Work in accordance with Article 11 of the General Conditions and as follows:

1. Include, the costs of labor, crew foreman and general foreman performing or directly supervising the changed Work on the site. Include travel and subsistence, but only to the extent incurred.
2. To the labor cost add all net premium for Workman's Compensation, taxes pursuant to the Federal Social Security Act, and payments required under State and Federal unemployment laws.
3. Add necessary extra materials, delivered at the site.
4. Include rent for plant and equipment at unit rental costs for similar rentals from an independent firm (i.e. a firm which is not owned in whole or in part by the CONTRACTOR). If equipment is owned by CONTRACTOR or rented from a firm in which the CONTRACTOR has an interest, calculate the rent in accordance with the applicable provisions and terms of the current "Cost Reference Guide for Construction Equipment" published by Dataquest.

NOTE: In Items 5 and 6 confirm percentages and edit as required.

5. Include Subcontractor's costs, determined by items 1 through 4 in the preceding subparagraphs, including a maximum of 10 percent overhead and 10 percent profit for the first \$20,000; 7-1/2 percent overhead and 7-1/2 percent profit on the next \$30,000; and 5 percent overhead and 5 percent profit on balance over \$50,000.
6. For all subcontract work add 5 percent overhead and 5 percent profit to the subcontractor's costs as determined in paragraph 5. For work performed by the CONTRACTOR's own forces add a maximum of 10 percent overhead and 10 percent profit for the first \$20,000; 7-1/2 percent overhead and 7-1/2 percent profit on the next \$30,000; and 5 percent overhead and 5 percent profit on balance over \$50,000.

1.4 FIELD DIRECTIVE CHANGE

- A. Initiation by OWNER: OWNER may issue a Field Directive Change with a Notice to Proceed without a prior Request for a Change Order Proposal or the CONTRACTOR's signature.
- B. Payment Determination: The OWNER will designate the method of determining the amount of compensation or credit, if any, based on one of the methods contained in Article 11 of the General Conditions.
- C. Timing: Proceed with the change in the Work immediately upon receipt of the Field Directive Change.
- D. Addition to Contract: The Field Directive Change will be incorporated into the Contract Documents via a Change Order at a later date.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01040
PROJECT MEETINGS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Coordination
- B. Preconstruction Conference
- C. Progress Meetings

1.2 COORDINATION

- A. General: Coordinate scheduling, submittals, and Contract work to assure efficient and orderly sequence of installation of interdependent construction elements.
- B. Accessory Placement: Place conduits, saddles, boxes, cabinets, sleeves, inserts, foundation bolts, anchors and other like work in floors, roofs or walls of buildings and structures in conformity with the construction program.

1.3 PRECONSTRUCTION CONFERENCE

- A. General: Prior to commencement of the Work, in accordance with the General Conditions, the OWNER will conduct a preconstruction conference to be held at a predetermined time and place.
- B. Delineation of Responsibilities: The purpose of the conference is to designate responsible personnel, to establish a working relationship among the parties and to identify the responsibilities of the OWNER, plant personnel and the CONTRACTOR/VENDOR. Matters requiring coordination will be discussed and procedures for handling such matters, established. The agenda will include:
 - 1. Submittal procedures
 - 2. Partial Payment procedures
 - 3. Maintenance of Records
 - 4. Schedules, sequences and maintenance of facility operations
 - 5. Safety and First Aid responsibilities
 - 6. Change Orders and Field Directive Changes
 - 7. Use of site
 - 8. Housekeeping
 - 9. Equipment delivery

- C. Attendees: The preconstruction conference is to be attended by the representatives of the CONTRACTOR/VENDOR, the OWNER and plant personnel that will be associated with the project. Representatives of regulatory agencies, subcontractors, and principal suppliers may also attend when appropriate.
- D. Chair and Minutes: The preconstruction conference will be chaired by the Owner who will also arrange for the keeping and distribution of minutes to all attendees.

1.4 PROGRESS MEETINGS

- A. Meeting Frequency and Format: Schedule progress meetings on at least a weekly basis or more frequently as warranted by the complexity of the Project, to review the Work, discuss changes in schedules, maintain coordination and resolve potential problems. Invite OWNER, ENGINEER and all subCONTRACTOR/VENDORS. Suppliers may be invited as appropriate. Minutes of the meeting will be maintained by CONTRACTOR/VENDOR and reviewed by ENGINEER prior to distribution by the CONTRACTOR/VENDOR. Distribute reviewed minutes to attendees within three calendar days after each meeting.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01041
PROJECT COORDINATION

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Work Progress
- B. Private Land
- C. Work Locations
- D. Open Excavations
- E. Test Pits
- F. Maintenance of Traffic
- G. Maintenance of Flow

1.2 WORK PROGRESS

- A. Furnish personnel and equipment which will be efficient, appropriate and large enough to secure a satisfactory quality of work and a rate of progress which will allow the completion of the work within the time stipulated in the Bid of these Specifications. If at any time such personnel appears to the ENGINEER to be inefficient, inappropriate or insufficient for securing the quality of work required or for producing the rate of progress aforesaid, he may order the CONTRACTOR to increase the efficiency, change the character or increase the personnel and equipment, and the CONTRACTOR shall conform to such order. Failure of the ENGINEER to give such order shall in no way relieve the CONTRACTOR of his obligations to secure the quality of the work and rate of progress.

1.3 PRIVATE LAND

- A. Do not enter or occupy private land outside of easements, except by permission of OWNER. Construction operations shall be conducted in accordance with Section 01500.

1.4 WORK LOCATIONS

- A. Structures and pipelines 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 noted on the Drawings, such notation is for the CONTRACTOR's convenience and does not relieve him from laying and jointing different or additional items where required.

1.5 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 the public and workmen.

1.6 TEST PITS

- A. Test pits for the purpose of locating underground pipeline or structures in advance of the construction shall be excavated and backfilled by the CONTRACTOR. Test pits shall be backfilled immediately after their purpose has been satisfied and maintained in a manner satisfactory to the ENGINEER. The costs for such test pits shall be borne by the CONTRACTOR.

1.7 MAINTENANCE OF TRAFFIC

- A. Maintenance of traffic shall be in accordance with Sections 01570.
- B. All projects and work on highways, roads, and streets, shall have a traffic control plan, (TCP), as required by Florida Statute and Federal regulations. All work shall be executed under the established plan and Department approved procedures. The TCP is the result of considerations and investigations made in the development of a comprehensive plan for accommodating vehicular and pedestrian traffic through the construction zone.
- C. The complexity of the TCP varies with the complexity of the traffic problems associated with a project. Many situations can be covered adequately with reference to specific sections from the Manual on Uniform Traffic Control Devices (MUTCD), the Traffic Control Devices Handbook (TCDH), or Roadway and Traffic Design Standard Series 600.

1.8 MAINTENANCE OF FLOW

- A. Provide for the flow of sewers, drains, 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 well in advance of the interruption of any flow.

PART 2 PRODUCTS

2.1 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. All newly constructed work shall be carefully protected from damage in any way. No wheeling or walking or placing of heavy loads on it shall be allowed and all portions damaged 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. Special attention is directed to substructure bracing requirements, described in Section 02151. 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. The CONTRACTOR shall be fully responsible for the satisfactory maintenance and repair of the construction and other work undertaken herein, for at least the guarantee period described in the contract.
- C. 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.

PART 3 EXECUTION

3.1 PROTECTION OF CONSTRUCTION AND EQUIPMENT

- A. Sequence and schedule work in a manner to preclude delays and conflicts between the work of various trades and contractors. Each trade shall keep informed as to the work of other trades on the project and shall execute their work in a manner that will not interfere with the work of other trades.

3.2 DIAGRAMMATIC NATURE OF DRAWINGS

- A. Where layout is diagrammatic, such as pipelines, conduits, ductwork, etc., it shall be followed as closely as other work will permit. Changes from diagrams shall be made as required to conform to the construction requirements.
- B. Before running lines, carefully verify locations, depths and sizes and confirm that lines can be run as contemplated without interfering with other construction. Any deviation shall be referred to the ENGINEER for approval before lines are run. Minor changes in location of the equipment, fixtures, piping, etc., from those shown on the Drawings, shall be made without extra charge if so directed by the ENGINEER before installation.

- C. Determine the locations and sizes of equipment, fixtures, conduit, ducts, openings, etc., in order that there will be no interference in the installation of the work or delay in the progress of other work. In the event that interferences develop, the ENGINEER's decision regarding relocation of work will be final.
- D. Any changes made necessary through failure to make proper arrangements to avoid interference shall not be considered as extras. Cooperate with those performing other work in preparation of interference drawings, to the extent that the location of piping, ductwork, etc., with respect to the installations of other trades shall be mutually agreed upon by those performing the work.

3.3 PROVISIONS FOR LATER INSTALLATION

- A. Where any work cannot be installed as the construction is progressing, provide for boxes, sleeves, inserts, fixtures or devices as necessary to permit installation of the omitted work during later phases of construction. Arrange for chases, holes, and other openings in the masonry, concrete or other work and provide for subsequent closure after placing equipment. Arrangement for and closure of openings shall be subject to the approval of the ENGINEER and all costs therefor shall be included in the contract price for the work.

3.4 COORDINATION

- A. The CONTRACTOR shall be fully responsible for the coordination of his work and the work of his employees, subcontractors, and suppliers with the OWNER, and regulatory agencies, and assure compliance with schedules.

END OF SECTION

SECTION 01045
CUTTING AND PATCHING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Requirements
- B. Scheduling of Shutdown

1.2 RELATED SECTIONS

- A. Section 01010 - Summary of Work

1.3 GENERAL REQUIREMENTS

- A. CONTRACTOR shall be responsible for all cutting, fitting and patching, including attendant 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. Remove samples of installed work as specified for testing.
 - 6. Provide routine penetrations of non-structural surfaces for installation of piping and electrical conduit.
- B. Coordination: Perform all cutting, fitting or patching of the Work that may be required to make the several parts thereof join in accordance with the Contract Documents. Perform restoration with competent workmen skilled in the trade.
- C. Improperly Timed Work: Perform all cutting and patching required to install improperly timed work, to remove samples of installed materials for testing, and to provide for alteration of existing facilities or for the installation of new Work in the existing construction.
- D. Limitations: Except when the cutting or removal of existing construction is specified or indicated, do not undertake any cutting or demolition which may affect the structural stability of the Work or existing facilities without the ENGINEER's concurrence.

1.4 SUBMITTALS

- A. Submit a written request to the ENGINEER well in advance of executing any cutting or alteration which affects:
 - 1. Work of the OWNER or any separate contractor.
 - 2. Structural value or integrity of any element of the project or work.
 - 3. Integrity or effectiveness of weather-exposed or moisture-resistant elements or systems.
 - 4. Efficiency, operational life, maintenance or safety of operational elements.
 - 5. Visual qualities of sight-exposed elements.

- B. Request shall include:
 - 1. Identification of the work.
 - 2. Description of affected work.
 - 3. The necessity for cutting, alteration or excavation.
 - 4. Effect on work of OWNER or any separate contract, or on structural or weatherproof integrity of work.
 - 5. Description of proposed work:
 - a. Scope of cutting, patching, alteration, or excavation.
 - b. Trades who will execute the work.
 - c. Products proposed to be used.
 - d. Extent of refinishing to be done.
 - 6. Alternatives to cutting and patching.
 - 7. Cost proposal, when applicable.
 - 8. Written permission of any separate contractor whose work will be affected.

- C. SUBMIT WRITTEN NOTICE TO THE ENGINEER DESIGNATING THE DATE AND THE TIME THE WORK WILL BE UNCOVERED.

1.5 SCHEDULING OF SHUTDOWN

- A. Connections to Existing Facilities: If any connections, replacement, or other work requiring the shutdown of an existing facility is necessary, schedule such work at times when the impact on the OWNER's normal operation is minimal. Overtime, night and weekend work without additional compensation from the OWNER, may be required to make these connections, especially if the connections are made at times other than those specified.

- B. Request for Shutdowns: Submit a written request for each shutdown to the OWNER and the ENGINEER sufficiently in advance of any required shutdown.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Comply with specifications and standards for each specific product involved.

PART 3 EXECUTION

3.1 INSPECTION

- A. Inspect existing conditions of projects, 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 the work.
- C. Report unsatisfactory or questionable conditions to the ENGINEER in writing; do not proceed with work until the ENGINEER has provided further instructions.

3.2 PREPARATION

- A. Provide adequate temporary support as necessary to assure structural value or integrity of affected portion of work.
- B. Provide devices and methods to protect other portions of project from damage.
- C. Provide protection from elements for that portion of the project which may be exposed by cutting and patching work, and maintain excavations free from water.
- D. Material Removal: Cut and remove all materials to the extent shown or as required to complete the Work. Remove materials in a careful manner with no damage to adjacent facilities. Remove materials which are not salvageable from the site.

3.3 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. Employ original installer or fabricator to perform cutting and patching for:
 - 1. Weather-exposed or moisture-resistant elements.
 - 2. Sight-exposed finished surfaces.
- D. Execute fitting and adjustment of products to provide a finished installation to comply with specified products, functions, tolerances, and finishes.
- E. Restore work which has been cut or removed; install new products to provide completed work in accord with requirements of contract documents.
- F. Fit work airtight to pipes, sleeves, ducts, conduit and other penetrations through surfaces.

- G. Refinish entire surfaces as necessary to provide an even finish to match adjacent finishes:
1. For continuous surfaces, refinish to nearest intersection.
 2. For an assembly, refinish entire unit.

END OF SECTION

SECTION 01051
LINES AND GRADES

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General
- B. Surveys
- C. Datum Plane
- D. Protection of Survey Data

1.2 GENERAL

- A. Construct all work in accordance with the lines and grades shown on the Drawings. Assume full responsibility for keeping all alignment and grade.

1.3 SURVEYS

- A. Reference Points: The OWNER will provide reference points for the work as described in the General Conditions. Base horizontal and vertical control points will be designated by the ENGINEER and used as datum for the Work. Perform all additional survey, layout, and measurement work.
 - 1. Keep ENGINEER informed, sufficiently in advance, of the times and places at which work is to be performed so that base horizontal and vertical control points may be established and any checking deemed necessary by ENGINEER may be done, with minimum inconvenience to the ENGINEER and at no delay to CONTRACTOR. It is the intention not to impede the Work for the establishment of control points and the checking of lines and grades set by the CONTRACTOR. However, when necessary, suspend working operations for such reasonable time as the ENGINEER may require for this purpose. Costs associated with such suspension are deemed to be included in the Contract Price, and no time extension or additional costs will be allowed.
 - 2. Provide an experienced survey crew including an instrument operator, competent assistants, and any instruments, tools, stakes, and other materials required to complete the survey, layout, and measurement of work performed by the CONTRACTOR.

1.4 DATUM PLANE

- A. All elevations indicated or specified refer to the Mean Sea Level Datum Plane, 1929 General Adjustment, of the United States Coast and Geodetic Survey and are expressed in feet and decimal parts thereof, or in feet and inches.

1.5 PROTECTION OF SURVEY DATA

- A. General: Safeguard all points, stakes, grade marks, known property corners, monuments, and bench marks made or established for the Work. Reestablish them if disturbed, and bear the entire expense of checking reestablished marks and rectifying work improperly installed.
- B. Records: Keep neat and legible notes of measurements and calculations made in connection with the layout of the Work. Furnish copies of such data to the ENGINEER for use in checking the CONTRACTOR's layout. Data considered of value to the OWNER will be transmitted to the OWNER by the ENGINEER with other records on completion of the Work.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01090

REFERENCE STANDARDS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Abbreviations and Symbols
- B. Reference Standards
- C. Definitions

1.2 RELATED SECTIONS

- A. Information provided in this section is used where applicable in individual Specification Sections, Divisions 2 through 16.

1.3 REFERENCE ABBREVIATIONS

- A. Reference to a technical society, trade association or standards setting organization, may be made in the Specifications by abbreviations in accordance with the following list:

AABC	Associated Air Balance Council
AAMA	Architectural Aluminum Manufacturers Association
AASHTO	American Association of State Highway and Transportation Officials
AATCC	American Association of Textile Chemists and Colorists
ACI	American Concrete Institute
ADC	Air Diffusion Council
AFBMA	Anti-friction Bearing Manufacturers Association
AGA	American Gas Association
AGMA	American Gear Manufacturers Association
AHA	Association of Home Appliance Manufacturers
AISC	American Institute of Steel Construction
AISI	American Iron and Steel Institute
AMCA	Air Movement and Control Association, Inc.
ANSI	American National Standards Institute
APA	American Plywood Association
ARI	American Refrigeration Institute
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigerating and Air Conditioning Engineers
ASME	American Society of Mechanical Engineers
ASSE	American Society of Sanitary Engineers

ASTM	American Society for Testing and Materials
AWI	Architectural Woodwork Institute
AWPA	American Wood Preservers Association
AWS	American Welding Society
AWWA	American Water Works Association
BHMA	Builders' Hardware Manufacturers Association
BIA	Brick Institute of American
CABO	Council of American Building Officials
CAGI	Compressed Air and Gas Institute
CISPI	Cast Iron Soil Pipe Institute
CMAA	Crane Manufacturers Association of America
CRD	U.S. Corps of Engineers Specifications
CRSI	Concrete Reinforcing Steel Institute
CTI	Cooling Tower Institute
DHI	Door and Hardware Institute
DOH	Department of Health
DOT	Department of Transportation
Fed. Spec.	Federal Specifications
FGMA	Flat Glass Marketing Association
FM	Factory Mutual
HMI	Hoist Manufacturing Institute
HPMA	See HPVA
HPVA	Hardwood Plywood Veneer Association
ICEA	Insulated Cable Engineers Association
IEEE	Institute of Electrical and Electronics Engineers
IFI	Industrial Fasteners Institute
MIL	Military Specifications
MSS	Manufacturer's Standardization Society
NAAMM	National Association of Architectural Metal Manufacturers
NACM	National Association of Chain Manufacturers
NBS	National Bureau of Standards, See NIST
NEBB	National Environmental Balancing Bureau
NEC	National Electrical Code
NEMA	National Electrical Manufacturers Association
NETA	National Electrical Testing Association
NFPA	National Fire Protection Association
NFPA	National Forest Products Association
NFPA	National Fluid Power Association
NIST	National Institute of Standards and Technology
NLMA	National Lumber Manufacturers Association
NSF	National Sanitation Foundation
OSHA	Occupational Safety and Health Act
PCI	Prestressed Concrete Institute
PDI	Plumbing and Drainage Institute
SAE	Society of Automotive Engineers
SCPRF	Structural Clay Products Research Foundation
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SPI	Society of the Plastics Industry

SSPC	Steel Structures Painting Council
STI	Steel Tank Institute
TCA	Tile Council of American
TIMA	Thermal Insulation Manufacturers' Association
UL	Underwriters' Laboratories, Inc.
USBR	U. S. Bureau of Reclamation
USBS	U. S. Bureau of Standards, See NIST

1.4 REFERENCE STANDARDS

- A. Latest Edition: Construe references to furnishing materials or testing, which conform to the standards of a particular technical society, organization, or body, to mean the latest standard, code, or specification of that body, adopted and published as of the date of bidding this Contract. Standards referred to herein are made a part of these Specifications to the extent which is indicated or intended.
- B. Precedence: The duties and responsibilities of the OWNER, CONTRACTOR or ENGINEER, or any of their consultants, agents or employees are set forth in the Contract Documents, and are not changed or altered by any provision of any referenced standard specifications, manuals or code, whether such standard manual or code is or is not specifically incorporated by reference in the Contract Documents. Any duty or authority to supervise or direct the furnishing or performance of the Work or any duty or authority, to undertake responsibility contrary to the powers of the ENGINEER as set forth in the Contract Documents cannot be assigned to the ENGINEER or any of the ENGINEER's consultants, agents or employees.

1.5 DEFINITIONS

- A. In these Contract Documents the words furnish, install and provide are defined as follows:
 1. Furnish (Materials): to supply and deliver to the project ready for installation and in operable condition.
 2. Install (services or labor): to place in final position, complete, anchored, connected in operable condition.
 3. Provide: to furnish and install complete. Includes the supply of specified services. When neither furnish, install or provide is stated, provided is implied.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01092

ABBREVIATIONS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Abbreviations
- B. Standards for Abbreviations

1.2 RELATED SECTIONS

- A. Abbreviations provided in this section are used where applicable in individual Specification Sections, Divisions 2 through 16.

1.3 ABBREVIATIONS

- A. Abbreviations which may be used in Divisions 1 through 16 for units of measure are as follows:

alternating current.....	ac	cubic	cu
American wire gauge	AWG	cubic centimeter(s).....	cc
ampere(s)	amp	cubic feet per day	cfm
ampere-hour(s)	AH	cubic feet per hour	cfh
annual.....	ann	cubic feet per minute.....	cfm
Ampere Interrupting Capacity.....	AIC	cubic feet per minute, standard conditions	scfm
atmosphere(s)	atm	cubic feet per second	cfs
average	avg	cubic foot (feet)	cu ft
biochemical oxygen demand	BOD	cubic inch(es)	cu in
Board Foot.....	FBM	cubic yard(s)	cu yd
brake horsepower	bhp	decibels.....	dB
Brinell Hardness	BH	decibels (A scale).....	dBa
British thermal unit(s).....	Btu	degree(s).....	deg
calorie (s).....	cal	dewpoint temperature	dpt
carbonaceous biochemical oxygen demand	CBOD	diameter	dia
Celsius (centigrade).....	C	direct current	dc
Center to Center	C to C	dissolved oxygen.....	DO
centimeter(s).....	cm	dissolved solids.....	DS
chemical oxygen demand	COD	dry-bulb temperature.....	dbt
coefficient, valve flow.....	C _v	efficiency	eff
		elevation.....	el

entering water temperature.....ewt
 entering air temperature eat
 equivalent direct radiation.....edr

 face area fa
 face to face f to f
 Fahrenheit F
 feet per day..... fpd
 feet per hour fph
 feet per minute..... fpm
 feet per second..... fps
 foot (feet) ft
 foot-candle..... fc
 foot-pound ft-lb
 foot-pounds per minute ft-lb/min
 foot-pounds per secondft-lb/sec
 formazin turbidity unit(s) FTU
 frequency..... freq

 gallon(s)..... gal
 gallons per day gpd
 gallons per day per
 cubic foot gpd/cu ft
 gallons per day per
 square foot..... gpd/sq ft
 gallons per hour gph
 gallons per minute gpm
 gallons per second gps
 gas chromatography and
 mass spectrometry GC-MS
 gauge ga
 grain(s) gr
 gram(s) g
 grams per cubic centimetergm/cc

 Heat Transfer Coefficient.....U
 height..... hgt
 Hertz..... Hz
 horsepower..... hp
 horsepower-hour hp-hr
 hour(s) hr
 humidity, relative..... rh
 hydrogen ion concentrationpH

 inch(es)..... in
 inches per secondips
 inside diameterID

Jackson turbidity unit(s) JTU

 kelvin..... K
 kiloamperes..... kA
 kilogram(s) kg
 kilometer(s) km
 kilovar (kilovolt-amperes
 reactive) kvar
 kilovolt(s)..... kV
 kilovolt-ampere(s)..... kVA
 kilowatt(s).....kW
 kilowatt-hour(s)kWh

 linear foot (feet)..... lin ft
 liter(s)..... L

 megavolt-ampere(s) MVA
 meter(s).....m
 micrograms per liter ug/L
 miles per hourmph
 milliamperes(s) mA
 milligram(s) mg
 milligrams per liter mg/L
 milliliter(s) mL
 millimeter(s) mm
 million gallons MG
 million gallons per day..... mgd
 millisecond(s) ms
 millivolt(s) mV
 minute(s)..... min

 mixed liquor suspended
 solids..... MLSS

 nephelometric turbidity
 unit NTU
 net positive suction head.....NPSH
 noise criteria..... nc
 noise reduction coefficient..... NRC
 number.....no

 ounce(s) oz
 outside airoa
 outside diameter OD

 parts per billion..... ppb
 parts per million..... ppm
 percent..... pct

phase (electrical) ph
 pound(s) lb
 pounds per cubic foot pcf
 pounds per cubic foot
 per hour pcf/hr
 pounds per day lbs/day
 pounds per day per
 cubic foot lbs/day/cu ft
 pounds per day per
 square foot lbs/day/sq ft
 pounds per square foot psf
 pounds per square foot
 per hour psf/hr
 pounds per square inch psi
 pounds per square inch
 absolute psia
 pounds per square inch
 gauge psig
 power factor PF
 pressure drop or
 difference dp
 pressure, dynamic
 (velocity) vp
 pressure, vapor vap pr

 quart(s) qt

 Rankine R
 relative humidity rh
 resistance res
 return air ra
 revolution(s) rev
 revolutions per minute rpm
 revolutions per second rps
 root mean squared rms

 safety factor sf
 second(s) sec
 shading coefficient SC
 sludge density index SDI

 Sound Transmission
 Coefficient STC
 specific gravity sp gr
 specific volume Sp Vol
 sp ht at constant pressure Cp
 square sq
 square centimeter(s) sq cm

square foot (feet) sq ft
 square inch (es) sq in
 square meter(s) sq m
 square yard(s) sq yd
 standard std
 static pressure st pr
 supply air sa
 suspended solids SS

 temperature temp
 temperature difference TD
 temperature entering TE
 temperature leaving TL
 thousand Btu per hour Mbh
 thousand circular mils kcmil
 thousand cubic feet Mcf
 threshold limit value TLV
 tons of refrigeration tons
 torque TRQ
 total dissolved solids TDS
 total dynamic head TDH
 total kjeldahl nitrogen TKN
 total oxygen demand TOD
 total pressure TP
 total solids TS
 total suspended solids TSS
 total volatile solids TVS

 vacuum vac
 viscosity visc
 volatile organic chemical VOC
 volatile solids VS
 volatile suspended solids VSS
 volt(s) V
 volts-ampere(s) VA
 volume vol

 watt(s) W
 watthour(s) Wh
 watt-hour demand WHD
 watt-hour demand meter WHDM
 week(s) wk
 weight wt
 wet-bulb WB
 wet bulb temperature WBT

 yard(s) yd
 year(s) yr

1.4 STANDARD FOR ABBREVIATIONS

- A. Use ASME Y1.1-1989, "Abbreviations for use on Drawings and in Text" for abbreviations for units of measure not included in Paragraph 1.3.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01300

SUBMITTALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description of Requirements
- B. Submittal Procedures
- C. Specific Submittal Requirements
- D. Action on Submittals
- E. Repetitive Review

1.2 DESCRIPTION OF REQUIREMENTS

- A. This section specifies procedural requirements for Shop Drawings, product data, samples, and other miscellaneous Work-related submittals.
- B. Procedures concerning items such as listing of manufacturers, suppliers, subcontractors, construction progress schedule, schedule of Shop Drawing submissions, bonds, payment applications, insurance certificates, and schedule of values are specified elsewhere.
- C. Work-Related Submittals:
 - 1. Substitution or "Or Equal" Items:
 - a. Includes material or equipment CONTRACTOR requests ENGINEER to accept, after Bids are received, as substitute for items specified or described in Specifications by using name of a proprietary item or name of particular supplier.
 - 2. Shop Drawings:
 - a. Includes technical data and drawings specially prepared for this Project, including fabrication and installation drawings, diagrams, actual performance curves, data sheets, schedules, templates, patterns, reports, instructions, design mix formulas, measurements, and similar information not in standard printed form.

- b. Standard information prepared without specific reference to the Project is not considered a Shop Drawing.
- 3. Product Data:
 - a. Includes standard printed information on manufactured products, and systems that has not been specially prepared for this Project, including manufacturer's product specifications and installation instructions, catalog cuts, standard wiring diagrams, printed performance curves, mill reports, and standard color charts.
- 4. Samples:
 - a. Includes both fabricated and manufactured physical examples of materials, products, and units of work, partial cuts of manufactured or fabricated work, swatches showing color, texture, and pattern, and units of work to be used for independent inspection and testing.
 - b. Mock-ups are special forms of samples which are too large or otherwise inconvenient for handling in manner specified for transmittal of sample submittals.
- 5. Working Drawings:
 - a. When used in the Contract Documents, the term "working drawings" shall be considered to mean the CONTRACTOR'S plans for temporary structures such as temporary bulkheads, support of open cut excavation, support of utilities control systems, forming and falsework for underpinning; temporary by-pass pumping and for such other work as may be required for construction but does not become an integral part of the project.
 - b. Copies of working drawings shall be submitted to the ENGINEER at least fourteen (14) calendar days (unless otherwise specified by the ENGINEER) in advance of the required 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.
- 6. Miscellaneous Submittals:
 - a. Work-related submittals that do not fit in the previous categories, such as guarantees, warranties, certifications, experience records, maintenance agreements, Operating and Maintenance Manuals, workmanship bonds,

survey data and reports, physical work records, quality testing and certifying reports, copies of industry standards, record drawings, field measurement data, and similar information, devices, and materials applicable to the Work.

1.3 SUBMITTAL PROCEDURES

A. Scheduling:

1. Submit for approval, a preliminary schedule of shop drawings and samples submittals, in duplicate, and in accordance with the General Conditions.
2. Prepare and transmit each submittal to ENGINEER sufficiently in advance of scheduled performance of related work and other applicable activities.

B. Coordination:

1. Coordinate preparation and processing of submittals with performance of work. Coordinate each submittal with other submittals and related activities such as substitution requests, testing, purchasing, fabrication, delivery, and similar activities that require sequential activity.
2. Coordinate submission of different units of interrelated work so that one submittal will not be delayed by ENGINEER's need to review a related submittal. ENGINEER may withhold action on any submittal requiring coordination with other submittals until related submittals are forthcoming.

C. Submittal Preparation:

1. Stamp and sign each submittal certifying to review of submittal, verification of products, field measurement, field construction criteria, coordination of information within submittal with requirements of the Work and the Contract Documents, coordination with all trades, and verification that product will fit in space provided.
2. Transmittal Form: In the transmittal form forwarding each specific submittal to the ENGINEER include the following information as a minimum.
 - a. Date of submittal and dates of previous submittals containing the same material.
 - b. Project title and number.
 - c. Submittal and transmittal number.
 - d. Contract identification.

- e. Names of:
 - (1) Contractor
 - (2) Supplier
 - (3) Manufacturer
- f. Identification of equipment and material with equipment identification numbers, model numbers, and Specification section number.
- g. Variations from Contract Documents and any limitations which may impact the Work.
- h. Drawing sheet and detail number as appropriate.

D. Resubmittal Preparation:

- 1. Comply with the requirements described in Submittal Preparation. In addition:
 - a. Identify on transmittal form that submittal is a resubmission.
 - b. Make any corrections or changes in submittals required by ENGINEER's notations on returned submittal.
 - c. Respond to ENGINEER's notations:
 - (1) On the transmittal or on a separate page attached to CONTRACTOR's resubmission transmittal, answer or acknowledge in writing all notations or questions indicated by ENGINEER on ENGINEER's transmittal form returning review submission to CONTRACTOR.
 - (2) Identify each response by question or notation number established by ENGINEER.
 - (3) If CONTRACTOR does not respond to each notation or question, resubmission will be returned without action by ENGINEER until CONTRACTOR provides a written response to all ENGINEER's notations or questions.
 - d. CONTRACTOR initiated revisions or variations:
 - (1) On transmittal form identify variations or revisions from previously reviewed submittal, other than those called for by ENGINEER.
 - (2) ENGINEER's responsibility for variations or revisions is established in the General Conditions.

1.4 SPECIFIC SUBMITTAL REQUIREMENTS

- A. Specific submittals required for individual elements of work are specified in the individual Specification sections. Except as otherwise indicated in Specification sections, comply with requirements specified herein for each indicated type of submittal.
- B. Requests for Substitution or "Or Equal"
 - 1. Collect data for items to be submitted for review as substitution into one submittal for each item of material or equipment in accordance with the General Conditions.
 - 2. Submit with other scheduled submittals for the material or equipment allowing time for ENGINEER to evaluate the additional information required to be submitted.
 - 3. If CONTRACTOR requests to substitute for material or equipment specified but not identified in Specifications as requiring submittals, schedule substitution submittal request in Submittal schedule and submit as scheduled.
- C. Shop Drawings:
 - 1. Check all drawings, data and samples before submitting 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. All shop drawings shall be submitted through the CONTRACTOR, including those from any subcontractors.
 - 2. Submit newly prepared information, with graphic information at accurate scale. Indicate name of manufacturer or supplier (firm name). Show dimensions and clearly note which are based on field measurement; identify materials and products which are included in the Work; identify revisions. Indicate compliance with standards and notation of coordination requirements with other work. Highlight, encircle or otherwise indicate variations from Contract Documents or previous submittals.
 - 3. Include on each drawing or page:
 - a. Submittal date and revision dates.
 - b. Project name, division number and descriptions.
 - c. Detailed specifications section number and page number.

- d. Identification of equipment, product or material.
 - e. Name of CONTRACTOR and Subcontractor.
 - f. Name of Supplier and Manufacturer.
 - g. Relation to adjacent structure or material.
 - h. Field dimensions, clearly identified.
 - i. Standards or Industry Specification references.
 - j. Identification of deviations from the Contract Documents.
 - k. CONTRACTOR's stamp, initialed or signed, dated and certifying to review of submittal, certification of field measurements and compliance with Contract.
 - l. Physical location and location relative to other connected or attached material at which the equipment or materials are to be installed.
- 4. Provide 8-inch by 3-inch blank space for CONTRACTOR and ENGINEER stamps.
 - 5. Submittals:
 - a. Submit 3 blue line or black line prints, or 2 reverse sepia reproducible and 1 blue or black line print. One reproducible or one print will be returned.
 - 6. Distribution:
 - a. Do not proceed with installation of materials, products or systems until copy of applicable product data showing only approved information is in possession of installer.
 - b. Maintain one set of product data (for each submittal) at Project site.
 - c. Mark 5 additional copies with the date of approval and forward to the ENGINEER for use in field and for OWNER's records.
- D. Product Data:
- 1. Preparation:
 - a. Collect required data into single submittal for each element of work or system. Where product data has been printed to include information on several similar products, some of which are not required for use on

Project or are not included in submittal, mark copies to clearly show such information is not applicable.

- b. Where product data must be specially prepared for required products, materials or systems, because standard printed data are not suitable for use, submit data as a Shop Drawing and not as product data.

2. Submittals:

- a. Submittal is for information and record, and to determine that products, materials, and systems comply with Contract Documents. Submittal is final when returned by ENGINEER marked "Approved" or "Approved as Noted".
- b. Submit 3 copies.

3. Distribution:

- a. Do not proceed with installation of materials, products or systems until copy of applicable product data showing only approval information is in possession of installer.
- b. Maintain one set of product data (for each submittal) at Project site, available for reference by ENGINEER and others.
- c. Mark 5 additional copies with the date of approval and forward to the ENGINEER for use in field and for OWNER records.

E. Samples:

1. Preparation:

- a. Where possible, provide samples that are physically identical with proposed materials or products to be incorporated into the Work. Where variations in color, pattern or texture are inherent in material or product represented by sample, submit multiple units (not less than 3 units) showing approximate limits of variations.
- b. Provide full set of optional samples where ENGINEER's selection required. Prepare samples to match ENGINEER's selection where so indicated.
- c. Include information with each sample to show generic description, source or product name and manufacturer, limitations, and compliance with standards.

- d. Submit samples for ENGINEER's visual review of general generic kind, color, pattern, texture, and for final check of coordination of these characteristics with other related elements of work.
2. Submittals:
- a. At CONTRACTOR's option, and depending upon nature of anticipated response from ENGINEER, initial submittal of samples may be either preliminary or final submittal.
 - b. A preliminary submittal, consisting of a single set of samples, is required where specifications indicate ENGINEER's selection of color, pattern, texture or similar characteristics from manufacturer's range of standard choices is necessary. Preliminary submittals will be reviewed and returned with ENGINEER's "Action" marking.
 - c. Final Submittals: Submit 3 sets of samples in final submittal, 1 set will be returned.
3. Distribution:
- a. Maintain returned final set of samples at Project site, in suitable condition and available for quality control comparisons throughout course of performing work.
 - b. Returned samples intended or permitted to be incorporated in the Work are indicated in Specification sections, and shall be in undamaged condition at time of use.
- F. Mock-Ups:
- 1. Mock-ups and similar samples specified in Specification sections are recognized as special type of samples. Comply with samples submittal requirements to greatest extent possible. Process transmittal forms to provide record of activity.
- G. Miscellaneous Submittals:
- 1. Inspection and Test Reports:
 - a. Classify each inspection and test report as being either "Shop Drawings" or "product data", depending on whether report is specially prepared for Project or standard publication of workmanship control testing at point of production. Process inspection and test reports accordingly.
 - 2. Guarantees, Warranties, Maintenance Agreements, and Workmanship Bonds:

- a. Refer to Specification sections for specific requirements. Submittal is final when returned by ENGINEER marked "Approved" or "Approved as Noted".
 - b. In addition to copies desired for CONTRACTOR's use, furnish 2 executed copies. Provide 2 additional copies where required for maintenance data.
3. Survey Data:
- a. Refer to Specification sections for specific requirements on property surveys, building or structure condition surveys, field measurements, quantitative records of actual Work, damage surveys, photographs, and similar data required by Specification sections. Copies will not be returned.
 - (1) Survey Copies: Furnish 2 copies. Provide 10 copies of final property survey (if any).
 - (2) Condition Surveys: Furnish 2 copies.
4. Certifications:
- a. Refer to Specification sections for specific requirement on submittal of certifications. Submit 7 copies. Certifications are submitted for review of conformance with specified requirements and information. Submittal is final when returned by ENGINEER marked "Approved".
5. Closeout Submittals:
- a. Refer to Specification Section 01720 for specific requirements on submittal of closeout information, materials, tools, and similar items.
 - (1) Record Documents: Section 01720.
 - (2) Materials and Tools: Spare parts, extra and overrun stock, maintenance tools and devices, keys, and similar physical units to be submitted.
 - (3) Operating and maintenance data.
- H. Operation and Maintenance Manuals:
- 1. Submit Operation and Maintenance Manuals in accordance with Section 01730.
- I. General Distribution:

1. Unless required elsewhere, provide distribution of submittals to subcontractors, suppliers, governing authorities, and others as necessary for proper performance of work.

1.5 ACTION ON SUBMITTALS

A. ENGINEER's Action:

1. General:

- a. Except for submittals for record and similar purposes, where action and return on submittals are required or requested, ENGINEER will review each submittal, mark with appropriate action, and return. Where submittal must be held for coordination, ENGINEER will also advise CONTRACTOR without delay.
- b. ENGINEER will stamp each submittal with uniform, self-explanatory action stamp, appropriately marked with submittal action.

B. Action Stamp:

1. Approved:

- a. Final Unrestricted Release: Where submittals are marked "Approved", Work covered by submittal may proceed PROVIDED IT COMPLIES WITH CONTRACT DOCUMENTS. Acceptance of Work will depend upon that compliance.

2. Approved As Noted:

- a. When submittals are marked "Approved as Noted", Work covered by submittal may proceed PROVIDED IT COMPLIES WITH BOTH ENGINEER'S NOTATIONS OR CORRECTIONS ON SUBMITTAL AND WITH Contract Documents. Acceptance of Work will depend on that compliance. Re-submittal is not required.

3. Comments Attached - Confirm or Resubmit:

- a. When submittals are marked "Examined and Returned for Correction", do not proceed with Work covered by submittal. Do not permit Work covered by submittal to be used at Project site or elsewhere where Work is in progress.
- b. Revise submittal or prepare new submittal in accordance with ENGINEER's notations in accordance with Paragraph 1.3D of this section. Resubmit submittal without delay. Repeat if necessary to obtain different action marking.

1.6 RE-SUBMITTAL REVIEW

- A. Cost of Subsequent Reviews: Shop Drawings and Operation and Maintenance Manuals submitted for each item will be reviewed no more than twice at the OWNER's expense. All subsequent reviews will be performed at times convenient to the ENGINEER and at the CONTRACTOR's expense based on the ENGINEER's then prevailing rates including all direct and indirect costs and fees. Reimburse the OWNER for all such fees invoiced to the OWNER by the ENGINEER.
- B. Time Extension: Any need for more than one resubmission, or any other delay in ENGINEER's review of submittals, will not entitle CONTRACTOR to extension of the Contract Time.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01310
PROGRESS SCHEDULE

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Form of Schedules
- B. Content of Schedules: Submit for approval, a preliminary progress schedule in accordance with the General Conditions.
- C. Schedule Revisions
- D. Submittal Requirements

1.2 FORM OF SCHEDULES

- A. Prepare schedules in form of a horizontal bar chart.
 - 1. Provide separate horizontal bar for each trade or operation.
 - 2. Utilize a horizontal time scale and identify first work day of each week.
 - 3. Utilize scale and spacings to allow space for notations and future revisions.
- B. Utilize a listing format which chronologically indicates the order of start of each item of work.
- C. Identify each listing by major specification section numbers.

1.3 CONTENT OF SCHEDULES

- A. Completion Dates: Show the beginning and ending contract dates stated in documents. Schedules showing completion prior to the contract completion date will be accepted but in no event will they be considered basis for a claim for delay against the OWNER by the CONTRACTOR for the period between the early completion date and the completion date provided in the Contract Documents.
- B. Show complete sequence of construction by activity.
- C. Show dates for beginning and completion of each major element of construction and installation dates for major items of equipment. Elements shall include, but not be limited to, the following:
 - 1. Shop drawing receipt from supplier/manufacturer submitted to ENGINEER, review and return to supplier/manufacturer

2. Material and equipment order, manufacturer, delivery, installation, and checkouts
 3. Performance tests and supervisory services activity
 4. Construction of various facilities
 5. Demolition
 6. Excavation, sheeting, shoring, dewatering
 7. Concrete placement sequence
 8. Structural steel erection
 9. Wall and roof construction
 10. Piping and equipment installation
 11. Electrical work activity
 12. Heating, ventilating, and air conditioning work activity
 13. Plumbing work activity
 14. Sewer installation
 15. Connection to existing sewers
 16. Water main installation
 17. Miscellaneous concrete placement
 18. Subcontractor's items of work
 19. construction, and paving
 20. Final cleanup
 21. Allowance for inclement weather
 22. Coordination with concurrent Work on site
- D. Show projected percentage of completion for each item as of first day of each month.

1.4 SCHEDULE REVISIONS

- A. As a minimum, revise construction schedule every 30 calendar days to reflect changes in progress of Work for duration of Contract.

- B. Indicate progress of each activity at date of submittal.
- C. Show changes occurring since previous submittal of schedule.
 - 1. Major change in scope
 - 2. Activities modified since previous submittal
 - 3. Revised projections of progress and completion
 - 4. Other identifiable changes
- D. Provide a written report as needed to define:
 - 1. Problem areas, anticipated delays, and impact on schedule
 - 2. Corrective action recommended and its effect
 - 3. Effect of changes on schedules of other Contractors

1.5 SUBMITTAL REQUIREMENTS

- A. Schedule: Submit final progress schedule in accordance with the General Conditions.
- B. For preliminary and final submittal of construction progress schedule and subsequent revisions thereof furnish three copies to ENGINEER.

PART 2 PRODUCTS Not Used

PART 3 EXECUTION Not Used

END OF SECTION

SECTION 01400
QUALITY CONTROL

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Submittals
- B. Inspection Services
- C. Inspection of Materials
- D. Quality Control
- E. Costs of Inspection
- F. Acceptance Tests
- G. Failure to Comply with Contract

1.2 RELATED SECTIONS

- A. Section 01300 - Submittals: Specific Submittal Requirements

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Certificate Submittals: Furnish the ENGINEER authoritative evidence in the form of Certificates of Manufacture that the materials and equipment to be used in the Work have been manufactured and tested in conformity with the Contract Documents. 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.

1.4 INSPECTION SERVICES

- A. OWNER's Access: At all times during the progress of the Work and until the date of final completion, afford the OWNER and ENGINEER every reasonable, safe, and proper facility for inspecting the Work at the site. The observation and inspection of any work will not relieve the CONTRACTOR of any obligations to perform proper and satisfactory work as specified. Replace work rejected due to faulty design, inferior, or defective materials, poor workmanship, improper installation, excessive wear, or nonconformity with the requirements of the Contract Documents, with satisfactory

work at no additional cost to the OWNER. Replace as directed, finished or unfinished work found not to be in strict accordance with the Contract, even though such work may have been previously approved and payment made therefor.

- B. Rejection: The OWNER and the OWNER's Authorized Representatives have the right to reject materials and workmanship which are defective or require correction. Promptly remove rejected work and materials from the site.
- C. Inferior Work Discoveries: Failure or neglect on the part of the OWNER or the OWNER's Authorized Representatives to condemn or reject bad or inferior work or materials does not imply an acceptance of such work or materials. Neither is it to be construed as barring the OWNER or the OWNER's Authorized Representatives at any subsequent time from recovering damages or a sum of money needed to build anew all portions of the Work in which inferior work or improper materials were used.
- D. Removal for Examination: Should it be considered necessary or advisable by the OWNER or the OWNER's Authorized Representatives, at any time before final acceptance of the Work, to make examinations of portions of the Work already completed, by removing or tearing out such portions, promptly furnish all necessary facilities, labor, and material, to make such an examination. If such Work is found to be defective in any respect, defray all expenses of such examination and of satisfactory reconstruction. If, however, such work is found to meet the requirements of the Contract, the cost of examination and restoration of the Work will be considered a change in the Work to be paid for in accordance with applicable provisions of the Contract.
- E. Operation Responsibility: Assume full responsibility for the proper operation of equipment during tests and instruction periods. Make no claim for damage which may occur to equipment prior to the time when the OWNER accepts the Work.
- F. Rejection Prior to Warranty Expiration: If at anytime prior to the expiration of any applicable warranties or guarantees, equipment is rejected by the OWNER, repay to the OWNER all sums of money received for the rejected equipment on progress certificates or otherwise on account of the Contract lump sum prices, and upon the receipt of the sum of money, OWNER will execute and deliver a bill of sale of all its rights, title, and interest in and to the rejected equipment. Do not remove the equipment from the premises of the OWNER until the OWNER obtains from other sources, equipment to take the place of that rejected. The OWNER hereby agrees to obtain other equipment within a reasonable time and the CONTRACTOR agrees that the OWNER may use the equipment furnished by the CONTRACTOR without rental or other charge until the other new equipment is obtained.

1.5 INSPECTION OF MATERIALS

- A. Premanufacture Notification: Give notice in writing to the ENGINEER sufficiently in advance of the commencement of manufacture or preparation of materials especially manufactured or prepared for use in or as part of the permanent construction. When required, notice to include 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, ENGINEER will arrange to have a representative present at such times during the manufacture or testing as may be necessary to inspect the materials, or will notify CONTRACTOR that the inspection will be made at a point other than the point of manufacture or testing, or that the inspection will be waived. Comply with these provisions before shipping any materials. Such inspection will not constitute a release from the responsibility for furnishing materials meeting the requirements of the Contract Documents.

- B. Testing Standards: Tests of electrical and mechanical equipment and appliances shall be conducted in accordance with recognized, applicable test codes except as may otherwise be stated herein.

1.6 QUALITY CONTROL

A. Testing

1. Field and Laboratory

- a. Provide personnel to assist the ENGINEER in performing the following periodic observation and associated services.
 - (1) Soils: Observe and test excavations, placement and compaction of soils. Determine suitability of excavated material. Observe subgrade soils and foundations.
 - (2) Concrete: Observe forms and reinforcement; observe concrete placement; witness air entrainment tests, facilitate concrete cylinder preparation and assist with other tests performed by ENGINEER.
 - (3) Masonry: Sample and test mortar, bricks, blocks and grout; inspect brick and block samples and sample panels; inspect placement of reinforcement and grouting.
- b. When specified in Divisions 2 through 16 of the Contract Documents, provide an independent laboratory testing facility to perform required testing. Qualify the laboratory as having performed previous satisfactory work. Prior to use, submit to the ENGINEER for approval.
- c. Cooperate with the ENGINEER and laboratory testing representatives. Provide at least 24 hours notice prior to when specified testing is required. Provide labor and materials, and necessary facilities at the site as required by the ENGINEER and the testing laboratory.
- d. Provide an independent testing agency, a member of the National Electrical Testing Association, to perform inspections and tests specified in Division 16 of these Specifications.

2. Equipment: Coordinate and demonstrate test procedures as specified in the Contract Documents or as otherwise required during the formal tests.
3. Pipeline and Other Testing: Conform to test procedures and requirements specified in the appropriate Specification Section.

B. Reports

1. Certified Test Reports: Where transcripts or certified test reports are required by the Contract Documents, meet the following requirements:
 - a. Before delivery of materials or equipment submit and obtain approval of the ENGINEER for all required transcripts, certified test reports, certified copies of the reports of all tests required in referenced specifications or specified in the Contract Documents. Perform all testing in an approved independent laboratory or the manufacturer's laboratory. Submit for approval reports of shop equipment tests within thirty days of testing. Transcripts or test reports are to be accompanied by a notarized certificate in the form of a letter from the manufacturer or supplier certifying that tested material or equipment meets the specified requirements and the same type, quality, manufacture and make as specified. The certificate shall be signed by an officer of the manufacturer or the manufacturer's plant manager.
2. Certificate of Compliance: At the option of the ENGINEER, or where not otherwise specified, submit for approval a notarized Certificate of Compliance. The Certificates may be in the form of a letter stating the following:
 - a. Manufacturer has performed all required tests
 - b. Materials to be supplied meet all test requirements
 - c. Tests were performed not more than one year prior to submittal of the certificate
 - d. Materials and equipment subjected to the tests are of the same quality, manufacture and make as those specified
 - e. Identification of the materials

1.7 COSTS OF INSPECTION

- A. OWNER's Obligation: Initial inspection and testing of materials furnished under this Contract will be performed by the OWNER or his authorized Representatives or inspection bureaus without cost to the CONTRACTOR, unless otherwise expressly specified. If subsequent testing is necessary due to failure of the initial tests or

because of rejection for noncompliance, reimburse the OWNER for expenditures incurred in making such tests.

- B. CONTRACTOR's Obligation: Include in the Contract Price, the cost of all shop and field tests of equipment and other tests specifically called for in the Contract Documents.
- C. Reimbursements to OWNER:
 - 1. 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. Reimburse the OWNER for expenditures incurred in making such tests on materials and equipment which are rejected for noncompliance.
 - 2. Reimburse OWNER for the costs of any jobsite inspection between the hours of 7:00 p.m. and 6:00 a.m.
 - 3. Reimburse OWNER for all costs associated with Witness Tests which exceed 5 Calendar Days per kind of equipment.

1.8 ACCEPTANCE TESTS

- A. Preliminary Field Tests: As soon as conditions permit, furnish all labor and materials and services to perform preliminary field tests of all equipment provided under this Contract. If the preliminary field tests disclose that any equipment furnished and installed under this Contract does not meet the requirements of the Contract Documents, make all changes, adjustments and replacements required prior to the acceptance tests.
- B. Final Field Tests: Upon completion of the Work and prior to final payment, subject all equipment, piping and appliances installed under this Contract to specified acceptance tests to demonstrate compliance with the Contract Documents.
 - 1. Furnish all labor, fuel, energy, water and other materials, equipment, instruments and services necessary for all acceptance tests.
 - 2. Conduct field tests in the presence of the ENGINEER. Perform the field tests to demonstrate that under all conditions of operation each equipment item:
 - a. Has not been damaged by transportation or installation
 - b. Has been properly installed
 - c. Has been properly lubricated
 - d. Has no electrical or mechanical defects
 - e. Is in proper alignment
 - f. Has been properly connected
 - g. Is free of overheating of any parts
 - h. Is free of all objectionable vibration

- i. Is free of overloading of any parts
 - j. Operates as intended
- 3. Operate work or portions of work for a minimum of 100 hours or 14 days continuous service, whichever comes first. For those items of equipment which would normally operate on wastewater or sludge, plant effluent may be used if available when authorized by ENGINEER. If water can not properly exercise equipment, conduct 100-hour test after plant startup. Conduct test on those systems which require load produced by weather (heating or cooling) exercise only when weather will produce proper load.
- C. Failure of Tests: If the acceptance tests reveal defects in material or equipment, or if the material or equipment in any way fails to comply with the requirements of the Contract Documents, then promptly correct such deficiencies. Failure or refusal to correct the deficiencies, or if the improved materials or equipment, when tested again, fail to meet the guarantees or specified requirements, the OWNER, notwithstanding its partial payment for work and materials or equipment, may reject said materials or equipment and may order the CONTRACTOR to remove the defective work from the site at no addition to the Contract Price, and replace it with material or equipment which meets the Contract Documents.

1.9 FAILURE TO COMPLY WITH CONTRACT

- A. Unacceptable Materials: If it is ascertained by testing or inspection that the material or equipment does not comply with the Contract, do not deliver said material or equipment, or if delivered remove it promptly from the site or from the Work and replace it with acceptable material without additional cost to the OWNER. Fulfill all obligations under the terms and conditions of the Contract even though the OWNER or the OWNER's Authorized Representatives fail to ascertain noncompliance or notify the CONTRACTOR of noncompliance.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01500
CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. General Requirements
- B. Temporary Utilities
- C. Temporary Construction
- D. Barricades and Enclosures
- E. Fences
- F. Security
- G. Temporary Controls
- H. Traffic Regulation
- I. Field Offices and Sheds

1.2 GENERAL REQUIREMENTS

- A. Plant and Facilities: Furnish, install, maintain and remove all false work, scaffolding, ladders, hoistways, braces, pumping plants, shields, trestles, roadways, sheeting, centering forms, barricades, drains, flumes, and the like, any of which may be needed in the construction of any part of the Work and which are not herein described or specified in detail. The CONTRACTOR shall accept responsibility for the safety and efficiency of such works and for any damage that may result from their failure or from their improper construction, maintenance or operation.
- B. First Aid: Maintain a readily accessible, completely equipped first aid kit at each location where work is in progress.
- C. Safety Responsibility: Accept sole responsibility for safety and security at the site. Indemnify and hold harmless the OWNER and the OWNER's Authorized Representatives, including the ENGINEER, for any safety violation, or noncompliance with governing bodies and their regulations, and for accidents, deaths, injuries, or damage at the site during occupancy or partial occupancy of the site by CONTRACTOR's forces while performing any part of the Work.

Communication Program required under OSHA regulations before beginning on site activities. Furnish two copies of amendments to Hazard Communications Program as they are prepared.

1.3 TEMPORARY UTILITIES

- A. Water: Provide all necessary and required water without additional cost, unless otherwise specified. If necessary, provide and lay water lines to the place of use; secure all necessary permits; pay for all taps to water mains and hydrants and for all water used at the established rates.
- B. Light and Power: Provide without additional cost to the OWNER temporary lighting and power facilities required for the proper construction and inspection of the Work. If, in the ENGINEER's opinion, these facilities are inadequate, do NOT proceed with any portion of the Work affected thereby. Maintain temporary lighting and power until the Work is accepted.
- C. Heat: Provide temporary heat, whenever required, for work being performed during cold weather to prevent freezing of concrete, water pipes, and other damage to the Work or existing facilities.
- D. Sanitary Facilities: Provide sufficient sanitary facilities for construction personnel. Prohibit and prevent nuisances on the site of the Work or on adjoining property. Discharge any employee who violates this rule. Abide by all environmental regulations or laws applicable to the Work.
- E. Connections to Existing Utilities:
 - 1. Unless otherwise specified or indicated, make all necessary connections to existing facilities including structures, drain lines, and utilities such as water, sewer, gas, telephone, and electricity. In each case, obtain permission from the OWNER or the owning utility prior to undertaking connections. Protect facilities against deleterious substances and damage.
 - 2. Thoroughly plan in advance all connections to existing facilities. Have on hand at the time of undertaking the connections, all material, labor and required equipment. Proceed continuously to complete connections in minimum time. Arrange for the operation of valves or other appurtenances on existing utilities, under the direct supervision of the owning utility.

1.4 TEMPORARY CONSTRUCTION

- A. Bridges: Design and place suitable temporary bridges where necessary for the maintenance of vehicular and pedestrian traffic. Assume responsibility for the sufficiency and safety of all such temporary work or bridges and for any damage which may result from their failure or their improper construction, maintenance, or representatives from all claims, suits or actions, and damages or costs of every description arising by reason of failure to comply with the above provisions.

1.5 BARRICADES AND ENCLOSURES

- A. Protection of Workmen and Public: Effect and maintain at all times during the prosecution of the Work, barriers and lights necessary for the protection of Workmen and the Public. Provide suitable barricades, lights, "danger" or "caution" or "street closed" signs and watchmen at all places where the Work causes obstructions to normal traffic, excavation sites, or constitutes in any way a hazard to the public.
- B. Barricades and Lights:
 - 1. Protect all streets, roads, highways, excavations and other public thoroughfares which are closed to traffic; use effective barricades which display acceptable warning signs. Locate barricades at the nearest public highway or street on each side of the blocked section.
 - 2. Statutory Requirements: Install and maintain all barricades, signs, lights, and other protective devices within highway rights-of-way in strict conformity with applicable statutory requirements by the authority having jurisdiction.

1.6 FENCES

- A. Existing Fences: Obtain written permission from the OWNER prior to relocating or dismantling fences which interfere with construction operations. Reach agreements with the fence owner as to the period the fence may be left relocated or dismantled. Install adequate gates where fencing must be maintained. Keep gates closed and locked at all times when not in use.
- B. Restoration: Restore all fences to their original or better condition and to their original location on completion of the Work.

1.7 SECURITY

- A. Preservation of Property:
 - 1. Preserve from damage, all property along the line of the Work, in the vicinity of or in any way affected by the Work, the removal or destruction of which is not called for by the Drawings. Preserve from damage, public utilities, trees, lawn areas, building monuments, fences, pipe and underground structures, and public streets. Note: Normal wear and tear of streets resulting from legitimate use by the CONTRACTOR are not considered as damage. Whenever damages occur to such property, immediately restore to its original condition. Costs for such repairs are incidental to the Contract.
 - 2. In case of failure on the part of the CONTRACTOR to restore property or make good on damage or injury, the OWNER may, upon 24 hours written notice, proceed to repair, rebuild, or otherwise restore such property as may be deemed necessary, and the cost thereof will be deducted from any moneys due or which may become due the CONTRACTOR

under this Contract. If removal, repair or replacement of public or private property is made necessary by alteration of grade or alignment authorized by the OWNER and not contemplated by the Contract Documents, the CONTRACTOR will be compensated, in accordance with the General Conditions, provided that such property has not been damaged through fault of the CONTRACTOR or the CONTRACTOR's employees.

B. Public Utility Installations and Structures:

1. Public utility installations and structures include all poles, tracks, pipes, wires, conduits, vaults, manholes, and other appurtenances and facilities, whether owned or controlled by public bodies or privately owned individuals, firms or corporations, used to serve the public with transportation, gas, electricity, telephone, storm and sanitary sewers, water, or other public or private utility services. Facilities appurtenant to public or private property which may be affected by the Work are deemed included hereunder.
2. The Contract Documents contain data relative to existing public utility installations and structures above and below the ground surface. Existing public utility installations and structures are indicated on the Drawings only to the extent such information was made available to, or found by, the ENGINEER in preparing the Drawings. These data are not guaranteed for completeness or accuracy, and the CONTRACTOR is responsible for making necessary investigations to become fully informed as to the character, condition, and extent of all public utility installations and structures that may be encountered and that may affect the construction operations.
3. Contact utility locating service sufficiently in advance of the start of construction to avoid damage to the utilities and delays to the completion date.
4. Remove, replace, relocate, repair, rebuild, and secure any public utility installations and structures damaged as a direct or indirect result of the Work under this Contract. Costs for such work are incidental to the Contract. Be responsible and liable for any consequential damages done to or suffered by any public utility installations or structures. Assume and accept responsibility for any injury, damage, or loss which may result from or be consequent to interference with, or interruption or discontinuance of, any public utility service.
5. Repair or replace any water, electric, sewer, gas, or other service connection damaged during the Work with no addition to the Contract price.
6. At all times in performance of the Work, employ proven methods and exercise reasonable care and skill to avoid unnecessary delay, injury, damage, or destruction to public utility installations and structures. Avoid

unnecessary interference with, or interruption of, public utility services. Cooperate fully with the owners thereof to that end.

7. Give written notice to the owners of all public utility installations and structures affected by proposed construction operations, sufficiently in advance of breaking ground in any area or on any unit of the Work, to obtain their permission before disrupting the lines and to allow them to take measures necessary to protect their interests. Advise the Chiefs of Police, Fire and Rescue Services of any excavation in public streets or the temporary shut-off of any water main. Provide at least 24 hours notice to all affected property owners whenever service connections are taken out of service.

C. **Miscellaneous Structures:** Assume and accept responsibility for all injuries or damage to culverts, building foundations and walls, retaining walls, or other structures of any kind met with during the prosecution of the Work. Assume and accept liability for damages to public or private property resulting therefrom. Adequately protect against freezing all pipes carrying liquid.

D. **Protection of Trees and Lawn Areas:**

1. Protect with boxes, trees and shrubs, except those ordered to be removed. Do not place excavated material so as to cause injury to such trees or shrubs. Replace trees or shrubs destroyed by accident or negligence of the CONTRACTOR or CONTRACTOR's employees with new stock of similar size and age, at the proper season, at no additional cost to the OWNER.
2. Leave lawn areas in as good condition as before the start of the Work. Restore areas where sod has been removed by seeding or sodding.

1.8 TEMPORARY CONTROLS

A. **During Construction:**

1. Keep the site of the Work and adjacent premises free from construction materials, debris, and rubbish. Remove this material from any portion of the site if such material, debris, or rubbish constitutes a nuisance or is objectionable.
2. Remove from the site all surplus materials and temporary structures when they are no longer needed.
3. Neatly stack construction materials such as concrete forms and scaffolding when not in use. Promptly remove splattered concrete, asphalt, oil, paint, corrosive liquids, and cleaning solutions from surfaces to prevent marring or other damage.
4. Properly store volatile wastes in covered metal containers and remove from the site daily.

5. Do not bury or burn on the site or dispose of into storm drains, sanitary sewers, streams, or waterways, any waste material. Remove all wastes from the site and dispose of in a manner complying with applicable ordinances and laws.
- B. Smoke Prevention:
1. Strictly observe all air pollution control regulations.
 2. Open fires will be allowed only if permitted under current ordinances.
- C. Noises:
1. Maintain acceptable noise levels in the vicinity of the Work. Limit noise production to acceptable levels by using special mufflers, barriers, enclosures, equipment positioning, and other approved methods.
 2. Supply written notification to the OWNER sufficiently in advance of the start of any work which violates this provision. Proceed only when all applicable authorizations and variances have been obtained in writing.
- D. Hours of Operation:
1. Operation of construction equipment between the hours of 7:00 p.m. and 6:00 a.m. the following day is prohibited. For operation of this equipment during this period obtain written consent from the OWNER.
 2. Do not carry out nonemergency work, including equipment moves, on Sundays without prior written authorization by the OWNER.
- E. Dust Control:
1. Take measures to prevent unnecessary dust. Keep earth surfaces exposed to dusting moist with water or a chemical dust suppressant. Cover materials in piles or while in transit to prevent blowing or spreading dust.
 2. Adequately protect buildings or operating facilities which may be affected adversely by dust. Protect machinery, motors, instrument panels, or similar equipment by suitable dust screens. Include proper ventilation with dust screens.
- F. Temporary Drainage Provisions:
1. Provide for the drainage of stormwater and any water applied or discharged on the site in performance of the Work. Provide adequate drainage facilities to prevent damage to the Work, the site, and adjacent property.
 2. Supplement existing drainage channels and conduits as necessary to carry all increased runoff from construction operations. Construct dikes

as necessary to divert increased runoff from entering adjacent property (except in natural channels), to protect the OWNER's facilities and the Work, and to direct water to drainage channels or conduits. Provide ponding as necessary to prevent downstream flooding.

3. Maintain excavations free of water. Provide, operate, and maintain pumping equipment.
- G. Pollution: Prevent the pollution of drains and watercourses by sanitary wastes, sediment, debris, and other substances resulting from construction activities. Do not permit sanitary wastes to enter any drain or watercourse other than sanitary sewers. Do not permit sediment, debris, or other substances to enter sanitary sewers. Take reasonable measures to prevent such materials from entering any drain or watercourse.

1.9 TRAFFIC REGULATION

- A. Parking: Provide and maintain suitable parking areas for the use of all construction workers and others performing work or furnishing services in connection with the Contract, to avoid any need for parking personal vehicles where they may interfere with public traffic or construction activities.
- B. Access: Conduct Work to interfere as little as possible with public travel, whether vehicular or pedestrian. Provide and maintain suitable and safe bridges, detours, or other temporary expedients for the accommodation of public and private travel. Whenever it is necessary to cross, obstruct, or close roads, driveways, and walks, whether public or private, give reasonable notice to owners of private drives before interfering with them. Such maintenance of traffic will not be required when the CONTRACTOR has obtained permission from the owner or tenant of private property, or from the authority having jurisdiction over the public property involved, to obstruct traffic at the designated point.

1.10 FIELD OFFICES AND SHEDS

- A. CONTRACTOR's Office: Erect, furnish, and maintain a field office with a telephone. Have an authorized agent present at this office at all times while the Work is in progress. Keep readily accessible copies of the Contract Documents, required record documents, and the latest approved shop drawings at this field office.
- B. Material Sheds and Temporary Structures: Provide material sheds and other temporary structures of sturdy construction and neat appearance.
- C. Location: Coordinate location of field offices, material sheds and temporary structures with ENGINEER and OWNER.

PART 2 PRODUCTS - Not Used

PART 3 EXECUTION - Not Used

END OF SECTION

SECTION 01570

TRAFFIC REGULATION

PART 1 GENERAL

1.1 SECTION INCLUDES:

- A. General Requirements
- B. Traffic Control

1.2 RELATED SECTIONS

- A. Section 01041 – Project Coordination
- B. Section 02230 – Roadway Crossings by Open Cut

1.3 GENERAL REQUIREMENTS

- 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. Remove temporary equipment and facilities when no longer required, restore grounds to original, or to specified conditions.
- C. The requirements specified herein are in addition to the plan for Maintenance of Traffic as specified in Sections 01041 and 02230.

1.4 TRAFFIC CONTROL

- A. The necessary precautions shall include, but not be limited to, such items as proper construction warning signs, signals, lighting devices, marking, barricades, channelization, and hand signaling devices. The CONTRACTOR shall be responsible for installation and maintenance of all devices and requirements for the duration of the Construction period.
- B. The CONTRACTOR shall provide at least 72 hours notification to the State or County Department of Transportation of the necessity to close any portion of a roadway carrying vehicles or pedestrians so that the final approval of such closings can be obtained at least 48 hours in advanced. At no time will more than one (1) lane of roadway be closed to vehicles and pedestrians. With any such closings adequate provision shall be made for the safe expeditious movement of each.

- C. The CONTRACTOR shall also be responsible for notifying Police, Fire, and other Emergency Departments whenever construction is within roadways and of the alternate routes. Monthly status reports shall be provided to these Departments, as a minimum.
- D. 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 pre-construction traffic control scheme. Any such actions shall be performed by the CONTRACTOR under the supervision, and in accordance with the Specifications, of the Owner, unless otherwise specified.
- E. The CONTRACTOR shall immediately notify the Owner of any vehicular or pedestrian safety or efficiency problems incurred as a result of the construction of the project.
- F. The CONTRACTOR shall be responsible for notifying all residents of any road construction and limited access at least 72 hours in advance.

PART 2 PRODUCTS

NOT USED.

PART 3 EXECUTION

NOT USED.

END OF SECTION

SECTION 01600
MATERIAL AND EQUIPMENT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description
- B. Substitutions
- C. Manufacturer's Written Instructions
- D. Transportation and Handling
- E. Storage, Protection and Maintenance
- F. Manufacturer's Field Quality Control Services
- G. Post Startup Services
- H. Special Tools and Lubricating Equipment
- I. Lubrication

1.2 DESCRIPTION

- A. Proposed Manufacturers List: Within 15 calendar days of the date of the Notice to Proceed, submit to the ENGINEER a list of the names of proposed manufacturers, materialmen, suppliers and subcontractors, obtain approval of this list by OWNER prior to submission of any working drawings. Upon request submit evidence to ENGINEER that each proposed manufacturer has manufactured a similar product to the one specified and that it has previously been used for a like purpose for a sufficient length of time to demonstrate its satisfactory performance.
- B. Furnish and install Material and Equipment which meets the following:
 - 1. Conforms to applicable specifications and standards.
 - 2. Complies with size, make, type, and quality specified or as specifically approved, in writing, by ENGINEER.

3. Will fit into the space provided with sufficient room for operation and maintenance access and for properly connecting piping, ducts and services, as applicable. Make the clear spaces that will be available for operation and maintenance access and connections equal to or greater than those shown and meeting all the manufacturers' requirements. Make all provisions for installing equipment furnished at no increase in Contract Price.
4. Manufactured and fabricated in accordance with the following:
 - a. Design, fabricate, and assemble in accordance with best engineering and shop practices.
 - b. Manufacture like parts of duplicate units to standard sizes and gauges, to be interchangeable.
 - c. Provide two or more items of same kind identical, by same manufacturer.
 - d. Provide materials and equipment suitable for service conditions.
 - e. Adhere to equipment capabilities, sizes, and dimensions shown or specified unless variations are specifically approved, in writing, in accordance with the Contract Documents.
 - f. Adapt equipment to best economy in power consumption and maintenance. Proportion parts and components for stresses that may occur during continuous or intermittent operation, and for any additional stresses that may occur during fabrication or installation.
 - g. Working parts are readily accessible for inspection and repair, easily duplicated and replaced.
5. Use material or equipment only for the purpose for which it is designed or specified.

1.3 SUBSTITUTIONS

A. Substitutions:

1. CONTRACTOR's requests for changes in equipment and materials from those required by the Contract Documents are considered requests for substitutions and are subject to CONTRACTOR's representations and review provisions of the Contract Documents when one of following conditions are satisfied:
 - a. Where request is directly related to an "or equal" clause or other language of same effect in Specifications.

- b. Where required equipment or material cannot be provided within Contract Time, but not as result of CONTRACTOR's failure to pursue Work promptly or to coordinate various activities properly.
- c. Where required equipment or material cannot be provided in manner compatible with other materials of Work, or cannot be properly coordinated therewith.

2. CONTRACTOR'S Options:

- a. Where more than one choice is available as options for CONTRACTOR's selection of equipment or material, select option compatible with other equipment and materials already selected (which may have been from among options for other equipment and materials).
- b. Where compliance with specified standard, code or regulation is required, select from among products which comply with requirements of those standards, codes, and regulations.
- c. "Or Equal": For equipment or materials specified by naming one or more equipment manufacturer and "or equal", submit request for substitution for any equipment or manufacturer not specifically named.

B. Conditions Which are Not Substitution:

- 1. Requirements for substitutions do not apply to CONTRACTOR options on materials and equipment provided for in the Specifications.
- 2. Revisions to Contract Documents, where requested by OWNER or ENGINEER, are "changes" not "substitutions".
- 3. CONTRACTOR's determination of and compliance with governing regulations and orders issued by governing authorities do not constitute substitutions and do not constitute basis for a Change Order, except as provided for in Contract Documents.

1.4 MANUFACTURER'S WRITTEN INSTRUCTIONS

- A. Instruction Distribution: When the Contract Documents require that installation, storage, maintenance and handling of equipment and materials comply with manufacturer's written instruction's, obtain and distribute printed copies of such instructions to parties involved in installation, including six copies to ENGINEER.
 - 1. Maintain one set of complete instructions at jobsite during storage and installation, and until completion of work.

- B. Manufacturer's Requirements: Store, maintain, handle, install, connect, clean, condition, and adjust products in accordance with manufacturer's written instructions and in conformity with Specifications.
 - 1. Should job conditions or specified requirements conflict with manufacturer's instructions, consult ENGINEER for further instructions.
 - 2. Do not proceed with work without written instructions.
- C. Performance Procedures: Perform work in accordance with manufacturer's written instructions. Do not omit preparatory steps or installation procedures, unless specifically modified or exempted by Contract Documents.

1.5 TRANSPORTATION AND HANDLING

- A. Coordination with Schedule: Arrange deliveries of materials and equipment in accordance with Construction Progress Schedules. Coordinate to avoid conflict with work and conditions at site.
 - 1. Deliver materials and equipment in undamaged condition, in manufacturer's original containers or packaging, with identifying labels intact and legible.
 - 2. Protect bright machined surfaces, such as shafts and valve faces, with a heavy coat of grease prior to shipment.
 - 3. Immediately upon delivery, inspect shipments to determine compliance with requirements of Contract Documents and approved submittals and that material and equipment are protected and undamaged.
- B. Handling: Provide equipment and personnel to handle material and equipment by methods recommended by manufacturer to prevent soiling or damage to materials and equipment or packaging.

1.6 STORAGE, PROTECTION, AND MAINTENANCE

- A. On-site storage areas and buildings:
 - 1. Conform storage buildings to requirements of Section 01500.
 - 2. Coordinate location of storage areas with ENGINEER and OWNER.

3. Arrange on site storage areas for proper protection and segregation of stored materials and equipment with proper drainage. Provide for safe travel around storage areas and safe access to stored materials and equipment.
4. Store loose granular materials in a well-drained area on solid surfaces to prevent mixing with foreign matter.
5. Store materials such as pipe, reinforcing and structural steel, and equipment on pallets, blocks or racks, off ground.
6. PVC Pipe may be damaged by prolonged exposure to direct sunlight and the CONTRACTOR shall take necessary precautions during storage and installation to avoid this damage. Pipe shall be stored under cover, and installed with sufficient backfill to shield it from the sun.
7. Store fabricated materials and equipment above ground, on blocking or skids, to prevent soiling or staining. Cover materials and equipment which are subject to deterioration with impervious sheet coverings; provide adequate ventilation to avoid condensation.

B. Interior Storage:

1. Store materials and equipment in accordance with manufacturer's instructions, with seals and labels intact and legible.
2. Store materials and equipment, subject to damage by elements, in weathertight enclosures.
3. Maintain temperature and humidity within ranges required by manufacturer's instructions.

C. Accessible Storage: Arrange storage in a manner to provide easy access for inspection and inventory. Make periodic inspections of stored materials or equipment to assure that materials or equipment are maintained under specified conditions and free from damage or deterioration.

1. Perform maintenance on stored materials of equipment in accordance with manufacturer's instructions, in presence of OWNER or ENGINEER.
2. Submit a report of completed maintenance to ENGINEER with each Application for Payment.
3. Failure to perform maintenance, to notify ENGINEER of intent to perform maintenance or to submit maintenance report may result in rejection of material or equipment.

- D. OWNER's Responsibility: OWNER assumes no responsibility for materials or equipment stored in buildings or on-site. CONTRACTOR assumes full responsibility for damage due to storage of materials or equipment.
- E. CONTRACTOR's Responsibility: CONTRACTOR assumes full responsibility for protection of completed construction. Repair and restore damage to completed Work equal to its original condition.
- F. Special Equipment: Use only rubber tired wheelbarrows, buggies, trucks, or dollies to wheel loads over finished floors, regardless if the floor has been protected or not. This applies to finished floors and to exposed concrete floors as well as those covered with composition tile or other applied surfacing.
- G. Surface Damage: Where structural concrete is also the finished surface, take care to avoid marking or damaging surface.

1.7 MANUFACTURER'S FIELD QUALITY CONTROL SERVICES

- A. General:
 - 1. Provide manufacturer's field services in accordance with this subsection for those tasks specified in other sections.
 - 2. Provide training as specified in Section 01670.
 - 3. Include and pay all costs for suppliers' and manufacturers' services, including, but not limited to, those specified.
- B. Installation Instruction: Provide instruction by competent and experienced technical representatives of equipment manufacturers or system suppliers as necessary to resolve assembly or installation procedures which are attributable to, or associated with, the equipment furnished.
- C. Installation Inspection, Adjustments and Startup Participation:
 - 1. Provide competent and experienced technical representatives of equipment manufacturers or system suppliers to inspect the completed installation as follows.
 - a. Verify that each piece of equipment or system has been checked for proper lubrication, drive rotation, belt tension, control sequence, or for other conditions which may cause damage.
 - b. Verify that tests, meter readings, and specified electrical characteristics agree with those required by the equipment or system manufacturer.
 - c. Verify that wiring and support components for equipment are complete.

- d. Verify that equipment or system is installed in accordance with the manufacturer's recommendations, approved shop drawings and the Contract Documents.
 - e. Verify that nothing in the installation voids any warranty.
2. Provide manufacturer's representatives to perform initial equipment and system adjustment and calibration conforming to the manufacturer's recommendations and instructions, approved shop drawings and the Contract Documents.
 3. Obtain ENGINEER's approval before start-up of equipment. Execute start-up under supervision of applicable manufacturer's representative in accordance with manufacturers' instructions.
 4. Furnish ENGINEER with three copies of the following. When training is specified, furnish the copies at least 24 hours prior to training.
 - a. "Certificate of Installation, Inspection and Start-up Services" by manufacturers' representatives for each piece of equipment and each system specified, certifying:
 - (1) That equipment is installed in accordance with the manufacturers' recommendations, approved shop drawings and the Contract Documents.
 - (2) That nothing in the installation voids any warranty.
 - (3) That equipment has been operated in the presence of the manufacturer's representative.
 - (4) That equipment, as installed, is ready to be operated by others.
 - b. Detailed report by manufacturers' representatives, for review by ENGINEER of the installation, inspection and start-up services performed, including:
 - (1) Description of calibration and adjustments if made; if not in Operation and Maintenance Manuals, attach copy.
 - (2) Description of any parts replaced and why replaced.
 - (3) Type, brand name, and quantity of lubrication used, if any.
 - (4) General condition of equipment.
 - (5) Description of problems encountered, and corrective action taken.

(6) Any special instructions left with CONTRACTOR or ENGINEER.

- D. Field Test Participation: Provide competent and experienced technical representatives of all equipment manufacturers and system suppliers as necessary to participate in field testing of the equipment specified in Section 01400.
- E. Trouble-Free Operation: Provide competent and experienced technical representatives of all equipment manufacturers and system suppliers as necessary to place the equipment in trouble-free operation after completion of start-up and field tests.

1.8 POST START-UP SERVICES

- A. General: Provide Post Start-up Services in accordance with this subsection for equipment specified in other sections.
- B. Site Visit: Provide the services of an authorized service representative for each equipment manufacturer or system supplier to make a final site visit after the equipment or system has been in operation for at least 6 months, but no longer than 11 months. Furnish assistance to OWNER's operating personnel in making adjustments and calibrations required to determine that the equipment and system is operating in conformance with design, manufacturer's, and specification requirements. Instruct the personnel in a review of proper operation and maintenance procedures.
- C. Certificate: Furnish "Certificate of Post Start-up Services" cosigned by ENGINEER and the manufacturer's representative, certifying that this service has been performed. Use form provided in this section, and furnish OWNER with three copies.

1.9 SPECIAL TOOLS AND LUBRICATING EQUIPMENT

- A. General: Furnish, per manufacturer's recommendations, special tools required for checking, testing, parts replacement, and maintenance. (Special tools are those which have been specially designed or adapted for use on parts of the equipment, and which are not customarily and routinely carried by maintenance mechanics.)
- B. Time of Delivery: Deliver special tools and lubricating equipment to OWNER when unit is placed into operation and after operating personnel have been properly instructed in operation, repair, and maintenance of equipment.
- C. Quality: Provide tools and lubricating equipment of a quality meeting equipment manufacturer's requirements.

1.10 LUBRICATION

- A. General: Where lubrication is required for proper operation of equipment, incorporate in the equipment the necessary and proper provisions in accordance with

manufacturer's requirements. Where possible, make lubrication automated and positive.

- B. Oil Reservoirs: Where oil is used, supply reservoir of sufficient capacity to lubricate unit for a 24-hour period.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

CERTIFICATE OF INSTALLATION, INSPECTION AND START-UP SERVICES

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify that the named equipment has been inspected, adjusted and operated by the Manufacturers' Representative and further certify:

1. That the equipment is installed in accordance with the manufacturer's recommendations, approved shop drawings and the Contract Documents.
2. That nothing in the installation voids any warranty.
3. That equipment has been operated in the presence of the manufacturer's representative.
4. That equipment, as installed, is ready to be operated by others.

MANUFACTURERS' REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

Attach the detailed report called for by Specification Section 01600.

Complete and submit three copies of this form with the detailed report to ENGINEER as specified.

CERTIFICATE OF POST START-UP SERVICES

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify the Manufacturers' Representative has inspected this equipment, made adjustments and calibrations, and that it is operating in conformance with the design, specifications, and manufacturer's requirements. Detailed notation of improper operation with corresponding recommendations, if any, are made and attached to this form.

MANUFACTURERS' REPRESENTATIVE

Signature _____ Date _____

Name (print) _____

Title _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

ENGINEER

Signature _____ Date _____

Name (print) _____

Title _____

_____ Complete and submit three copies of this form to OWNER upon completion of 6 to 11 months reinspection as required by Specification Section 01600.

(NO TEXT FOR THIS PAGE)

SECTION 01670

TRAINING

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Training

1.2 TRAINING

- A. Training: Provide the services of knowledgeable, technically competent, factory trained specialists to instruct (Plant) (Pump Station) personnel in the operation and maintenance of the equipment and system components listed in Paragraph B. The OWNER will furnish training classroom space.

1. Coordinate services with the OWNER, with a minimum of 30 days prior notice.
2. Provide a combination of classroom and "hands-on" instruction designed to completely familiarize operating and maintenance personnel with the systems theory, standard operating procedures, safety features and emergency procedures, and general maintenance of all components.
3. Conduct all training at the (Plant) (Pump Station) during regular hours on weekdays.

- B. Provide training for the following:

Contractor shall refer to individual sections for training requirements.

- C. Length of Training: The minimum lengths of training sessions are listed in Paragraph B. above.
- D. Credentials: Submit for approval, credentials of equipment manufacturer representatives who are to be course instructors at least 14 days prior to a proposed training session.
- E. Scheduling: Submit training outline and other information described in paragraphs G through K for approval at least 14 days prior to the proposed date for the training sessions. Verify scheduling with the OWNER at least 14 days prior to the training sessions.
- F. Number of Copies: For each training class, provide instructional material for at least ten attendees plus five extra copies, plus duplicate copies of all audio-visual aids utilized during each training course.

- G. Training Outline Submission: Provide a proposed training outline including the topics presented in Paragraph K. Identify specific components and procedures in the proposed training outline.
- H. Training Topic Detail: Detail specific training topics. Describe "hands-on" demonstrations planned for the training. Reference training aids to be utilized in the training (i.e. video tapes, slides, transparencies) and attach where applicable.
- I. Training Handouts: Attach training handouts to the proposed training outline.
- J. Training Segment Duration: Indicate the duration of each training segment.
- K. Training Outline:
 - 1. Equipment Operation
 - a. Describe equipment's operating (process) function.
 - b. Describe equipment's fundamental operating principles and dynamics.
 - c. Identify equipment's mechanical, electrical and electronic components and features.
 - d. Identify all support equipment associated with the operation of the subject equipment.
 - 2. Detailed Component Description
 - a. Identify and describe in detail each component's function.
 - b. Where applicable, group related components into subsystems.
 - c. Identify, and describe in detail, equipment safety features and control interlocks.
 - 3. Equipment Preventive Maintenance
 - a. Describe preventive maintenance inspection procedures required to perform and inspect the equipment in operation, and spot potential trouble symptoms (anticipate breakdowns).
 - b. Outline recommended routine lubrication and adjustments (preventive maintenance).
 - 4. Equipment Troubleshooting
 - a. Define recommended systematic troubleshooting procedures.

- b. Provide component specific troubleshooting checklists.
 - c. Describe applicable equipment testing and diagnostic procedures to facilitate troubleshooting.
5. Equipment Corrective Maintenance
- a. Describe recommended equipment preparation requirements.
 - b. Identify and describe the use of special tools required for maintenance of the equipment.
 - c. Describe component removal/installation and disassembly/ assembly procedures.
 - d. Perform at least two "hands-on" demonstrations of common corrective maintenance repairs.
 - e. Describe recommended measuring instruments and procedures, and provide instruction on interpreting alignment measurements, as appropriate.
 - f. Define recommended torquing, mounting, calibration, and alignment procedures and settings, as appropriate.
 - g. Describe recommended procedures to check/test equipment following corrective repair.
- L. Certificate: Provide "Certificate of Instructional Services" signed by ENGINEER and equipment representative, verifying that training has been accomplished to satisfaction of all parties. Use form provided in this section, and furnish ENGINEER with three copies.
- M. Substantial Completion: Training provided by manufacturers' representative, ENGINEER and OWNER does not constitute substantial completion.
- N. Equipment Use: Use of equipment for training will not void manufacturers' or contract warranties.

PART 2 PRODUCTS (Not Used)

PART 3 EXECUTION (Not Used)

END OF SECTION

CERTIFICATE OF INSTRUCTIONAL SERVICES

Project _____

Equipment _____

Specification Section _____

Contract _____

I hereby certify the equipment Manufacturers' Representative has instructed OWNER's personnel in startup operation and maintenance of this equipment as required in the Contract Documents.

MANUFACTURER'S REPRESENTATIVE

Signature _____

Name: (print) _____

Title: _____

Representing _____

CONTRACTOR

Signature _____ Date _____

Name (print) _____

Title _____

ENGINEER

Signature _____ Date _____

Name (print) _____

Title _____

COMMENTS:

Complete and submit three copies of this form to ENGINEER upon completion of training as required by Specification Section 01670.

(NO TEXT FOR THIS PAGE)

SECTION 01710

CLEANING

PART 1 GENERAL

1.1 SECTION INCLUDES:

- A. General Requirements
- B. Disposal Requirements

1.2 GENERAL REQUIREMENTS

- A. Execute cleaning during progress of the work and at completion of the work.

1.3 DISPOSAL REQUIREMENTS

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

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

3.1 DURING CONSTRUCTION

- A. Execute daily cleaning to keep the work, the site, and adjacent properties free from accumulations of waste materials, rubbish, and windblown debris, resulting from construction operations.
- B. Provide onsite containers for the collection of waste materials, debris and rubbish. All waste materials including containers, food debris and other miscellaneous materials must be disposed of daily in onsite containers.
- C. Remove waste materials, debris and rubbish from the site periodically and dispose of at legal disposal areas away from the site.

3.2 FINAL CLEANING

- A. Requirements: At the completion of work and immediately prior to final inspection, clean the entire project as follows:
 - 1. Thoroughly clean, sweep, wash, and polish all work and equipment provided under the Contract, including finishes. Leave the structures and site in a complete and finished condition to the satisfaction of the ENGINEER.
 - 2. Direct all subcontractors to similarly perform, at the same time, an equivalent thorough cleaning of all work and equipment provided under their contracts.
 - 3. Remove all temporary structures and all debris, including dirt, sand, gravel, rubbish and waste material.
 - 4. Should the CONTRACTOR not remove rubbish or debris or not clean the buildings and site as specified above, the OWNER reserves the right to have the cleaning done at the expense of the CONTRACTOR.
- B. Employ experienced workers, or professional cleaners, for final cleaning.
- C. Use only cleaning materials recommended by manufacturer of surface to be cleaned.
- D. In preparation for substantial completion or occupancy, conduct final inspection of sight-exposed interior and exterior surfaces, and of concealed spaces.
- E. Remove grease, dust, dirt, stains, labels, fingerprints, and other foreign materials from sight-exposed interior and exterior finished surfaces. Polish surfaces so designated to shine finish.
- F. Repair, patch, and touch up marred surfaces to specified finish, to match adjacent surfaces.
- G. Replace air-handling filters if units were operated during construction.
- H. Clean ducts, blowers, and coils, if air-handling units were operated without filters during construction.
- I. Vacuum clean all interior spaces, including inside cabinets.
- J. Handle materials in a controlled manner with as few handlings as possible. Do not drop or throw materials from heights.

- K. Schedule cleaning operations so that dust and other contaminants resulting from cleaning process will not fall on wet, newly-painted surfaces.
- L. Clean interior of all panel cabinets, pull boxes, and other equipment enclosures.
- M. Wash and wipe clean all lighting fixtures, lamps, and other electrical equipment which may have become soiled during installation.
- N. Perform touch-up painting.
- O. Broom clean exterior paved surfaces; rake clean other surfaces of the grounds.
- P. Remove erection plant, tools, temporary structures and other materials.
- Q. Remove and dispose of all water, dirt, rubbish or any other foreign substances.

3.3 FINAL INSPECTION

- A. After cleaning is complete the final inspection may be scheduled. The inspection will be done with the OWNER and ENGINEER.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 01720
CONTRACT CLOSE OUT

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Warranties and Bonds
- B. Record Drawings
- C. Special Tools

1.2 WARRANTIES AND BONDS

Prior to final payment deliver to the OWNER the original and one copy of all bonds, warranties, guarantees and similar documents, including those customarily provided by manufacturers and suppliers which cover a period greater than the one year correction period. Show OWNER as beneficiary of these documents.

1.3 RECORD DRAWINGS

At the site keep and maintain one record copy of all Contract Documents, reference documents and all technical documents submitted in good order. As the work progresses the Engineer or his designated representative shall record on one set of reproducible drawings all changes and deviations from the original Plans. He shall record the exact location of all changes in vertical and horizontal alignment by offsets and ties at each; sewer, water, electric, gas, communication and other services by off-set distance to permanent improvements such as building and curbs.

Prior to acceptance of the project and before final payment is made, the Engineer shall submit one (1) set of reproducible drawings, two (2) sets of blueline or blackline prints, all marked "Drawings of Record". These Record Drawings must be certified by the Florida Registered Professional Engineer, who prepared the plans and signs and seals these plan, and submits AutoCAD compatible diskette copy of the drawings, and other applicable related records to the Department of Lee County Utilities.

These Record Drawings must be certified by the Florida Registered Professional Engineer, who prepared the plans and signs and seals these plans. The Record Drawings shall include vertical and horizontal alignment of all water, sewer, and effluent reuse lines, valves, tees, bends, reducers, hydrants, pump stations, service connections, meter boxes and/or pads, and other pertinent structures. Pipeline runs in excess of 152.4m, (500'), without fittings shall include vertical alignment information at 152.4m, (500') intervals. Said alignment shall be tied to permanent improvements, such as roadway and/or railroad centerlines and rights-of-way, building and property

corners, and shall be certified by a Professional Land Surveyor, licensed in the State of Florida. The Professional Land Surveyor can coordinate with the Contractor to install the necessary appurtenances on buried utilities to facilitate the survey after construction is completed. In addition, property strap numbers and street names shall be shown on the plan.

On a case by case basis, Lee County Utilities may waive the requirement for certification by a Professional Land Surveyor, licensed in the State of Florida. However, prior consent must first be obtained from Lee County Utilities. The County shall withhold final acceptance of the project until the requirement for record drawings and related records has been met. Record Drawings without detailed field verified horizontal and vertical locations of all facilities shown will be rejected.

1.4 SPECIAL TOOLS

Special tools are considered to be those tools which, because of their limited use, are not normally available but which are necessary for maintenance of particular equipment.

For each type of equipment provided under this CONTRACT, furnish a complete set of all special tools including grease guns and other lubricating devices, which may be needed for the adjustment, operation, maintenance, and disassembly of such equipment. Furnish only tools of high grade, smooth forged alloy tool steel. Manufacture grease guns of the lever type.

Furnish and erect one or more neat and substantial steel wall cases or cabinets with flat key locks and clips or hooks to hold each special tool in a convenient arrangement.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

SECTION 01730

OPERATION AND MAINTENANCE MANUALS

PART 1 GENERAL

1.1 SECTION INCLUDES

- A. Description
- B. Quality Assurance
- C. Submittals
- D. Format and Contents

1.2 DESCRIPTION

- A. Scope: Furnish to the ENGINEER 10 copies of an Operation and Maintenance Manual for all equipment and associated control systems furnished and installed.

1.3 QUALITY ASSURANCE

- A. Reference Codes and Specifications: No current government or commercial specifications or documents apply.

1.4 SUBMITTALS

- A. Prior to the Work Reaching 50 Percent Completion, submit to the ENGINEER for approval two copies of the manual with all specified material. Submit the approval copies with the partial payment request for the specified completion. Within 30 days after the ENGINEER's approval of the two-copy submittal, furnish to the ENGINEER the remaining 8 copies of the manual. Provide space in the manual for additional material. Submit any missing material for the manual prior to requesting certification of substantial completion.

1.5 FORMAT AND CONTENTS

- A. Prepare and arrange each copy of the manual as follows:
 - 1. One copy of an equipment data summary (see sample form) for each item of equipment.
 - 2. One copy of an equipment preventive maintenance data summary (see sample form) for each item of equipment.

3. One copy of the manufacturer's operating and maintenance instructions. Operating instructions include equipment start-up, normal operation, shutdown, emergency operation and troubleshooting. Maintenance instructions include equipment installation, calibration and adjustment, preventive and repair maintenance, lubrication, troubleshooting, parts list and recommended spare parts.
 4. List of electrical relay settings and control and alarm contact settings.
 5. Electrical interconnection wiring diagram for equipment furnished including all control and lighting systems.
 6. One valve schedule giving valve number, location, fluid, and fluid destination for each valve installed. Group all valves in same piping systems together in the schedule. Obtain a sample of the valve numbering system from the ENGINEER.
 7. Furnish all O&M Manual material on 8-1/2 by 11 commercially printed or typed forms or an acceptable alternative format.
- B. Organize each manual into sections paralleling the equipment specifications. Identify each section using heavy section dividers with reinforced holes and numbered plastic index tabs. Use 3-ring, hard-back binders Type No. VS11 as manufactured by K&M Company, Torrance, CA, or equal. Punch all loose data for binding. Arrange composition and printing so that punching does not obliterate any data. Print on the cover and binding edge of each manual the project title, and manual title, as furnished and approved by the ENGINEER.
- C. Leave all operating and maintenance material that comes bound by the equipment manufacturer in its original bound state. Cross-reference the appropriate sections of the CONTRACTOR's O&M manual to the manufacturers' bound manuals.
- D. Label binders Volume 1, 2, and so on, where more than one binder is required. Include the table of contents for the entire set, identified by volume number, in each binder.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

Not Used

END OF SECTION

Lee County Fiesta Village WWTP Filter PLC Upgrade
Lee County Utilities

Equipment Data Summary

Equipment Name: Specification Reference:

Manufacturer:

Name:

Address:

Telephone:

Number Supplied: Location/Service:

Model No: Serial No:

Type:

Size/Speed/Capacity/Range (as applicable):

Power Requirement (Phase/Volts/Hertz):

Local Representative:

Name:

Address:

Telephone:

NOTES:

Lee County Fiesta Village WWTP Filter PLC Upgrade
Lee County Utilities

Preventive Maintenance Summary

Equipment Name:

Location:

Manufacturer:

Name:

Address:

Telephone:

Model No:

Serial No:

Maintenance
Task

Lubricant/Part

D W M Q SA A

O&M Manual
Reference

NOTES:

*D-Daily W-Weekly M-Monthly Q-Quarterly SA-Semi-Annual A-Annual

SECTION 01740
WARRANTIES AND BONDS

PART 1 GENERAL

1.1 REQUIREMENTS INCLUDED

- A. Compile specified warranties and bonds, as in Articles 6 and 13 of the General Conditions.
- B. Co-execute submittals when so specified.
- C. Review submittals to verify compliance with Contract Documents.
- D. Submit to the ENGINEER for review and transmittal to OWNER.

1.2 SUBMITTAL REQUIREMENTS

- A. Assemble warranties, bonds and service and maintenance contracts, executed by each of the respective manufacturers, suppliers, and subcontractors.
- B. Two original signed copies are required.
- C. Table of Contents. Neatly typed in orderly sequence. Provide complete information for each items.
 - 1. Product or work item.
 - 2. Firm, with name of principal, address and telephone number.
 - 3. Scope.
 - 4. Date of beginning 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.

1.3 FORM OF SUBMITTALS

- A. Prepare in duplicate packets.
- B. Format:
 - 1. Size 8-1/2" x 11", punch sheets for standard 3-post binder.
 - a. 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-post binder, with durable and cleanable plastic covers and maximum post width of 2 inches.

1.4 WARRANTY SUBMITTAL REQUIREMENTS

- A. For all major pieces of equipment, submit a warranty from the equipment manufacturer. The manufacturer's warranty period shall be concurrent with the CONTRACTOR's for one (1) year, unless otherwise specified, commencing at the time of substantial completion.
- B. The CONTRACTOR shall be responsible for obtaining certificates for equipment warranty for all major equipment specified under Division 11, 13, 14, 15, and 16 and which has a 1 HP motor or which lists for more than \$1,000. The ENGINEER reserves the right to request warranties for equipment not classified as major. The CONTRACTOR shall still warrant equipment not considered to be "major" in the CONTRACTOR's one-year warranty period even though certificates of warranty may not be required.

PART 2 PRODUCTS

NOT USED

PART 3 EXECUTION

NOT USED

END OF SECTION

SECTION 01900 PERMITS

PART 1 GENERAL

1.1 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.

1.2 PERMITS

- A. The Owner has obtained / will obtain permits from the following agencies where required for the construction of the work included in the project.

- 1. Lee County Building Department

- B. All other permits and licenses required to perform the work included in the contract are the complete and total responsibility of the CONTRACTOR including but not limited to the following:

- 1. To be determined

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION (NOT USED)

END OF SECTION

SECTION 02050

DEMOLITION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: All work necessary for the removal and disposal of buildings, structures, foundations, piping, equipment and roadways, or any part thereof including masonry, steel, reinforced concrete, plain concrete, electrical facilities, and any other material or equipment shown or specified to be removed.
- B. Basic Procedures and Schedule: Carry out demolition so that adjacent structures, which are to remain, are not endangered. Schedule the work so as not to interfere with the day to day operation of the existing facilities. Do not block doorways or passageways in existing facilities.
- C. Additional Requirements: Provide dust control and make provisions for safety.

1.2 SUBMITTALS

- A. Provide all submittals, including the following, as specified in Division 1.
- B. Site Inspection: Visit the site and inspect all existing structures. Observe and record any defects which may exist in buildings or structures adjacent to but not directly affected by the demolition work. Provide the OWNER with a copy of this inspection record and obtain the (ENGINEER's) (OWNER's) approval prior to commencing the demolition.

1.3 QUALITY ASSURANCE

- A. Limits: Exercise care to break concrete well for removal in reasonably small masses. Where only parts of a structure are to be removed, cut the concrete along limiting lines with a suitable saw so that damage to the remaining structure is held to a minimum.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 EXAMINATION OF EXISTING DRAWINGS

- A. Drawings of existing structures and equipment will be available for inspection at the office of the (ENGINEER) (OWNER).

3.2 PROTECTION

- A. General Safety: Provide warning signs, protective barriers, and warning lights as necessary adjacent to the work as approved or required. Maintain these items during the demolition period.
- B. Existing Services: Undertake no demolition work until all mechanical and electrical services affected by the work have been properly disconnected. Cap, reroute or reconnect interconnecting piping or electrical services that are to remain in service either permanently or temporarily in a manner that will not interfere with the operation of the remaining facilities.
- C. Hazards: Perform testing and air purging where the presence of hazardous chemicals, gases, flammable materials or other dangerous substances is apparent or suspected, and eliminate the hazard before demolition is started.

3.3 DEMOLITION REQUIREMENTS

- A. Explosives: The use of explosives will not be permitted.
- B. Protection: Carefully protect all mechanical and electrical equipment against dust and debris.
- C. Removal: Remove all debris from the structures during demolition and do not allow debris to accumulate in piles.
- D. Access: Provide safe access to and egress from all working areas at all times with adequate protection from falling material.
- E. Protection: Provide adequate scaffolding, shoring, bracing railings, toe boards and protective covering during demolition to protect personnel and equipment against injury or damage. Cover floor openings not used for material drops with material substantial enough to support any loads placed on it. Properly secure the covers to prevent accidental movement.
- F. Lighting: Provide adequate lighting at all times during demolition.
- G. Closed Areas: Close areas below demolition work to anyone while removal is in progress.

- H. Material Drops: Do not drop any material to any point lying outside the exterior walls of the structure unless the area is effectively protected.

3.4 DISPOSAL OF MATERIALS

- A. Final Removal: Remove all debris, rubbish, scrap pieces, equipment, and materials resulting from the demolition unless otherwise indicated. Take title to all demolished materials and remove such items from the site.
- B. OWNER's Property: In addition to any items which may be shown, the following items remain the property of the OWNER. Remove carefully, without damage, all items listed or shown, and stockpile as directed.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 02630
DUCTILE IRON PIPE AND FITTINGS

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment, and incidentals required, and install ductile iron pipe, fittings and appurtenances as shown on the Drawings and as specified herein.
- B. NOTE: No buried ductile iron pipe shall be acceptable for sanitary force main construction. All water mains larger than 12 inches shall be constructed of Ductile Iron Pipe and shall be used for all vertical deflections ditch crossings, subaqueous crossings, and all paved surfaces unless otherwise approved by Lee County Utilities.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. Section 02650 - Laying and Jointing Buried Pipe

1.3 REFERENCE SPECIFICATIONS, CODES, AND STANDARDS

- A. Commercial Standards: (Latest Revision)
 - 1. ANSI/AWWA C104/A21.4 Cement-Mortar Lining for Ductile-Iron Pipe and Fittings for Water.
 - 2. ANSI/AWWA C105/A21.5 Polyethylene Encasement for Ductile-Iron Piping for Water and Other Liquids.
 - 3. ANSI/AWWA C110/A21.10 Ductile-Iron Fittings, 3 in. Through 48 Inches, for Water and Other Liquids. (C110 2-48 inches).
 - 4. ANSI/AWWA C111/A21.11 Rubber Gasket Joints for Ductile-Iron Pressure Pipe and Fittings.
 - 5. ANSI/AWWA C115/A21.15 Flanged Ductile-Iron Pipe with Threaded Flanges.
 - 6. ANSI/AWWA C150/A21.50 Thickness Design of Ductile-Iron Pipe.
 - 7. ANSI/AWWA C151/A21.51 Ductile-Iron Pipe, Centrifugally Cast for Water or Other Liquids.
 - 8. ANSI/AWWA C153/A21.53 Ductile-Iron Compact Fittings, 3 inches through 16 inches, for Water and Other Liquids.
 - 9. AWWA C600 Installation of Ductile Iron Water Mains and Their

Appurtenances.

10. AWWA F477 Method for Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Material

1.4 CONTRACTOR SUBMITTALS

- A. Shop Drawings: Submit shop drawings of pipe and fittings in accordance with the requirements in the General Conditions, the requirements of the referenced standards and the following supplemental requirements as applicable:
 - 1. Certified dimensional drawings of all valves, fittings, and appurtenances.
 - 2. For pipe 48 inches in diameter and larger, a line layout and marking diagram shall indicate the specific number and location (station) of each fitting.
 - 3. In all cases, a line layout to indicate the limits of each reach of restrained joints, or of concrete encasement shall be supplied.
- B. Certifications: Furnish a certified affidavit of compliance for all pipe and other products or materials furnished under this Section of the Specifications, which indicates that all tests have been made and that all results comply with the requirements of AWWA C151, including but not necessarily limited to the following:
 - 1. Acceptance Tests.
 - 2. Hydrostatic Tests.
 - 3. Low Temperature Impact Tests.
- C. Additional Documentation: Foundry records shall be furnished in the form of written transcripts upon request.
- D. All expenses incurred for certification, testing, and data submittal shall be borne by the CONTRACTOR or the Supplier.

1.5 QUALITY ASSURANCE

- A. Inspection: All pipe shall be available for inspection at the place of manufacture prior to shipping in accordance with the provisions of the referenced standards. Notify the ENGINEER in writing not less than 10 calendar days prior to the shipping of the pipe.
- B. The ENGINEER shall be given access to all areas where manufacturing and testing is performed and shall be permitted to make all inspections necessary to confirm manufacturer compliance with these Specifications.
- C. Tests: Except as modified herein, all materials used in the manufacture of the pipe shall be tested in accordance with the requirements of the referenced standards as applicable.
- D. Provide data on material tests at no additional cost to the OWNER.

- E. In addition to those tests specifically required, the ENGINEER may request additional samples of any material including lining and coating samples for testing by the OWNER. The additional samples shall be furnished at no additional cost to the OWNER.

1.6 CORROSION PROTECTION

- A. The allowed force main pipe materials are polyvinyl chloride (PVC) or high density polyethylene (HDPE) or fiberglass. Use of ductile iron pipe (DIP) and DIP fittings are not allowed without the specific approval of Lee County Utilities. Where a force main is expected to flow full pipe at all times, DIP may be used after specific approval by Lee County Utilities. The DIP pipe will be required to have a Polybond Plus lining or approved equal. The Polybond Plus lining consist of a minimum of 60 mils thick polyethylene lining with a fusion bonded epoxy primer layer to the DIP pipe. This lining must extend through the bell of the pipe to a point under the sealing gasket. To ensure a holiday-free lining, documentation must be provided, prior to shipment, showing each section of the lined pipe has passed the holiday testing at production per ASTM G62 with a minimum of 10,000 volt charge.
- B. If specifically approved by Lee County Utilities for use, exterior protection shall be provided for underground ductile iron pipe and fittings within areas of severe corrosive conditions. This shall be accomplished by the installation of polyethylene encasement through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas shall be those set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing said utility shall be protected for a distance of 20 feet to each side. If ductile iron pipe is to be installed parallel to and within 10 feet of cathodically protected pipe, then protection shall be provided for the entire length. Steel pipe shall not be installed in severe corrosion areas.

PART 2 PRODUCTS

2.1 GENERAL

- A. Cement mortar lined ductile iron pipe shall conform to ANSI/AWWA C151 and C104, subject to the following supplemental requirements. The pipe shall be of the diameter and class shown, shall be furnished complete with rubber gaskets as indicated in the Contract Documents, and all specials and fittings shall be provided as required under the Contract Documents.
- B. Markings: Legibly mark specials 48 inches in diameter and larger in accordance with the laying schedule and marking diagram. All fittings shall be marked at each end with top field centerline.
- C. Handling and Storage: The pipe shall be handled by wide slings, padded cradles, or other devices designed and constructed to prevent damage to the pipe and its lining. The use of equipment or handling, which might injure the pipe and its lining, will not be permitted. Stockpiled pipe shall be suitably supported

and shall be secured to prevent accidental rolling. All other pipe handling equipment and methods shall be acceptable to the ENGINEER.

- D. Laying lengths: Maximum pipe laying lengths shall be 20 feet.
- E. Finish: The pipe shall have smooth dense interior surfaces and shall be free from fractures, excessive interior surface crazing and roughness, in accordance with ANSI/AWWA C104.
- F. Closures and Correction Pieces: Closures and correction pieces shall be provided as required so that closures may be made due to different headings in the pipe laying operation and so that correction may be made to adjust the pipe laying to conform to pipe stationing shown on the Drawings or line layouts where applicable.

2.2 PIPE DESIGN CRITERIA

- A. General: Ductile Iron pipe shall be designed in accordance with the requirements of ANSI/AWWA C150 as applicable and as modified in this Section.
- B. Pipe Wall Thickness for Internal Pressure: The pipe shall be designed with a net thickness to withstand the design internal pressure in accordance with the hoop stress formula. In addition to the requirements of the Section, the minimum wall thickness shall be in accordance with the minimum thickness wall depicted in table 50.5 of ANSI/AWWA C150.
- C. Ductile Iron Pipe shall be a minimum of Class 50 or pressure Class 250 and will be accepted in any diameter for use within the water distribution system.
- D. All aboveground water main pipe shall be painted blue. The pipe wall thickness shall not be less than that required by a working pressure of 250 psi in laying condition Type 4 "B" with 5-foot cover in conformance with ANSI Standard A21.50.

2.3 MATERIALS

- A. Ductile Iron Pipe: Pipe materials shall conform to the requirements of ANSI/AWWA C151.
- B. Cement: Cement for mortar lining shall conform to the requirements of ANSI/AWWA C104; provided that cement for mortar lining shall be Type II or V. A fly ash or pozzolan shall not be used.
- C. Adapters to connect ductile iron pipe or fittings to pipe or fittings of dissimilar materials shall be supplied by the CONTRACTOR in accordance with the pipe manufacturer recommendations, and as approved by the ENGINEER.

2.4 SPECIALS AND FITTINGS

- A. Fittings for ductile iron pipe shall conform to the requirements of ANSI/AWWA C153/A21.53 or ANSI/AWWA C110/A21.10 for diameters 3 inches through 48 inches and shall have a minimum pressure rating of 250 psi. Ductile iron fittings shall be cement lined, seal coated and outside coated as specified. Ductile Iron fittings larger than 48 inches shall conform to the above referenced standard with the necessary modifications for the larger size manufacturer's standard.
- B. All above-ground fittings in direct contact with wastewater shall be HDPE or ductile iron flanged joints with a minimum pressure rating of 250 psi conforming to ANSI A21.10. If above-ground ductile iron fitting is used, the fitting shall be lined with Protecto 401 applied in strict accordance with the manufacturers specifications to a dry film thickness of 40 mils. All DIP fittings for wastewater service shall have an internal fusion bonded epoxy coating to a minimum of 20 mil thickness. All above- ground fittings shall have a factory applied exterior epoxy coating in accordance with AWWA C550.

2.5 DESIGN OF PIPE

- A. General: The pipe furnished shall be ductile iron pipe, mortar-lined, with rubber gasketed joints.
- B. The pipe shall be designed, manufactured, tested, inspected, and marked according to applicable requirements previously stated and except as hereinafter modified, shall conform to ANSI/AWWA C151.
- C. Pipe Dimensions: The pipe shall be of the diameter and class shown. The minimum wall thickness for each pipe size shall be as specified herein or shown on the Drawings.
- D. Fitting Dimensions: The fittings shall be of the diameter shown and class specified.
- E. Joint Design: Ductile Iron pipe and fittings shall be furnished with mechanical joints, push-on joints and flanged joints as follows:
 - 1. For buried pipe applications, unless otherwise indicated, mechanical and push-on joints shall conform to ANSI/AWWA C111/A21.11, with the minimum pressure rating of 250 psi.
 - 2. For above-ground or buried vault applications, unless otherwise indicated, flanged joints shall conform to ANSI/AWWA C115/A21.15, with the minimum pressure rating of 250 psi. All above-ground fittings shall be painted blue.
- F. Restraining Devices: Restraining joints shall be placed at all bends, tees, plugs, reducers, and other fittings to provide lateral support, and shall conform to the details shown on the drawings in Sections 9 of the Lee County Utilities Operations Manual. Concrete thrust blocks may be utilized as additional restraint if approved by Lee County Utilities.

1. Joint restraint devices for ductile iron mechanical joint pipe and ductile iron mechanical joint fittings to ductile iron pipe shall be EBAA Iron Inc., Series 1100 Megalug (R), Star Pipe Products, L.P., or approved equal.
 2. Bell joint restraint devices for ductile iron push joint pipe shall be EBAA Iron Inc., Series 1700 Megalug (R) for bell restraint, Star Pipe Products L.P., or approved equal.
- G. For bell-and-spigot ends with rubber gaskets, the clearance between the bells and spigots shall be such that when combined with the gasket groove configuration and the gasket itself will provide watertight joints under all operating conditions when properly installed. Require the pipe manufacturer to submit details complete with significant dimensions and tolerances and also to submit performance data indicating that the proposed joint has performed satisfactorily under similar conditions. In the absence of a history of field performance, the results of a test program shall be submitted.
- H. Gaskets shall be a Buna N, Neoprene, or a Nitril-based rubber product approved by the County. Gaskets shall have clean tips unless otherwise specified. Elastomeric gaskets conforming to ASTM F-477 shall also be acceptable.
- I. Shop-applied interior linings and exterior coatings shall be applied evenly to the nominal thickness specified. Holiday free cement is not possible to manufacture. Exterior coatings: asphalt coating for buried pipe or primed pipe cannot be furnished holiday free.

2.6 CEMENT-MORTAR LINING

- A. Cement-Mortar Lining For Shop Application: Except as otherwise provided herein, interior surfaces of all ductile iron pipe shall be cleaned and lined in the shop with cement-mortar lining applied centrifugally in conformity with ANSI/AWWA C104. Ductile-Iron pipefittings need not have the cement-mortar lining applied centrifugally. The lining machines shall be of a type that has been used successfully for similar work. Every precaution shall be taken to prevent damage to the lining. If lining is damaged or found faulty at delivery site, the damaged or unsatisfactory portions shall be repaired in the filed in accordance with ANSI/AWWA C104.
- B. The nominal wet lining thickness shall be as follows:
- | Nominal Pipe Diameter (in.) | Nominal Lining Thickness (in.) | Nominal Replacement Lining Thickness (in.) |
|-----------------------------|--------------------------------|--|
| 3-12 | 1/8 | 1/8 |
| 14-24 | 3/16 | 3/16 |
| 30-64 | 1/4 | 1/4 |

- C. Protection of Pipe Lining/Interior: All shop-applied cement mortar lining shall be given a seal coat of asphaltic material in conformance with ANSI/AWWA C104.

2.7 EXTERIOR COATING OF PIPE

- A. Exterior Coating of Exposed Piping: The exterior surfaces of pipe which will be exposed to the atmosphere inside structures or above ground shall be thoroughly cleaned and then given a shop coat of rust-inhibitive primer conforming to the requirements of Section 09900, "Painting and Coating". All above-ground pipe shall be painted blue. NOTE: Where severely corrosive soils and other adverse conditions occur, this coating may not provide the desired protection. In such cases, a heavier coating, polyethylene wrap, cathodic protection or a combination of these may be required. To determine the protection needed, an investigation should be made of the following items.
 - a. Experience with existing installations in the area, if any
 - b. Soil resistivity
 - c. Soil Ph
 - d. Oxidation-reduction potential of the soil
 - e. Sulfides
 - f. Moisture content
 - g. Soil description
 - h. Existence of stray direct currents
 - i. Possible cathodic interference
- B. Exterior Coating of Buried Piping: The exterior coating shall be an asphaltic coating approximately 1 mil thick, conforming to ANSI/AWWA C151.

2.8 CORROSION PROTECTION

- A. The allowed force main pipe materials are polyvinyl chloride (PVC) or high density polyethylene (HDPE) or fiberglass. Use of ductile iron pipe (DIP) and DIP fittings are not allowed without the specific approval of Lee County Utilities. Where a force main is expected to flow full pipe at all times, DIP may be used after specific approval by Lee County Utilities. The DIP pipe will be required to have a Polybond Plus lining or approved equal. The Polybond Plus lining consist of a minimum of 60 mils thick polyethylene lining with a fusion bonded epoxy primer layer to the DIP pipe. This lining must extend through the bell of the pipe to a point under the sealing gasket. To ensure a holiday-free lining, documentation must be provided, prior to shipment, showing each section of the lined pipe has passed the holiday testing at production per ASTM G62 with a minimum of 10,000 volt charge.
- B. If specifically approved by Lee County Utilities for use, exterior protection shall be provided for underground ductile iron pipe and fittings within areas of severe corrosive conditions. This shall be accomplished by the installation of polyethylene encasement through the area of concern. The soil test evaluation to determine the necessity for extra protection in suspect areas shall be those set forth in ANSI Standard A21.5. Additionally, where other existing utilities are known to be cathodically protected, ductile iron pipe crossing said utility shall be protected for a distance of 20 feet to each side. If ductile iron pipe is to be installed parallel to and within 10 feet of cathodically protected pipe, then protection shall be provided for the entire length. Steel pipe shall not be installed in severe corrosion areas.

PART 3 EXECUTION

3.1 INSTALLATION OF PIPE

- A. Handling and Storage: All pipe, fittings, etc., shall be carefully handled and protected against damage, impact shocks, and free fall and in accordance with ANSI/AWWA C600. Pipe shall not be placed directly on rough rocky ground but in such instances shall be supported in a manner which will protect the pipe against injury whenever stored at such trench site or elsewhere. No pipe shall be installed where the lining or coating show defects that may be harmful as determined by the ENGINEER. Such damaged lining or coating shall be repaired, or a new undamaged pipe shall be furnished and installed.
- B. All pipe damaged prior to Substantial Completion or during warrantee period shall be repaired or replaced by the CONTRACTOR.
- C. Inspect each pipe and fitting prior to installation to insure that no damaged portions of the pipe get installed.
- D. Before placement of pipe in the trench, each pipe or fitting shall be thoroughly cleaned of any foreign substance, which may have collected therein and shall be kept clean at all times thereafter. For this purpose, the openings of all pipes and fittings in the trench shall be closed during any interruption to the work.
- E. Pipe Laying: The pipe shall be installed in accordance with ANSI/AWWA C600.
- F. Pipe shall be laid directly on the bedding material. No blocking will be permitted, and the bedding shall be such that it forms a continuous, solid bearing for the full length of the pipe. Excavations shall be made as needed to facilitate removal of handling devices after the pipe is laid. Bell holes shall be formed at the ends of the pipe to prevent point loading at the bells or couplings. Excavation shall be made as needed outside the normal trench section at field joints to permit adequate access to the joints for field connection operations and for application of coating on field joints.
- G. Where necessary to raise or lower the pipe due to unforeseen obstructions or other causes, the ENGINEER may change the alignment and/or the grades. Such change shall be made by the deflection of joints, by the use of bevel adapters, or by the use of additional fittings. However, in no case shall the deflection in the joint exceed 70 percent of the maximum deflection recommended by the pipe manufacturer. No joint shall be misfit any amount which will be detrimental to the strength and water tightness of the finished joint.
- H. Pipe and Specials Protection: The openings of all pipe and specials shall be protected with suitable bulkheads to prevent unauthorized access by persons, animals, water, or any undesirable substance. At all times, means shall be provided to prevent the pipe from floating.

- I. Pipe Cleanup: As pipe laying progresses, keep the pipe interior free of all debris. Completely clean the interior of the pipe of all sand, dirt, mortar splatter and any other debris following completion of pipe laying, pointing of joints, and any necessary interior repairs per ANSI/AWWA C600 and C602 prior to testing and disinfecting the completed pipeline. Pipe larger than 12" diameter will utilize a polyurethane foam plug "Poly Pig" to remove all debris from main.

3.2 RUBBER GASKETED JOINTS

- A. Rubber Gasketed Joints: Immediately before jointing pipe, the bell end of the pipe shall be thoroughly cleaned, and a clean rubber gasket shall be placed in the bell groove. The bell and spigot end of push-on joint pipe shall be carefully cleaned and lubricated with a vegetable-based lubricant or per manufacturer's recommendation. The spigot end of the pipe section shall then be inserted into the bell of the previously laid joint and telescoped into its proper position. Tilting of the pipe to insert the spigot into the bell will not be permitted.

3.3 INSTALLATION OF PIPE APPURTENANCES

- A. Installation of Valves: All valves shall be handled in a manner to prevent any injury or damage to any part of the valve. All joints shall be thoroughly cleaned and prepared prior to installation. Adjust all stem packing and operate each valve prior to installation to insure proper operation.
- B. All valves shall be installed so that the valve stems are plumb and in the location shown on the Drawings.
- C. Mechanical joints consisting of bell, socket, gland, gasket, bolts, and nuts shall conform to ANSI Standard A21.11. Bolts and nuts shall be high strength, low alloy, Cor-Ten, T-Head Type having hexagonal nuts. Bolts and nuts shall be machined through and nuts shall be tapped at right angles to a smooth bearing surface. Single sealed gasket push-on type joints shall conform to the requirements of ANSI A21.11 and shall be Tyton, Fastite, Superbelltite, Alltite, or approved equal.
- D. Mechanical joint retainer glands may be used to restrain mechanical joint pipe and fittings to the plain end of ductile iron pipe and fittings when used in conjunction with thrust blocks of reduced size. The Utilities ENGINEER must approve thrust block size. Joint flexibility shall be maintained.

3.4 TESTING AND DISINFECTION

- A. Test completed water pipeline in accordance with Section 02676. Disinfect completed water pipeline in accordance with Section 2675.

END OF SECTION

SECTION 02676

LEAKAGE TESTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Testing for any signs of leakage in all pipelines and structures required to be watertight.
 - 1. Test gravity sewers and drain lines by low pressure air testing.
 - 2. Test all other pipelines with water under the specified pressures.
- B. Operation of Existing Facilities: Conduct all tests in a manner to minimize as much as possible any interference with the day-to-day operations of existing facilities or other contractors working on the site.

1.2 PERFORMANCE REQUIREMENTS

- A. Written Notification of Testing: Provide written notice when the work is ready for testing, and make the tests as soon thereafter as possible.
 - 1. Personnel for reading meters, gauges, or other measuring devices, will be furnished.
 - 2. Furnish all other labor, equipment, air, water and materials, including meters, gauges, smoke producers, blower, pumps, compressors, fuel, water, bulkheads and accessory equipment.

1.3 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. AWWA C 600 - Installation of Ductile-Iron Water Mains and Their Appurtenances

1.4 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Testing Report: Prior to placing the sewer system in service submit for review and approval a detailed bound report summarizing the leakage test data, describing the test procedure and showing the calculations on which the leakage test data is based.

1. Reference Sewer Line Data

a. For Low Pressure Air Testing

- (1) The length and diameter of the section of line tested (MH to MH) including any laterals.
- (2) A complete description of test procedures and methods, including:
 - (a) Trench backfilling and sewer cleaning status
 - (b) Type of plugs used and where
 - (c) Depth of sewer, and ground water pressure over sewer pipe
 - (d) Stabilization time period and air pressure
 - (e) Actual air test pressures used if ground water is present
 - (f) The allowed time by specifications
 - (g) The actual test time
 - (h) The air pressure at beginning and end of test
- (3) The name of the inspector/tester and the date(s) and time(s) of all testing, including any retesting.
- (4) A description of any repairs made.

PART 2 PRODUCTS

Not Used

PART 3 EXECUTION

3.1 LEAKAGE TESTING

- A. All new sewer and water pipelines installed shall be tested for leakage. The test used will be Hydrostatic Testing for pressure lines and Low Pressure Air Testing for gravity lines. Tests to be performed will be indicated by the ENGINEER and witnessed by the ENGINEER and the Lee County Utilities representatives.

1. Flushing

- a. All mains shall be flushed to remove all sand and other foreign matter. The velocity of the flushing water shall be at least 4 fps. Flushing shall be terminated at the direction of the ENGINEER. dispose of the flushing water without causing a nuisance or property damage.
- b. Temporary flush out connections shall be installed on all dead end water mains at the locations shown on the Drawings and in accordance with the detail shown in Section 9 of the Lee County Utilities Operations Manual.

2. Hydrostatic Testing

Perform hydrostatic testing of the system as set forth in the following, and shall conduct said tests in the presence of representatives from the COUNTY and other authorized agencies, with 48 hours advance notice provided.

Piping and appurtenances to be tested shall be within sections between valves unless alternate methods have received prior approval from the COUNTY. Testing shall not proceed until concrete thrust blocks are in place and cured, or other restraining devices installed. All piping shall be thoroughly cleaned and flushed prior to testing to clear the lines of all foreign matter. While the piping is being filled with water, care shall be exercised to permit the escape of air from extremities of the test section, with additional release cocks provided if required.

Hydrostatic testing shall be performed with a sustained pressure for a minimum of two (2) hours at 150 psi pressure or 2-1/2 times working pressure, whichever is higher, unless otherwise approved by Lee County Utilities, for a period of not less than two (2) hours. Testing shall be in accordance with the applicable provisions as set forth in the most recent edition of AWWA Standard C600. The allowable rate of leakage shall be less than the number of gallons per hour determined by the following formula:

$$L = \frac{SD (P)^{1/2}}{133,200}$$

Where,

- L = Allowable leakage in gallons per hour;
- S = Length of pipe tested in feet;
- D = Nominal diameter of the pipe in inches;
- P = Average test pressure maintained during the leakage test in pounds per square inch

For 150 psi, $L = (9.195 \times 10^{-5}) SD$

The testing procedure shall include the continued application of the specified pressure to the test system, for the one hour period, by way of a pump taking

supply from a container suitable for measuring water loss. The amount of loss shall be determined by measuring the volume displaced from said container.

Should the test fail, necessary repairs shall be accomplished by the CONTRACTOR and the test repeated until results are within the established limits. The CONTRACTOR shall furnish the necessary labor, water, pumps, and gauges at specified location(s) and all other items required to conduct the required testing and perform necessary repairs.

General. All sanitary sewers and associated service lines shall be constructed watertight to prevent infiltration and/or exfiltration. All new sanitary sewer systems will be subject to low pressure air testing.

3. Low Pressure Air Test

After completing backfill of a section of gravity sewer line, conduct a Line Acceptance Test using low pressure air. The test shall be performed using the below stated equipment, according to state procedures and under the supervision of the ENGINEER and in the presence of a Lee County Utilities representative, with 48 hours advanced notice provided.

a. Equipment:

1. Pneumatic plugs shall have a sealing length equal to or greater than the diameter of the pipe to be inspected.
2. Pneumatic plugs shall resist internal bracing or blocking.
3. All air used shall pass through a single control panel.
4. Three individual hoses shall be used for the following connections:
 - a. From control panel to pneumatic plugs for inflation.
 - b. From control panel to sealed line for introducing the low pressure air.
 - c. From sealed line to control panel for continually monitoring the air pressure rise in the sealed line.

b. Procedures:

All pneumatic plugs shall be seal tested before being used in the actual test installation. One length of pipe shall be laid on the ground and sealed at both ends with the pneumatic plugs to be checked. Air shall be introduced into the plugs to 25 psi. The sealed pipe shall be pressurized

to 5 psi. The plugs shall hold against this pressure without bracing and without movement of the plugs out of the pipe.

After a manhole to manhole reach of pipe has been backfilled and cleaned and the pneumatic plugs are checked by the above procedure, the plugs shall be placed in the line at each manhole and inflated to 25 psi. Low pressure air shall be introduced into this sealed line until the internal air pressure reaches 4 psi greater than the average back pressure of any ground water that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize. After the stabilization period (3.5 psi minimum pressure in the pipe), the air hose from the control panel to the air supply shall be disconnected. The portion of line being tested shall be termed "Acceptable", if the time required in minutes for the pressure to decrease from 3.5 to 2.5 psi (greater than the average back pressure of any ground water that may be over the pipe) is greater than the time shown for the given diameters in the following table:

<u>Pipe Diameter</u> <u>In Inches</u>	<u>Minutes</u>
8	4.0
10	5.0
12	5.5
16	7.5
18	8.5
24	11.5

Time in minutes = 0.472 D
D = Diameter of pipe in inches.

In areas where ground water is known to exist, the CONTRACTOR shall install capped pipe adjacent to the top of one of the sewer lines. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the Line Acceptance Test, the ground water shall be determined by removing the pipe cap, and a measurement of the height in feet of water over the invert of the pipe shall be taken. The height in feet shall be divided by 2.3 to establish the pounds of pressure that will be added to all readings. (For example, if the height of water is 11-1/2 feet, then the added pressure will be 5 psi. This increases the 3.5 psi to 8.5 psi, and the 2.5 psi to 7.5 psi. The allowable drop of one pound and the timing remain the same).

If the installation fails to meet this requirement, the CONTRACTOR shall, at his own expense, determine the source of leakage. He shall then repair or replace all defective materials and/or workmanship.

3.2 LEAKAGE TESTS FOR STRUCTURES

- A. Structure Leakage Testing: Perform leakage tests of wet wells, tanks, vaults and similar purpose structures before backfilling, by filling the structure with water to the overflow water level and observing the water surface level for the following 24 hours.
1. Make an inspection for leakage of the exterior surface of the structure, especially in areas around construction joints.
 2. Leakage will be accepted as within the allowable limits for structures from which there are no visible leaks.
 3. If visible leaks appear, repair the structure by removing and replacing the leaking portions of the structure, waterproofing the inside, or by other methods approved.
 4. Water for testing will be provided by the OWNER at the CONTRACTOR's expense.

END OF SECTION

SECTION 02999

MISCELLANEOUS WORK AND CLEANUP

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. This Section includes operations which cannot be specified in detail as separate items but can be sufficiently described as to the kind and extent of work involved. Furnish all labor, materials, equipment and incidentals to complete the work under this Section.
- B. The work of this Section includes, but is not limited to, the following:
 - 1. Restoring of sidewalks, driveways, curbing and gutters.
 - 2. Crossing utilities.
 - 3. Relocation of existing water lines, low pressure, gas lines, telephone lines, electric lines, cable TV lines and storm drains as necessary, all as shown on the drawings.
 - 4. Restoring easements and rights-of-ways.
 - 5. Cleaning up.
 - 6. Incidental work.

1.2 WORK SPECIFIED UNDER OTHER SECTIONS

- A. All work shall be completed in a workmanlike manner by competent workmen in full compliance with all applicable sections of these Specifications.

PART 2 PRODUCTS

2.1 MATERIALS

- A. Materials required for this Section shall be of at least the same type and quality as materials that are to be restored. Where possible, reuse existing materials that are removed and then replaced, with the exception of paving.

PART 3 EXECUTION

3.1 RESTORING OF CURBING, FENCES, AND GUARD RAILS

- A. Existing curbing shall be protected. If necessary, curbing shall be removed from joint to joint and replaced after backfilling. Curbing which is damaged during construction shall be replaced with curbing of equal quality and dimension.

3.2 CROSSING UTILITIES

- A. This item shall include any extra work required in crossing culverts, water courses, drains, water mains, and other utilities, including all sheeting and bracing, extra excavation and backfill, or any other work required for the crossing, whether or not shown on the drawings.

3.3 RELOCATIONS OF EXISTING GAS LINES, TELEPHONE LINES, ELECTRIC LINES, AND CABLE TV LINES

- A. Notify the proper authority of the utility involved when relocation of these lines is required. Coordinate all work by the utility so that the progress of construction will not be hampered.

3.4 PROTECTION AND RESTORATION OF PROPERTY

- A. Protection and Restoration of Property: During the course of construction, take special care and provide adequate protection in order to minimize damage to vegetation, surfaced areas, and structures within the construction right-of-way, easement or site, and take full responsibility for the replacement or repair thereof. Immediately repair any damage to private property created by encroachment thereon. Should the removal or trimming of valuable trees, shrubs, or grass be required to facilitate the installation within the designated construction area, this work shall be done in cooperation with the County and/or local communities which the work takes place. Said valuable vegetation, removed or damaged, shall be replanted, if possible, or replaced by items of equal quality, and maintained until growth is re-established. Top soil damaged in the course of work shall be replaced in kind with suitable material, graded to match existing grade. Following construction completion, the work area along the route of the installation shall be finish grade to elevations compatible with the adjacent surface, with grassing or hand raking required within developed areas.
- B. Existing lawn surfaces damaged by construction shall be re-graded and re-sodded or re-seeded. These areas shall be maintained until all work under this Contract has been completed and accepted.

3.5 CLEANING UP

- A. Remove all construction material, excess excavation, buildings, equipment and other debris remaining on the job as a result of construction operations and shall render the site of the work in a neat and orderly condition.
- B. Work site clean-up shall follow construction operations without delay and in accordance with Section 01710.

3.6 INCIDENTAL WORK

- A. Do all incidental work not otherwise specified, but obviously necessary for the proper completion of the Contract as specified and as shown on the drawings.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 05510
METAL STAIRS, LADDERS, AND WALKWAYS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Technical requirements for metal stairs, ladder, and walkways.

1.2 REFERENCES

- A. General: References to standards, specifications, manuals, or codes of any technical society, organization or association, or to the Laws or Regulations of any government 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, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

B. ANSI Standards

1. ANSI A14.3 Safety Requirements for Fixed Ladders

C. ASTM Standards

1. ASTM A36 Specification for Structural Steel
2. ASTM A53 Specification for Pipe, Steel, Black and Hot-Dipped, Zinc-Coated Welded and Seamless
3. ASTM A123 Specification for Zinc (Hot-Dip Galvanized) Coating on Iron and Steel Products
4. ASTM A193 Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
5. ASTM A500 Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

D. AWS Standards

1. AWS D1.1 Welding in Building Construction

1.3 SYSTEM DESCRIPTION

- A. Furnish and install metal stairs, ladders, and walkways required to complete work show and specified
- B. Furnish and install metal stairs, ladders, and walkways as shown on the Drawings and specified in this Section.

1.4 SUBMITTALS

A. Shop Drawings.

1. Show stair, ladder and walkway fabrication and construction details.
2. Including necessary plans, sections and elevations to show Life Safety features.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements

1. Design, fabrication and construction of stairs, ladders and walkways shall comply with SBC, OSHA and NFPA 101 Life Safety code.
2. Stairs, ladders and walkways for utility facilities shall conform to "industrial Occupancy" An accessible to the public, unless otherwise indicated on the Drawings

PART 2 – PRODUCTS

2.1 MATERIALS FOR METAL STAIR, LADDERS, AND WALKWAYS

A. Steel

1. Steel bars, plates, shapes, and connections for steel stairs and walkways shall meet the requirements of ASTM A36.
2. Structural steel tubing for steel walkways shall meet the requirements of ASTM A500, Grade B. Wall thickness shall be as shown on the Drawings.
3. Steel pipe for steel walkways shall meet the requirements of ASTM A53, Schedule 40.
4. Steel fabrications shall be galvanized by the hot dip method, after fabrication, in accordance with the requirements of ASTM A1 23.

B. Aluminum

1. Aluminum bars, plates, rods, and shapes for aluminum stairs, ladders, and walkways shall be Alloy 6061 -T6, unless otherwise shown or specified.
2. Aluminum bars, plates, rods, and shapes shall have standard mill finish.

C. Welding Electrodes

1. Welding electrodes for structural steel shall conform to AWS A5.5, E70XX.

2. Use 4043 filler metal for aluminum.
3. Use type E308 electrode where the base metal is type 304 stainless steel and type E309 where the base metal is type 316 stainless steel or where stainless steel is welded to carbon steel.
4. Field welding of galvanized steel shall not be acceptable.

D. Anchor Bolts and Fasteners

1. Anchor bolts and fasteners shall be Type 316 stainless steel.
2. Anchor bolts and fasteners for metal stairs, ladders, and walkways shall be adhesive anchors, unless otherwise noted. Wedge anchors shall be as manufactured by "HILTI", or equal. Adhesive anchors shall be Hilti Hit-RE 500 V3 epoxy adhesive with Type 316 stainless steel all thread anchor rods.

2.2 METAL STAIRS

A. General

1. Fabricate metal stairs to meet the requirements of SBC, OSHA, NFPA 101 and the standard practice for stairs of the National Association of Ornamental Metal Manufacturers.
2. Size of various members and number of parts indicated on the Drawings are minimum, and shall be increased as necessary to meet the requirements of this Section.
3. Stair members shall be constructed to support dead loads and additional live working stresses permitted for materials in Standard Building Code.

B. Aluminum Stairs

1. Aluminum Stairs, General
 - a. Fabricate aluminum stairway frame of aluminum structural shapes. Frame for each run of aluminum stairway shall be continuous, without joints.
 - b. Provide aluminum stairways with aluminum treads and aluminum handrail and guard railing.
2. Aluminum Stairway Connections
 - a. Connections between aluminum stairway members shall be aluminum bars, plates, and shapes or fabricated of Type 316 stainless steel.

- b. Connections between aluminum stairway sections and aluminum fabrications, such as landings, walkways, and platforms, shall be aluminum bars, plates, and shapes or fabricated of Type 316 stainless steel.
 - c. Connections between aluminum stairway and concrete shall be fabricated of Type 316 stainless steel.
 - d. Connections between aluminum stairway and steel fabrications, such as landings, walkways, and platforms, shall be fabricated of Type 316 stainless steel.
3. Aluminum Stair Treads
- a. Aluminum stair treads shall be same pattern and alloys as aluminum walkway grating.
 - b. Aluminum stair treads shall be a minimum of 1-1/2 inches thick, unless otherwise indicated on the drawings.
 - c. Aluminum stair treads shall have 1-1/4-inch wide abrasive nosing.
4. Aluminum Handrail and Guard Railing: Aluminum handrail and guard railing shall meet the requirements of Section 05521 Aluminum Handrails and Railings.

2.3 METAL LADDERS

A. Metal Ladders, General

- 1. Ladders and cages shall be designed and fabricated in accordance with Part 1910 of the Occupational Safety and Health Standards and ANSI A14.3.
- 2. Provide ladder with safety cage or safety climbing device if ladder height is such that safety cage or safety climbing device is required to meet OSHA requirements. Provide safety cage unless safety-climbing device is specifically shown or noted on the Drawings.

B. Aluminum Ladders, Cages, and Supports

- 1. Aluminum Ladders
 - a. Ladder frame, or uprights, shall be 3/8-inch by 2-inch aluminum bars. Ladder uprights shall be spaced 18 inches apart.
 - b. Ladder rungs shall be aluminum rods. Rungs shall be not less than 1 inch in diameter. Rungs shall be smooth. Rungs shall be spaced 12 inches on centers. Ends of rungs shall be fitted into, and welded to, the uprights.

2. Aluminum Cages: Fabricate aluminum cages of aluminum bars bent to shape.
3. Supports for Aluminum Ladders and Cages
 - a. Supports shall be 3/8-inch by 2-inch aluminum bars bent to shape.
 - b. Supports shall be spaced not more than 5 feet apart.
 - c. Supports shall be welded to uprights.

2.4 METAL WALKWAYS

A. Metal Walkways, General

1. Fabricate metal walkways to meet the requirements of SBC, OSHA, and NFPA 101.
2. Size of various members and number of parts indicated on the Drawings are minimum, and shall be increased as necessary to meet the requirements of this Section.
3. Walkway members shall be constructed to support dead loads and additional live working stresses permitted for materials in Standard Building Code.

B. Aluminum Walkways

1. Aluminum Walkways, General

- a. Fabricate aluminum walkway frame of aluminum structural shapes and bars. Frame for each section of walkway between supports shall be continuous, without joints.
- b. Provide aluminum walkways with aluminum grating floor plates as indicated on the Drawings. Provide aluminum walkways with aluminum guard railing.

2. Aluminum Walkway Connections

- a. Connections between aluminum walkway members shall be aluminum bars, plates, and shapes or fabricated of Type 316 stainless steel.
- b. Connections between aluminum walkway sections and aluminum supports shall be aluminum bars, plates, and shapes or fabricated of Type 316 stainless steel.
- c. Connections between aluminum walkway and concrete shall be fabricated of Type 316 stainless steel.

- d. Connections between aluminum walkway and steel fabrications, such as supports, landings, walkways, and platforms, shall be fabricated of Type 316 stainless steel.
3. Aluminum Walkway Floor
- a. Aluminum walkway floor grating shall meet the requirements of Section 05530 Metal Grating, Trench Covers, and Floor Plates. Aluminum walkway floor grating shall be a minimum of 1-1/2 inches thick, unless otherwise indicated on the drawings.
 - b. Aluminum walkway floor plate shall meet the requirements of Section 05530 Metal, Grating, Trench Covers, and Floor Plates. Aluminum walkway floor plate shall be a minimum of 1/4 inch thick, unless otherwise indicated on the drawings.
4. Aluminum Handrail and Guard Railing: Aluminum handrail and guard railing shall meet the requirements of Section 05521 Aluminum Handrails and Railings.

PART 3 –EXECUTION

3.1 INSPECTION

- A. Take field measurements prior to preparation of shop drawings.
- B. Inspect structures, members, and surfaces on which stairs, ladders, and walkways are to be mounted. Correct defects prior to installation of metal stairs and walkways.

3.2 PREPARATION

- A. Clean and strip primed items to bare metals where site welding is required. Supply items required to be cast into concrete with setting templates, to appropriate sections.

3.3 INSTALLATION

- A. Install items plumb and level, accurately fitted, free from distortion or defects.
- B. Provide anchors, plates, angles, hangers and struts required for connecting stairs to structure.
- C. Ladders shall be installed in accordance with the requirements of ANSI A14.3 and Part 1910 of the Occupational Safety and Health Standards. Ladders shall be rigidly supported not less than 7 inches from adjacent surfaces. Ladders shall be secured to support structure using Type 316 stainless steel connectors. Ladder shall be secured to cast-in-place concrete wall or slab by Type 316 stainless steel anchor bolts and adhesive anchors.

- D. Allow for erection loads, and for sufficient temporary bracing to maintain true alignment until completion of erection and installation of permanent attachments.
- E. Field weld components indicated on Drawings. Perform field welding in accordance with AWS D1.1.
- F. Field bolt and weld to match shop bolting and welding. Conceal bolts and screws wherever possible.
- G. Mechanically fasten joints butted tight, flush, and hairline. Grind welds smooth and flush.
- H. Obtain Engineer's approval prior to site cutting or making adjustments not scheduled.
- I. Fabrication and Erection: Except as otherwise shown, the fabrication and erection of structural steel shall conform to the requirements of the American Institute of Steel Construction "manual of Steel Construction".

3.4 PREVENTION OF ELECTROLYSIS

- A. Aluminum in contact with dissimilar metals shall be separated with 1/8" thick layer of neoprene backing pad of full abutting area.
- B. Install corrosion barriers between aluminum and concrete.
 - 1. Isolate surface mounted aluminum with one of the following systems:
 - a. Coat bottom of surface mounted aluminum railing posts and aluminum clip angles with two coats of coal tar epoxy.
 - b. Install vinyl or neoprene barrier pad between bottom of surface mounted aluminum railing post, or angle clip, and concrete.' Area of pad shall equal area of aluminum surface.

3.5 WELDING

- A. Welding shall be by the metal-arc method or gas-shielded arc method as described in the American Welding Society's "Welding Handbook" as supplemented by other pertinent standards of the AWS. Qualification of welders shall be in accordance with the AWS Standards governing same.
- B. In assembly and during welding, component parts shall be adequately clamped, supported and restrained to minimize distortion and for control of dimensions. Weld reinforcement shall be as specified by the AWS Code. Upon completion of welding, remove weld splatter, flux, slag and burrs left by attachments. Repair welds to produce a workmanlike appearance, with uniform weld contours and dimensions. Sharp comers of material, which is to be painted or coated, shall be ground to a minimum of 1/32 inch on the flat.

3.6 CLEANING

- A. Clean paint spatter, concrete slobbers, grease, oil, or any other debris from exterior surfaces of metal stairs, ladders, and walkways.

END OF SECTION

SECTION 05521
ALUMINUM HANDRAILS AND RAILINGS

PART 1 - GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for aluminum handrails, railings, and accessories.

1.2 DEFINITIONS

- A. Guardrail (OSHA): A barrier secured to uprights and erected along the exposed sides and ends of platforms to prevent falling of persons.
- B. Handrail: A single bar or pipe supported on brackets from a wall or partition, as on a stairway or ramp, to give persons a handhold in case of tripping.
- C. Railing (OSHA): A vertical barrier erected along exposed sides or stairways and platforms to prevent falls of persons. The top member of railing usually serves as a handrail.
- D. Stair Railing (OSHA): A vertical barrier erected along exposed sides of a stairway to prevent falls of persons.
- E. Toeboard (OSHA):
- F. A vertical barrier at floor level erected along exposed edges of a floor opening, wall opening, platform, runway, or ramp to prevent falls of materials.

1.3 SYSTEM DESCRIPTION

- A. General: Furnish and install aluminum handrail, railings, and appurtenances as shown on the Drawings and specified in this Section.
- B. Type: Two rail system permitted by SBC, Group F, Industrial Occupancy, inaccessible to the public.

1.4 SUBMITTALS

- A. Submit the following prior to handrail and railing fabrication:
 - 1. Shop drawings and product data.
 - 2. Detailed layout of handrail and railing system with sufficient plans, sections, and elevations for the complete field installation.
 - 3. Dimensions and details demonstrating compliance with OSHA and Life Safety requirements.
 - 4. Note stating design load standard.

5. Physical characteristics of handrail and railing, joints, and anchors.

1.5 QUALITY ASSURANCE

A. Regulatory Requirements

1. Design and construction of guardrails and stair handrails shall comply with SBC Code, OSHA Standards, and NFPA 101, Life Safety Code.
2. Plant structures and buildings shall be considered Group F, Industrial Occupancy, inaccessible to the public.
3. Workmanship: Aluminum railing fabrication shall be performed by craftsmen experienced in the fabrication of architectural metal work.

PART 2 – PRODUCTS

2.1 MANUFACTURER

- A. Moultrie Manufacturing Co., Wesrail;
- B. Thompson Fabricating Co., Thompson Railing Systems;
- C. Or approved equal.

2.2 ALUMINUM RAILING SYSTEM FOR INDUSTRIAL OCCUPANCY

- A. Type: Mechanically jointed, pipe rail.
- B. Configuration: Two pipe rails and one toeboard.
- C. Fittings
 1. Type
 - a. Mechanically fastened, component.
 - b. Components that are glued or epoxied will be rejected.
 2. Fastener Material: Stainless steel.
- D. Design Load
 1. Standard: Building Code or OSHA, whichever is more restrictive.
 2. Vertical Post Minimum Spacing: Five feet.
- E. Railing and Posts
 1. Material: Aluminum alloy 6061-T6.
 2. Rail and Post Size

- a. Nominal Diameter: 1 - 1/2"
- b. Minimum Wall Thickness (1) Rails: Schedule 40. (2) Posts: Schedule 80.

3. Post Reinforcement: As required to meet design load standards.

F. Toeboards

1. Requirement: Provide on railing along exposed edges of floor openings, wall openings, platforms, runways, and ramps.
2. Material: Aluminum alloy 6061-T6.
3. Minimum Thickness: 1/4"
4. Maximum Projection into Walkway Area: 1-1/4"
5. Gap Between Walkway Surface and Toeboard
 - a. Minimum: 1/8"
 - b. Maximum: 1/4"
6. Vertical Height from Top Surface of Walkway to Top of Toeboard
 - a. Minimum: 4"
 - b. Maximum: 6"
7. Connection to Vertical Posts
 - a. If Detailed on Drawings: As shown on Drawings.
 - b. If Not Detailed on Drawings: As shown on approved shop drawings.

G. Wall Brackets

1. Material: Aluminum alloy, or Type 3 16 stainless steel.
2. Design
 - a. Manufacturer's standard design as shown on approved shop drawings.
 - b. End wall mounted handrail at line of first nosing.

H. Vertical Post Supports

1. Material: Aluminum alloy, or Type 3 16 stainless steel.

2. Type
 - a. Top surface mount or side mount as indicated on the Drawings.
 - b. Posts that are grouted or epoxied in sleeves or cored openings will be rejected.

I. Mounting Bolts

1. Material: Type 316 stainless steel
2. Type: Wedge bolts furnished by railing manufacturer.

J. Aluminum Finish

1. Type: Clear anodized.
2. Standard: Aluminum Association MIO-C22-A41 (215-RI).

2.3 PROTECTION

A. Type: Plastic wrap.

B. Maintenance

1. Remove plastic wrap only as required to cut and connect rails and posts
2. Maintain plastic wrap until substantial completion.

PART 3 – EXECUTION

3.1 INSPECTION

A. Field Measurement and Coordination

1. Take field measurements prior to preparation of shop drawings.
2. Coordinate and furnish setting drawings, diagrams, templates, instructions, and directions for installation of railing.

B. Mounting Surfaces

1. Inspect mounting surfaces.
2. Correct defects prior to installation of railing.

C. Railing Components

1. Check railing components prior to installation.
2. Check railing components for damage and fit.

3.2 INSTALLATION

- A. Install guardrails and handrails in accordance with applicable requirements of SBC, OSHA, and NFPA 101.
- B. Provide anchors and plates required for mounting railing.
- C. Perform cutting and fitting required for installation of railing.
 - 1. Cut and fit railing as shown on shop drawings.
 - 2. Do not make alterations not shown on shop drawings without approval of Design Engineer.
- D. Install rails level and vertical posts plumb, accurately fitted, and free from distortion or defects.
 - 1. Precision fit joints, junctions, miters, and butting sections
 - 2. Provide tight, hairline joints.
- E. Install corrosion barriers between aluminum and concrete and between aluminum and dissimilar metals.
 - 1. Isolate surface mounted aluminum with one of the following systems:
 - a. Coat bottom of surface mounted aluminum railing posts and aluminum clip angles with two coats of coal tar epoxy.
 - b. Install vinyl or neoprene barrier pad between bottom of surface mounted aluminum railing post, or angle clip, and concrete. Area of pad shall equal area of aluminum surface.
 - 2. Coat aluminum embedded in concrete or grout with two coats of coal tar epoxy.

3.3 EXPANSION BOLTS

- A. Space anchor bolts ten diameters apart and five diameters edge distance for no reduction in pullout strength.
- B. Provide a safety factor of four on expansion bolt pullout and shear values published by the manufacturer.

3.4 CLEANING

- A. Clean installed railing.
- B. Remove paint, adhesives, concrete slobbers, grease, oil, and other substances from railing and exposed fasteners.

- C. Exposed surfaces of railing shall be free from burrs.
- D. Exposed surfaces of railing shall be free from gouges, scratches, grazes, or other blemishes.

END OF SECTION

SECTION 05530
METAL GRATING, TRENCH COVERS, AND FLOOR PLATES

PART 1 GENERAL

1.1 SUMMARY

A. Section Includes: Technical requirements for metal grating, trench covers, and floor plates.

1.2 REFERENCES

A. General: References to standards, specifications, manuals, or codes of any technical society, organization or association, or to the Laws or Regulations of any government 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, on the Effective Date of the Agreement if there were no Bids), except as may be otherwise specifically stated in the Contract Documents.

B. ANSUNAAM Standards

1. ANSUNAAM MGB 53 1 Metal Bar Grating Manual

1.3 SYSTEM DESCRIPTION

A. Furnish and install metal grating, trench covers, floor plates, and appurtenances required to complete work shown and specified.

B. Furnish and install metal grating, trench covers, floor plates, and appurtenances as shown on the Drawings and specified in this Section.

C. New aluminum grating shall be same type as existing aluminum grating.

1.4 SUBMITTALS

A. Submit the following:

B. Product data for manufactured products.

C. Shop drawings showing plans, elevations and details of sections and connections. Show type and location of fasteners.

PART 2 PRODUCTS

2.1 GRATING

A. Grating, General.

1. Grating bar section, depth and spacing shall be based upon a uniformly applied load of 200 pounds per square foot over the full span unless a greater loading is noted on the Drawings. Grating deflection

shall not exceed L360 or 1/4 inch whichever is less. Provide stiffener angles as required to meet load requirements specified in this Section.

2. Bearing bars and cross bars shall be continuous. Bearing bars shall have rectangular cross section.
3. Exposed ends of grating bearing bar and cut outs shall be banded with a bar of the same depth and thickness as the main bearing bars. When welded construction is used, weld cut bar to band bar. When crimped or swaged construction is used, limit protrusion of bars at edges to 1/16-inch, maximum, and peen or grind protruding bars to a smooth surface.
4. Provide cutouts in grating for valve operators, conduits, pipes, and other penetrations. Band edges of cutouts.
5. Grind rough weld beads and sharp metal edges smooth.
6. Punch bolt holes 1/16-inch larger than nominal size of bolts, unless otherwise specified. Whenever needed, because of metal thickness, sub-punch and ream holes, or drill holes.
7. Fabricate grating in sections, which do not exceed 75 pounds each.

B. Aluminum Grating

1. Aluminum Grating Manufacturers
 - a. IKGBORDEN;
 - b. McNichols Co.;
 - c. Ohio Gratings, Inc.;
 - d. Or approved equal.
2. Aluminum Grating Material
 - a. Aluminum grating bearing and crossbars shall be 6063-T6 aluminum alloy.
 - b. Aluminum grating shall have mill finished.
3. Aluminum Grating Fabrications
 - a. Aluminum grating fabrications and tolerances shall meet the requirements of NAAMM Metal Bar Grating Manual.
 - b. Maximum allowable deflection for aluminum grating specified in this Section shall be based on an allowable stress of 12,000 pounds per square inch.
 - c. Grating depth shall be not less than the depth indicated on the Drawings. In no case shall aluminum grating depth be less than 1-

1/2 inches.

4. Aluminum Rectangular Bar Grating
 - a. Aluminum rectangular bar grating shall be pressure backed grating with rectangular bearing bars and square, or rectangular, cross bars swage-locked at right angles to bearing bars.
 - b. Bearing bars and cross bars shall be spaced as follows, unless otherwise shown on the Drawings.
 - (1) Bearing Bar Spacing: 1-3/16 inches center-to-center
 - (2) Cross Bar Spacing: 4 inches center-to-center.
 - c. Surface shall have a no skid finish.
5. Aluminum Grating Frame
 - a. Aluminum grating set in concrete floor shall be furnished with aluminum grating frame. Aluminum grating manufacturer shall furnish angle frame.
 - b. Grating frames shall be mitered and welded flush at comers for a finish appearance.
 - c. Furnish angle frames with Type 316 stainless steel anchor straps.
6. Aluminum Grating Accessories
 - a. Provide saddle clips and grating clamps necessary to secure grating.
 - b. Clamps and bolts used for attaching the grating to supporting members shall be stainless steel, and as recommended by the manufacturer.

2.2 TRENCH COVERS

- A. Trench Covers, General
 1. Trench covers shall designed for a uniformly applied load of 300 pounds per square foot over the full span unless a greater loading is noted on the Drawings.
 2. Trench cover deflection shall not exceed L/360 or 1/4 inch whichever is less.
 3. Provide stiffener angles as required to meet load requirements specified in this Section.
- B. Aluminum Trench Covers

1. Aluminum Trench Cover Material
 - a. Aluminum trench covers shall be 6063-T6 aluminum alloy, unless otherwise shown or specified.
 - b. Aluminum trench covers shall have mill finished, unless otherwise shown or specified.
2. Aluminum Trench Covers, General
 - a. Maximum allowable deflection for aluminum trench covers specified in this Section shall be based on an allowable stress of 12,000 pounds per square inch. Trench cover thickness shall be as shown on the Drawing, but in no case shall trench covers be less than 1/4-inch thick.
 - b. Aluminum trench covers shall be aluminum checkered plate equal to ALCOA C-102 aluminum tread plate and Reynolds diamond tread plate.
 - c. Punch or drill bolt holes in aluminum trench covers for fasteners that secure trench cover to trench cover frame. Punch or drill bolt holes 1/16-inch larger than nominal size of bolts, unless otherwise specified. If holes are punched, sub-punch and ream holes whenever needed because of metal thickness. Counter sink bolt holes for flat head bolts or screws.
3. Aluminum Trench Cover Frame
 - a. Aluminum trench covers shall be furnished with fabricated aluminum frames.
 - b. Trench cover frames shall be mitered and welded flush at corners for a finish appearance.
 - c. Furnish trench cover frames with Type 316 stainless steel anchor straps.
4. Aluminum Trench Cover Accessories
 - a. Provide fasteners necessary to trench covers to trench cover frames.
 - b. Fasteners used for attaching aluminum trench covers to trench cover frame shall be Type 316 stainless steel

2.3 FLOOR PLATES

- A. Floor Plates, General

1. Floor plates shall be designed for a uniformly applied load of 200 pounds per square-foot over the full span unless a greater loading is noted on the Drawings. Floor plate deflection shall not exceed L/1360 or 1/14 inch whichever is less. Provide stiffener angles as required to meet load requirements specified in this Section.
2. Provide cutouts in floor plates for valve operators, conduits, pipes, and other penetrations.
3. Grind sharp metal edges smooth.
4. Punch bolt holes 1/16-inch larger than nominal size of bolts, unless otherwise specified. Whenever needed, because of metal thickness, sub-punch and ream holes, or drill holes.
5. Fabricate floor plates in sections, which do not exceed 75 pounds each.

B. Aluminum Floor Plates

1. Aluminum Floor Plate Material
 - a. Aluminum floor plates shall be 6063-T6 aluminum alloy: unless otherwise shown or specified.
 - b. Aluminum floor plates shall have mill finished, unless otherwise shown or specified.
2. Aluminum Floor Plates, General
 - a. Maximum allowable deflection for aluminum floor plates specified in this Section shall be based on an allowable stress of 12,000 pounds per square inch. Floor plates thickness shall be as shown on the Drawing, but in no case shall floor plates be less than 1/4-inch thick.
 - b. Aluminum floor plates shall be aluminum checkered plate equal to ALCOA C-102 aluminum tread plate and Reynolds diamond tread plate.
 - c. If aluminum floor plates are to be secured to supporting members or frame, punch or drill bolt holes in floor plates for fasteners that secure floor plate to supporting members or frame. Punch or drill bolt holes 1/16-inch larger than nominal size of bolts, unless otherwise specified. If holes are punched, sub-punch and ream holes whenever needed because of metal thickness. Counter sink bolt holes for flat head bolts or screws.
3. Aluminum Floor Plate Frame
 - a. Aluminum floor plate set in concrete floor shall be furnished with fabricated aluminum frame.

b. Floor plate frame shall be mitered and welded flush at corners for a finish appearance.

c. Furnish floor plate frames with Type 316 stainless steel anchor straps.

4. Aluminum Floor Plate Accessories

a. If Drawings indicate floor plate is to be secured to supporting members or frame, provide fasteners necessary to secure floor plate. If code, Laws, or Regulations require floor plate to be secured to supporting members or frame, provide fasteners necessary to secure floor plate.

b. Fasteners used for attaching aluminum floor plate to supporting members or frame shall be Type 316 stainless steel.

PART 3 – EXECUTION

3.1 INSPECTION

A. Field Measurements

1. Take field measurement prior to preparation of shop drawings.

2. Verify opening locations, opening sizes, and dimension tolerances are acceptable.

B. Grating and Floor Plates

1. Verify grating, trench cover, and floor plate dimensions.

2. Check grating, trench covers, and floor plates for damage.

C. Mounting surfaces, supports, and Anchors

1. Inspect surfaces, supports, and anchors on which grating, trench covers, and floor plates are to be mounted and secured.

2. Verify supports and anchors are properly located and oriented.

3. Correct defects prior to installation of grating, trench covers, and floor plates.

3.2 INSTALLATION

A. Install components in accordance with manufacturer's instructions.

B. Place frames in correct position, plumb and level.

C. Set perimeter closure flush with top of grating and surrounding construction.

D. Secure grating to prevent movement.

3.3 CLEANING

A. Clean paint spatter, concrete slobbers, grease, oil, or any other debris from exterior surfaces of grating, trench covers, and floor plates.

END OF SECTION

SECTION 09900
PAINTING AND SPECIAL COATINGS

PART 1 GENERAL

1.1 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.
- D. Related Work Specified Elsewhere:
 - 1. Section 09902: Piping and Equipment Identification System.

1.2 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.

1.3 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.

1.4 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.

1.5 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

2.1 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.

2.2 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 Endruatone 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.

2.3 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

2.4

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.

2.5 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.

2.6 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.
- 2.7 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.

2.8 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.

2.9 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. Surfacers: 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 Expoxoline 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 Expoxoline 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

3.1 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.

3.2 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.

3.3 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.

3.4 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.

3.5 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.

3.6 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.

3.7 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.

3.8 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.

3.9 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

SECTION 13300
INSTRUMENTATION AND CONTROL SYSTEM

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The Contractor shall provide an approved Control System Integrator (CSI) to have total responsibility in providing a complete and operational system in full compliance with the specifications and contract drawings. This shall include all materials, labor, tools, fees, and documentation required to furnish, install, test, programming, graphics configurations, and place into operation a complete and operable filter control system.
- B. Furnish and install, complete with all accessories, a programmable logic control based monitoring and control system with its associated instrumentation as described herein and shown on the contract drawings. The system shall serve as a self-contained monitoring and control system for all aspects of the filter control system operation. It shall also be capable of integration with the existing Fiesta Village WWTP SCADA system.
- C This Specification has been developed to establish minimum requirements for a PLC upgrade for the existing filters. This system shall be designed, constructed, tested, and documented in strict accordance with the guidelines of this documentation. All system construction and programming will be the responsibility of the CSI. All materials and labor shall be provided for a fully functional system including any items which are required for system operation but are not specifically addressed in this document or on the contract drawings.
- D. This specification is intended to be used in conjunction with all drawings supplied and is not intended to be complete without reference diagrams on system configurations, etc. All bidders must conform to all areas of the documentation. It is the intent of this specification that the monitoring and control system contractor have single source responsibility for the complete control and instrumentation package for the project; including but not limited level instrumentation, valve actuators, and existing pumps and blowers interconnecting conduit and control wiring for total system responsibility.
- E. The Contractor shall be responsible to provide a new filter control enclosure and modifications and demolition to existing control panels as described herein or as shown on the drawings. Modifications to existing control panels shall also conform to the requirements of these specifications and drawings. The CSI shall be responsible for field-verifying all signal wiring to the existing panels retrofitted or replaced under this contract. Existing signal wiring, which is not shown or detailed on the contract drawings but is required for operability of the system, shall be incorporated into the new control system furnished under this contract.
- F. The new filter control panel enclosure shall be assembled, wired, and tested in the CSI's own facilities as specified herein.
- G. The specifications provided within this section shall be applied to all of the Instrumentation and Control specifications listed below as well as additional specifications sections as referenced under paragraph 1.5. The ICS shall be provided as a single and complete system as specified herein and as specified within the following ICS specifications:

1. Section 13330: Control Panels
 2. Section 13350: Fiber Optic Communication System
 3. Section 13360: Functional Descriptions
- H. Refer to Attachments A, at the end of this specification section, which includes the existing and new PLC inputs and outputs (I/O) schedules for the filter system. These schedules provide a summary of the PLC I/O, both discrete and analog, which shall be included in the new filter control system and information for developing the new filter system PLC program.
1. Attachment A: Existing PLC I/O Schedule
 2. Attachment B: New PLC I/O Schedule
- I. The Contractor shall be ultimately responsible for installation of the ICS. However, the CSI will include installation within the scope of his subcontract to provide for installation of the complete system as specified. The CSI shall also coordinate this work with the Contractor to ensure that the proper type, size, and number of wires with their conduits are provided and installed. This coordination will also ensure that proper electrical power circuits are provided for all components and systems.
- J. The Contractor's responsibilities, as distinct from the CSI's responsibilities, shall be to provide all additional materials and work necessary to supplement the materials and work provided by the CSI thereby satisfying all requirements that are within ICS specification sections.
- K. The Contractor shall coordinate structural work, penetrations, painting, etc., as required for installation of a complete ICS. Instruments furnished under this contract or existing instruments relocated shall be installed under the supervision of the CSI.
- L. The Contractor shall be responsible for coordinating interfaces between ICS equipment provided under the ICS specification sections and the equipment provided under other sections of the specifications. The Contractor shall verify and coordinate space requirements, process equipment power supply and voltage, process equipment control power supply and voltage, compatibility of control signals, details of equipment installation and interconnection. Coordination shall include distribution of approved shop drawings to all vendors, subcontractors, etc., involved in the control interface. Likewise, the Contractor shall ensure that instrumentation and control devices provided under other sections of the specifications and specified on the drawings are compatible and of the same manufacturer, quality and characteristics as similar devices specified under the ICS specification sections.
- M. All components and necessary accessories such as mounting hardware, TVSS, fuses, circuit breakers, terminals, ground bars, relays, indicators, control operators, power supplies, signal conditioning and converters, connectors, digital hardware and software, signal and data transmission systems, specialty cable, control panels, interconnecting wiring, required or specified to complete the system and functions indicated, shall be provided, whether specifically mentioned or not.

1.2 PROJECT DESCRIPTION

A. Background

The Fiesta Village Wastewater Treatment Plant (WWTP) Filter System consists of four (4) filters, two (2) blowers, two (2) backwash pumps, two (2) Screw Lift Pumps, two (2) Mudwell pumps, two (2) washer compressors, motorized valves, five (5) for each filter, and level instruments. Two local control panels, located inside the filter building, include a local control system for each filter (Control Panel No. 1 for Filters 1 & 2 and Control Panel No. 2 for Filters 3 & 4). Local control and monitoring of the valves, backwash pumps and blowers, are provided at these local control panels, which includes manual and semi-auto filter backwash and bump control.

A remote I/O panel consisting of a Modicon Quantum PLC RIO, also located inside the filter building, interfaces with the filters' local control panels for remote monitoring and control capability at the Plant SCADA system. The remote I/O panel has a copper network connection to a Modicon Quantum PLC (PLC-2) which is located inside the MCC-2 building adjacent to the filter building. PLC-2 has a fiber optic network connection to the Plant SCADA computer located inside the control room. The Fiesta WWTP currently utilizes Schneider Electric CitectSCADA Human Machine Interface (HMI) for the Plant SCADA System. The Plant SCADA System currently has a SCADA screen of the filter system which displays the filters' piping configuration, valve open/close statuses, filter equipment run statuses and alarms, and filter levels. The filtration system SCADA screen currently does not provide valve remote control capability, timers, and other details related to the filter system.

Each filter level is monitored by its respective HydroRanger ultrasonic level transmitter which provides the filter level signal input to PLC-2 Remote I/O Panel. Other level inputs are also provided to the PLC-2 Remote I/O Panel. These inputs and other existing I/O, for the Filter System, are listed under this section in Attachment A: Filter PLC I/O Schedule (Existing). Schedule 1 provides the I/O description, type, point location, and PLC address. The existing I/O point locations, noted under the "Rack #, Slot #" column, are provided by the existing Remote I/O panel as-built drawings. The PLC addresses are provided by the existing PLC program. The last column "Notes" states some discrepancies between these two columns. Schedule 2: Filter PLC I/O Schedule (New) is a list of additional new I/O. Both PLC I/O schedule 1 and 2 will be utilized by the contractor to develop and program the new PLC Filter Panel Control System.

B. Description of Work:

1. New Filter System PLC Panel: The Remote I/O Panel, located inside the Filter Building, will be replaced with a new stand-alone filter control system housed in a control panel enclosure consisting of a new CompactLogix PLC, an uninterruptable power supply (UPS), and panel-mounted components and devices for local control and monitoring, and communication equipment to support a fiber optic network connection to the Plant SCADA system. The New PLC Control Panel construction description and details are shown on the contract drawings. The approved manufacturers and part numbers for the new PLC Control Panel equipment and components are listed under the bill of materials. The new Filter PLC panel design and construction shall be in accordance with the control enclosure specification provided under section 13330. The filter system description of operation is provided under section 13360, Functional Descriptions, which will be utilized for the development of the new filter control system CompactLogix PLC program and the Computer System HMI graphics modifications.

2. Demolition of Existing Filter Local Control Panels and Remote I/O Panel: The existing Filter Local Control Panels and Remote I/O Panel will be removed once the new Filter PLC Panel has been installed and is fully operational. Refer to drawings I-1 and I-6 for the locations of these panels and further details of this work.
3. Existing PLC-2 Program Code Modifications: The existing PLC-2 modifications will include the removal of any PLC code from the existing program related to the existing filter control system remote I/O rack. This work will be provided once the new Filter PLC Control Panel is fully operational.
4. New Fiber Optic Network Connections to Control Room and MCC-2 Buildings: The existing coax network cable connection between the existing Filter Building Remote I/O Panel and the MCC-2 Building PLC-2 Panel shall be replaced with a 6 pair fiber optic cable. A fiber optic patch panel will be provided and located inside the new Filter PLC Panel, as shown on contract drawings, to support this new fiber optic network connection.

The existing fiber optic cable network connection, between the Control Room and existing PLC-2 panel, shall also be replaced with a 12 pair fiber optic cable. The existing patch panel located inside the existing PLC-2 Panel shall be replaced with a larger patch panel to support these connections between the Control Room and Filter Building new Filter PLC Control Panel.

The existing conduit and pull boxes, currently utilized for the existing coax cable and fiber optic cable, will be reused for new fiber optic cable installations. The contractor shall coordinate with the Owner for the locations of these existing pull boxes and conduit routing. Refer to specification section 13350 for the fiber optic cable, patch panels, and accessories specifications, installation instructions, fiber optic system testing requirements, and training details.

5. Control Room Existing HMI Computer Graphic Screens Modifications: The existing SCADA graphic tags will be revised for the new Filter Panel PLC. The existing HMI computer graphic screens shall remain the same in kind with the exceptions of the following additional statuses and alarms:
 - “Valve In Auto” statuses (Typical for each Valve)
 - Filter PLC Panel Power Failure/On UPS
 - Filter PLC Panel UPS Low Battery
 - Filter PLC Panel High Temperature
 - Pipe Gallery High Level
 - Backwash Valve Position (0-100%)
 - Blower Air Temperature (Typical for each Blower)
 - Blower Motor Temperature (Typical for each Blower)

Backwash sequencing, such as timers and details of the filters’ operation, shall also be included; this information shall be provided on a new pop-up graphic screen where a navigation control button is provided on the existing filter graphic screen. Existing alarm graphic screens shall also be modified to include any additional alarms provided under this upgrade.

6. Other Improvements:

The following is a list of other improvements and additions to the Filter System:

- a. Pipe Gallery High Level Flood Alarm Float Switch - Provide a new float switch for monitoring high level flood alarm in the existing pipe gallery. Float switch high level flood alarm signal shall be hardwired to the new Filter System PLC panel and monitored both locally at the Filter PLC Panel and remotely via Plant SCADA system. Float switch location and elevation set point shall be coordinated with the Owner. Refer to the float switch specifications specified herein for float switch approved manufacturer and part number.
- b. Existing Filter Level Transmitters – Relocate and install the existing filter level transmitters to a new panel mounting rack. Mounting rack shall be constructed of a stainless steel panel with aluminum posts. Construction of mounting rack shall be in accordance with the Owner's standards and as shown on drawing I-6. Reuse existing manufacturer's cable, between the existing filter level sensor and transmitters, where feasible, without splicing the cable. Provide new manufacturer cable if additional length is required. Refer to drawings I-1 and I-6 for additional details of this work.
- c. Existing Blower Temperature Gauges – Relocate and install existing blower temperature gauges on the new Filter PLC panel as shown on the drawings. Remove existing Blower Temperature Gauge Panel and mounting rack as specified.

1.3 RELATED WORK SPECIFIED ELSEWHERE

A. Division 1 – General Requirements

B. Section 15100 – Valves and Appurtenances

C. Division 16 – Electrical

1. Where electrical subcomponents are to be provided as part of ICS equipment, but for which there is no specification, provide in accordance with Division 16 - Electrical. These subcomponents shall be compatible and of the same quality and characteristics as similar devices specified under Division 16 - Electrical. If possible the same make and/or model supplied under Division 16 shall be provided.
2. The following work shall be provided under Division 16 – Electrical:
 - a. Conduit, raceways, and installation of wire and cable for all instrumentation and control system signal wiring, grounding systems, special cables and network cables except as noted.
 - b. Instrumentation and control system signal field wire.
 - c. Grounding systems for all ICS equipment.
 - d. Mounting of ICS electrical enclosures (i.e. control panels, TVSS boxes, electronic instrumentation, etc.) with exclusion of final measuring elements of instrumentation (i.e. flow tubes, sensors in process piping, etc.) which shall be as coordinated by the Contractor.

1.4 CODES AND STANDARDS

A. The ICS shall comply with the National Electric Code, National Electric Safety Code, OSHA, and with all applicable federal, state, Owner, municipal, and electrical utility codes

and regulations, as well as the Contract Documents. In the event of any conflict between these codes, regulations, and Contract Documents, the most restrictive shall apply.

- B. The Instrumentation and Control System shall comply with the following codes and standards as well as any others within the specifications and drawings. In the event of any conflict between these codes, regulations, standards and Contract Documents, the most restrictive shall apply.
 - 1. Applicable state, Owner, and municipal code requirements.
 - 2. Applicable standards of the National Fire Protection Association (NFPA)
 - a. National Electrical Code (NEC)
 - b. Standard for Electrical Safety in the Workplace (NFPA 70E)
 - 3. Applicable standards of the Underwriter's Laboratories, Inc. (U.L.)
 - a. UL 508 Industrial Control Equipment
 - b. UL 508A Industrial Control Panels
 - 4. Applicable standards of the Institute of Electrical and Electronics Engineers (IEEE).
 - 5. Applicable standards of the National Electrical Manufacturers Association (NEMA).
 - a. NEMA 250 Enclosures for Electrical Equipment (1000 V Maximum)
 - b. NEMA ICS 1 Industrial Control and Systems: General Requirements
 - c. NEMA ICS 6 Enclosures for Industrial Control and Systems
 - 6. Applicable standards of the International Society of Automation (ISA)
 - a. ISA 5.1 - Instrumentation Symbols and Identification
 - b. ISA 5.4 - Instrument Loop Diagrams
 - c. ISA 20 - Specification Forms for Process Measurement and Control Instruments, Primary Elements, and Control Valves
 - d. ISA TR20.00.01 - Specification Forms for Process Measurement and Control Instruments

1.5 CONTROL SYSTEM INTEGRATOR

- A. The contractor providing this system shall be an instrumentation and control systems contractor who is experienced in and regularly engaged in engineering, installation and service of systems of similar size and complexity within the wastewater treatment industry. The panel supplier shall be a UL listed panel shop and all panels shall be UL-508A certified. All panels shall utilize components in order to achieve a minimum of 10KA AIC rating.
- B. The contractor shall assume total systems responsibility for all aspects of this system including installation, commissioning and start-up of the system, training of operating personnel and coordinating interfaces between this system

and equipment provided by others. This responsibility shall include mounting and wiring of relays, transformers, disconnecting means, and other control devices as required forming a complete system.

- D. The installing contractor shall maintain an office with full time sales and service staff within a one hundred and fifty-mile radius of the site.
- E. Contractor shall provide the service of a qualified control system integrator that has demonstrated competence in providing controls system integration on this type of facility. Submit qualifications within 5 days of bid. Provide a list of ten (10) professional references of owners or clients of previous work. Include references from a minimum of three (3) governmental agencies that have contracted for similar type and size services, and three (3) engineering consultants whose design was incorporated or undertaken by the Contractor within the last five (5) years. The list shall include: Company name and address. Contracting officer and telephone number. Technical representative and telephone number. A written description of the project. Project value quoted for integration services work for each project. Include only projects utilizing the type and make of PLC (Allen Bradley) and HMI programming (Citect) used on this project.
- F. The approved control system integrator shall demonstrate specialty-programming expertise for 3-dimensional graphic screen HMI Citect programming functions. The Engineer and Owner shall approve the PLC/HMI Citect Programmer. The control system integrator shall maintain complete responsibility for the work of the HMI Certified programmer.
- G. The control system integrator shall insure the continued operation of the existing systems during tie-ins or interconnecting to the existing W W T P S C A D A system. Provide temporary programming that may be required during construction to facilitate construction and testing as determined by the engineer.
- H. Lee County Utilities will provide a Citect Standards library to be used in screen development. The filter graphic screens modifications shall be coordinated, reviewed, and approved with Lee County Utilities.
- I. The control system integrator shall assume full responsibility for all aspects of this system including components, devices, and systems not provided under this section, but that are directly interfaced by components or subsystems provided under this section such as the filters' valve operators.
 - 1. Verify that the component, device, or system has been installed in accordance with the manufacturer's recommendations with respect to operation and control, coordinate installation, provide interfaces required.
 - 2. Verify the calibration and adjustment of devices.
 - 3. Verify proper control system interface and operation.
 - 4. Start up and test to demonstrate proper control system interface and operation, in coordination with the equipment manufacturer.
 - 5. Provide the necessary modifications to the equipment, or other controls to properly interface and control the equipment.
 - 6. Provide as-built documentation of the existing controls and instrumentation devices and their integration into the total control and monitoring systems.

- J. The Owner shall have the right of access to the CSI's facilities and the facilities of their equipment suppliers to inspect materials and parts, witness inspections, tests and work in progress, and examine applicable design documents, records and certifications during any stage of design, fabrication and tests. The CSI and their equipment suppliers shall furnish office space, supplies and services required for these surveillance activities.

1.6 QUALITY ASSURANCE

- A. The listing of specific products in this specification in no way relieves the Contractor of furnishing equipment which shall meet the performance and quality criteria specified herein.
- B. All equipment and materials shall be new and the products of reputable recognized suppliers having adequate experience in the manufacture of these particular items.
- C. For uniformity, only one manufacturer will be accepted for each type of product.
- D. All equipment shall be designed for the service intended and shall be of rugged construction, of ample strength for all stresses that may occur during fabrication, transportation, and erection as well as during continuous or intermittent operation. They shall be adequately stayed, braced and anchored and shall be installed in a neat and workmanlike manner. Appearance and safety, as well as utility, shall be given consideration in the design of details.
- E. All components and devices installed shall be standard items of industrial grade, unless otherwise noted, which shall be of sturdy and durable construction and be suitable for long, trouble free service.
- F. Electronic equipment shall be suitable for the specified environmental conditions.
- G. Optional or substituted equipment or both requiring changes in details or dimensions required to maintain all structural, mechanical, electrical, control, operating, maintenance or design features incorporated in these specifications and drawings, shall be made at no additional cost to the Owner. In the event that the changes are necessary, calculations and drawings showing the proposed revisions shall be submitted for approval. The Owner shall coordinate all changes with other affected trades and contracts and pay all additional charges incurred.

1.7 SUBMITTALS

- A. Submittals shall be provided in accordance with the requirements set forth in Division 1.
- B. Every submittal shall have a separate section entitled "Requested Deviations from ICS Specifications" which shall clearly define and clearly explain all requested deviations and exceptions of the Instrumentation and Control System to this Specification. Only those deviations requests listed in this section will be reviewed.
- C. After all changes or corrections resulting from the review of the system supplier's drawings have been made, panels may be built and instrumentation devices may be supplied in accordance with the approved drawings. One set of "as shipped" prints shall be included in the panels when shipped from the system supplier's wiring and assembly shop.

- D. Prepare shop drawing submittal drawings using a computer aided drafting system compatible with Autodesk Autocad version 2014 or greater. Shop drawing submittals shall be submitted on hard copy and electronic CD-Rom (dwg) format.
- E. The following major list of submittals shall be provided as a minimum. Major submittals are generally listed in the order they are to be provided. Refer to related ICS specification sections and equipment subsections for additional submittals and submittal requirements.
1. Preliminary Design Review Project Plan Submittal
 2. Control Panel and Equipment Submittal
 3. SCADA System Software Submittal
 4. Fiber Optic Communications Submittal
 5. Training Submittal
 6. Testing Submittal
 7. Tools, Supplies, and Spare Parts Lists Submittal
 8. Preliminary & Final Operational and Maintenance Manuals
- F. Preliminary Design Review/Project Plan Submittal
1. The Project Plan shall provide an overview of the proposed system including system architecture diagrams, the approach to work, the proposed work schedule indicating milestones and potential meetings, project personnel and organization, details of factory testing and field testing, details of training programs, and a paragraph by paragraph review of the specifications indicating any proposed deviations. The schedule shall illustrate all major project milestones including the following:
 - a. Schedule for all subsequent project submittals.
 - b. Tentative dates for all project design review meetings.
 - c. Schedule of manufacture and staging of all instrumentation and control system equipment.
 - d. Schedule for all testing.
 - e. Schedule for shipment of all instrumentation and control system equipment and peripheral devices.
 - f. Schedule for equipment start up.
 - g. Schedule for all training.
 2. No other submittals will be allowed prior to acceptance of the Project Plan.
- G. Control Panel and Equipment Submittal
1. Provide detailed drawings covering control panels, consoles and/or enclosures which shall include:
 - a. Cabinet assembly and layout drawings to scale. These shall include both front and interior layouts. For existing panels to be refurbished or demolished, include details of this work showing new and existing equipment, panel components, and control and power wire, before and after the Filter System upgrade.
 - b. Material, fabrication and painting specifications.

- c. Bill of materials which includes the manufacturer and complete model number, description and options provided for the device, and quantity supplied. Bill of materials shall include item numbers for cross-referencing with the Panel drawings.
 - d. Heat calculations for control panels consisting of a PLC control system.
 - e. Power supply device sizing calculations which includes UPS systems (where applicable).
 - f. Panel wiring diagrams showing all power connections to equipment within and on the panel, combined panel power draw requirements (volts, amps), breaker sizes, fuse sizes, and grounding. This wiring diagram shall be in ladder logic format and shall reference the appropriate loop drawing for continuations or details where required. Show all wire numbers and terminal block designations.
2. Provide detailed loop diagrams on a single 11-in x 17-in or 8.5-In x 11-in sheet for each monitoring or control loop. The loop diagram shall show all components of the loop both analog and digital, including all relays, switches, dropping resistors, etc. which are being provided for proper operation. Loop numbers used shall correspond to the loop numbers indicated in the Contract Documents. The format shall be the International Society of Automation, Standard for Instrument Loop Diagrams, ISA-5.4 plus the following requirements:
- a. On each diagram, present a tabular summary of (1) the output capability of the transmitting instrument, (2) the input impedance of each receiving instrument, (3) an estimate of the loop wiring impedance based on wire sizes and approximate length used, (4) the total loop impedance, (5) reserve output capacity.
 - b. Show all interconnecting wiring between equipment, panels, terminal junction boxes and field mounted components. The diagrams shall show all components and panel terminal board identification numbers and all wire numbers. This diagram shall include all intermediate terminations between field elements and panels (e.g. terminal junction boxes). The diagrams shall be coordinated with the electrical contractor and shall bear his mark showing this has been done.
 - c. Show location of all devices.
 - d. Show instrument description showing type, manufacturer, model number, range, set points, and operation (e.g. fail open, open on energize, normally closed, etc.) as applicable.
 - e. Show all instrument loop power or instrument air requirements back to termination on terminal block or bulkhead, fuse block (including fuse size), etc., as applicable.
3. Provide complete documentation of the proposed hardware (PLCs, communications equipment, peripherals, etc.) including:
- a. A system block diagram(s) showing in schematic form, the interconnections between major hardware components such as: control centers, panels, consoles, computer and peripheral devices, telemetry equipment, local digital processors and like equipment. The block diagram shall reflect the total integration of all digital devices in the system and shall reflect any man/machine interface locations. All components shall be clearly identified with appropriate cross references to the location of each.

The diagram shall reference all interconnecting cabling requirements for digital components of the system including any data communication links.

- b. Data sheet for each hardware component, listing all model numbers, optional, auxiliary, and ancillary devices that are being provided.

The data sheets shall be provided with an index and proper identification and cross referencing. They shall include but not be limited to the following information.

- (1) Equipment Number and ISA tag number per the Loop Diagrams (as applicable).
- (2) Product (item) name used herein and on the Contract Drawings.
- (3) Manufacturers complete model number.
- (4) Location of the device.
- (5) Input - output characteristics.
- (6) Range, size, and graduations.
- (7) Physical size with dimensions, enclosure NEMA classification and mounting details.
- (8) Materials of construction of all components.
- (9) Power supply device sizing calculations where applicable.

- c. Equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment identification tags. As a minimum the specification sheets shall include the following:

- (1) Dimensions and working clearances.
- (2) Mounting or installation details.
- (3) Connection diagrams.
- (4) Electrical power requirements (volts, amps).
- (5) Materials of construction.
- (6) Environmental characteristics.
- (7) Performance characteristics.

- d. The submittal shall also contain all planning information, site preparation instructions, grounding and bonding procedures, cabling diagrams, plug identifications, safety precautions or guards, and equipment layouts in order to enable the Contractor to proceed with the detailed site preparation for all equipment.

- 4. Provide a complete system Input/Output (I/O) for the filter system PLC panel. The list shall be sorted first by ISA tag name and second by I/O type (i.e. AI, AO, D1, DO) and shall contain as a minimum the following for each active point and spare point:

- a. Full ISA instrument tag (or "SPARE").
- b. Type of I/O (i.e., DI, DO, AI or AO).
- c. I/O terminal point physical location (panel name, rack, slot, point, etc.).
- d. I/O point address.
- e. Point name and description.
- f. Terminal Strip and Number

- 5. Provide complete documentation of all field devices and other instruments supplied under this contract.

- a. Provide data sheets for each component listing all model numbers, optional, and ancillary devices that are being provided.
- b. The data sheets shall be provided with an index and proper identification and cross referencing. They shall include but not be limited to the following information.
 - (1) Plant Equipment Number and ISA tag number per the Loop Diagrams.
 - (2) Product (item) name used herein and on the Contract Drawings.
 - (3) Manufacturers complete model number.
 - (4) Location of the device.
 - (5) Input - output characteristics.
 - (6) Range, size, and graduations.
 - (7) Physical size with dimensions, enclosure NEMA classification and mounting details.
 - (8) Materials of construction of all components.
 - (9) Instrument or control device sizing calculations where applicable.
 - (10) Certified calibration data on all flow metering devices.
- c. Provide equipment specification sheets which shall fully describe the device, the intended function, how it operates and its physical environmental and performance characteristics. Each data sheet shall have appropriate cross references to loop or equipment identification tags. As a minimum the specification sheets shall include the following:
 - (1) Dimension, rigid-clearances.
 - (2) Mounting and installation details which show mounting equipment, such as racks, panels, and brackets, etc., supplied for installation. Information on mounting equipment shall be submitted for review and approval.
 - (3) Connection.
 - (4) Electrical power or air requirements.
 - (5) Materials of construction.
 - (6) Environmental characteristics.
 - (7) Performance characteristics.
 - (8) Required accessories (Surge protection, connection cable, sun shields, mounting equipment, etc.)
- d. The submittal shall also contain mounting and installation details of relocated instruments. Mounting equipment, such as racks, panels, and brackets, etc., supplied under this contract shall also be submitted for review and approval and included on mounting detail drawings.

H. SCADA System Software Submittal

- 1. Software submittals shall include the following as a minimum:
 - a. Bill of materials with software names, vendors and complete listings of included software modules and support contract.
 - b. Standard manufacturer's literature describing the products.
 - c. Description of function of software in ICS System.
 - d. Software features, limitations and constraints of software.
 - e. Minimum system (processor and memory) requirements.

2. Filter PLC Control System:

- a. Provide logic submittal diagrams in ISA format of all loops that are implemented in software and include a description of the control function and its control strategy, a listing of the scanned inputs and the outputs of the control function, operator inputs or outputs to and from the function and displays related to the function; failure contingencies and cross reference to other loop diagrams.
- b. Generate a complete listing of all virtual discrete and analog points that are used to link modules. The virtual tag lists shall be developed and submitted to the engineer to facilitate operator interface programming.
- c. Critical Path Software Development: The control system integrator shall submit a system software functional design submittal and shall meet with the Engineer at his office prior to software code development. The functional design submittal shall provide a description of the system on a functional level organized into functional subsystems. The submittal shall describe the individual programs that support these functions and include a subsystem summary; technical description from the user's standpoint; subsystem structure indicating data structures; interface structure; operator interface considerations and related operator interface display formats; initialization considerations and impacts of power failure or operator interface failure or shut down.
- d. Control software (ladder logic), where a written overview description is provided of each ladder logic program provided under this contract. These descriptions shall lead the user through the major subsections of the programs. They shall generally describe the programming methods and techniques that were used to implement the functional requirements specified under section 13360.
- e. Each element (Input, output, or function block) shall be described completely in a 15 character (minimum) description. Ladder rungs shall have comments that describe the function of the rungs. Provide an average of one 120 character comment line per ladder rung.
- f. Discrete and analog input/output lists and cross reference. Each input and output shall be capable of being given up to a 27-character alphanumeric functional identification that is printed above the respective input or output in the program listing. The cross reference shall indicate each rung number where the input or output is used.
- g. Internal coils list and cross-reference. Each coil shall be capable of being given a 27-character alphanumeric function identification that is printed above the respective coil and all of its contacts in the program listing. The cross-reference shall indicate each rung number where the respective coil or contact is used.
- h. Data register list and cross-reference. This listing provides a listing of the data registers used and their locations(s) in the program.
- i. A listing of all programmed special functions, including memory locations used and location in the program where the special functions can be found. Function descriptions shall also be shown in the special function printout for all pertinent memory locations used in each special function. Programmed values of all memory locations used shall also be shown.
- j. Timers, counters, integer add and subtract, move, master control relay, and jump functions shall show all memory locations used and their

- k. programmed values.
 - l. Variable data memory storage record, indicating the memory location and description of the variable data; i.e., tag number, timer number, counter number. Function listing; all identified PLC functions indicated on the drawings and specifications shall be listed and fully described.
 - m. This information shall be submitted for review by the Engineer prior to software code development. This is a critical path item and should be given appropriate consideration by the CSI.
3. Existing PLC-2 Program Modifications:
- a. Provide a copy of the existing Modicon PLC-2 code marked up with proposed modifications to the existing program, eliminating the PLC code for the existing Filter System remote I/O rack. These modifications shall be reviewed and approved by the Owner prior to making the proposed changes to the existing PLC program.
 - b. Existing program shall be backed up in an electronic copy (disk or CD-ROM) and provided to the Owner prior to making the approved modifications.
 - c. Provide the revised PLC-2 code as specified under paragraph L, Operation and Maintenance Manuals.
4. Plant SCADA Graphic Displays:
- a. Submit all SCADA computer graphic displays and operator interface functions specified herein which include modifications to the existing plant SCADA graphic displays as required to perform specific functions as specified under section 13360, Functional Descriptions, for the filter control system operation.
 - b. Submit graphic displays for review by the Owner and the Engineer at least sixty (60) days prior to commencement of factory testing.
 - c. Displays shall be full color printouts of actual process and control graphics implemented in the system.
- H. Fiber Optic Communication Submittal – Refer to Specification section 13350, Fiber Optic Communication System, for submittal requirements.
- I. Training Submittals
1. Training Plan Submittal: The training plan shall include:
- a. Definitions of each course.
 - b. Specific course attendance.
 - c. Schedule of training courses including dates, duration, and locations of each class.
 - d. Resumes of the instructors who will actually conduct the training.
- J. Testing Submittals
1. The test plan shall be submitted after all equipment submittals have been approved by the Owner and/or Engineer.

2. The test plan shall demonstrate that the CSI has designed and configured a system that meets the design specifications. The documents for the test plan shall be structured so that it is easily understood what the inputs are, what the predicted outputs should be, and what the actual outputs are. The test plan should have sign-off and date block for the CSI, the Contractor, and the Owner.
3. The complete test plan should include but not be limited to the following:
 - a. Test assumptions and methods
 - b. Test Equipment List
 - c. Test Personnel Staffing and Qualifications
 - d. Test Schedule with time allotted for each task
 - e. System hardware and software summary.
 - f. Communications test to the various PLCs for Discrete and Analog I/O data transfer.
 - g. 100 percent I/O point test including all spare points based upon the previously submitted System I/O list.
 - h. Functional and Control strategy tests.
4. Test Procedures: Submit the procedures proposed to be followed during the test. Procedures shall include test descriptions, forms, and checklists to be used to control and document the required tests. Testing may not be started until all Testing Submittals have been approved.
5. Test Documentation: Submit a copy of the signed off test procedures upon completion of each required test.

K. Tools, Supplies, and Spare Parts Lists Submittal

1. This submittal shall include a list of all required and recommended spares. The following information shall be provided in table format:
 - a. Specification Section
 - b. Tag name
 - c. Description
 - d. Quantity
 - e. Manufacturer
 - f. Model, part, order number
 - g. Storage instructions for all spare parts.
 - h. Local distributor and manufacturer contact information. Contact information shall include address, phone number, and website.

L. Operation and Maintenance Manuals

1. Prior to installation of any equipment onsite, preliminary O&M manuals shall have been submitted and approved. No installation of equipment shall be permitted without the Contractor maintaining an updated version of these preliminary O&M manuals onsite for the Owner's and Engineer's use.
2. After all field changes or corrections made during installation and field check out have been completed, then all system supplier documentation, including drawings, shall be revised to reflect the "as installed, corrected and accepted" condition of the system and

final record copies of O&M manuals for the system shall be provided to the Owner and Engineer for approval.

3. Final system documentation shall be provided in 3-hole type binders of archival quality (e.g. slant D or elliptical binding, vinyl with metal hinge or extra heavy weight vinyl, etc.) with a binding no larger than three (3) inches. Materials shall be printed on 8.5" x 11" or 11" x 17" tear resistant paper or ring reinforced paper where tear resistant is not available. Drawings shall be either folded to fit within an 8.5" x 11" binder or in an 11" x 17" 3-hole binder. Each binder shall include fifteen percent (15%) spare space for the addition of future material. Tear resistant paper shall be Xerox Never Tear or equal.
4. Final documentation shall also be provided in an electronic format. Electronic documentation shall be organized and provided on CD which shall include all CAD drawings, manuals and word processing documents. Electronic documentation format shall be primarily Adobe .pdf with additional documents provided in AutoCAD, Microsoft Office, HTML or as approved by the Engineer or Owner. Organization of the electronic documentation shall be such as to allow point and click navigation from a table of contents to the particular documents with the ability to return to the table of contents from any location with one mouse click.
5. AutoCAD drawings files shall include all supporting files, symbol libraries and print configurations needed to support future modifications and properly print additional drawing copies.
6. All electronic media (i.e. software, electronic documentation, configuration files/reports, device backups, etc.) shall be provided with two (2) backup copies, each organized into a separate binder. Media storage binders shall include but not be limited to the following:
 - a. Table of contents.
 - b. Archival media holders (e.g. CD, DVD, floppy, tape disk, etc.).
 - c. Support contacts (i.e. company, phone, internet link, etc.).
 - d. Software system requirements and installation instructions.
7. Laminated or water/tear resistant copies of all Panel Record drawings shall be supplied in drawing pocket of each control enclosure after "as installed, corrected, and accepted" revisions have been made to the enclosure.
8. Operation and Maintenance manuals shall include but not be limited to the following:
 - a. As-Built drawings of the new Filter PLC Control Panel and Level Transmitter mounting rack panel.
 - b. Bill of Material listing for all components provided within the PLC panel (and any other panels provided) as well as provided external instrumentation devices, with cut sheets and operator's manual/user's reference books. Provide hard copy manuals and CD-Rom copy where available.
 - c. Description of Operation, Local. Describe the control that takes place locally through the use of the local control panel. The written description should be supported with pictorial representation of the panel controls or portion of an electrical drawing.
 - d. Description of Operation, SCADA. Describe the control that takes place at the Wastewater Treatment Plant SCADA Server, similar to the local Operation

- Description listed above. Support the written description with pictorial representations such as snap shots of the SCADA screen or picture/images.
- e. Description of Operation Procedures. Describe Power up procedures, shut down procedures, and troubleshooting procedures.
 - f. Complete documentation for the PLC and its programming for the new Filter PLC control system and existing and modified PLC-2 control system. Include the RS Logix Report with: Processor Information listing, I/O configuration, channel configuration, program file list, data file list, complete ladder-logic printout, address assignment listings for all Data Files/Bits.
 - g. Complete documentation concerning the Operator Interface and its database/address assignment.
 - h. Complete documentation of the Citect Screens and its database/address assignment, similar to that above for the operator interface. Include configuration/setup listings that were used for the SCADA programming. Manual shall contain a copy of the most current SCADA system project back up. It will also include a back-up of any include projects and the "citect.ini" file for all the automation computers.
 - i. Complete electronic copy (disk or CD-ROM) of the PLC ladder logic program for the Filter Control system PLC and existing modified program of PLC-2. The licensed copy of the programming software as specified. The electronic copy shall contain the actual PLC programs and not a PDF version of the program.
 - j. Complete electronic copy (disk or CD-ROM) of the operator interface program. The licensed copy of the programming software for the operator interface where required.
 - k. Complete electronic copy (disk or CD-ROM) of the Citect Screen files and any other configuration files that are specific to the configuration/setup for the facility. Include a copy of the most current 3D model files used for the SCADA screens in the native format of the software.
 - l. Instrumentation Calibration Sheets and Settings Reports for all instruments as specified herein.
 - m. Alarm display listings with clear descriptive messages. Alarm messages shall have the instruction address included in it.
 - n. A copy of the memory maps from PLC to PLC. The electronic copy of the O&M manual shall contain the actual Excel file for the IO map and not a PDF version of the actual file.
 - o. Provide complete electronic file document library including AutoCAD files for all of the drawings, word processing files for all of the training and the sequence of operation.
 - p. System specifications.
 - q. Electrical power requirements.
 - r. Explanation of internal fault diagnostics.
 - s. Recommended spare parts list

1.8 MEETINGS

- A. The Contractor shall be required to give the Owner and their representatives, at least two weeks notice prior to any scheduled meetings. The notice may be shortened by consent.
- B. Graphic Design and Review Meetings: The CSI shall conduct SCADA graphic display design and review meetings with the Owner and Engineer at the Owner's location. The purpose of the design meeting shall be to establish conventions, standards, formats, configurations, for screen development and for discussion of preliminary graphical

displays. The CSI is encouraged to submit preliminary information in advance of this meeting to facilitate discussions. The purpose of the graphic review meeting are for the CSI to present work completed, as a minimum, at the 80% level for comment by the Owner and Engineer and for any coordination and information requests. The intent is to achieve an acceptability of software prior to the factory demonstration testing in which all parties are confident of the end-product results. Acceptability of software implementation is at the Owner's discretion and must be achieved prior to scheduling the Factory Acceptance Test. One graphic design and review meeting shall be conducted but of sufficient quantity to adequately address all issues and concerns of the Owner in developing a quality system.

- C. Additional meetings may be required at the discretion of the Owner and Engineer, to resolve specific action items not addressed in the preliminary design review or preliminary site testing meeting.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. Refer to specification section 13330, Control Enclosures, for panel equipment and components specifications and requirements.
- B. The filter electrical control system equipment shall be mounted within a two-door NEMA Type 4X Stainless Steel dead-front enclosure with outer doors, constructed of not less than 316 stainless steel power white coated and shall be equipped with a 3-point latch with all hardware and exterior components construction of 300 series stainless steel. The enclosure shall be equipped with a removable, aluminum back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. All hardware shall be stainless steel. The Filter PLC enclosure shall include the following features:
 - 1. PLC Equipment
 - 2. Fiber Optic Network Switch
 - 3. Fiber Optic Patch Panel
 - 4. Internal Light with Toggle-Switch
 - 5. Internal Service Power Outlets
 - 6. 24VDC Power Supply
 - 7. Uninterruptible Power Supply (UPS)
 - 8. UPS Bypass-Switch
 - 9. Surge Protection
 - 10. Drawing Pockets
 - 11. Panel Air Condition Unit
 - 12. Miscellaneous Panel Components
- C. The software written for this application shall be in ladder logic and provide a flexible, configurable and expandable control system for the filter control system. The vendor shall provide a licensed copy of all software used in this project and registered to Lee County. All ladder code provided with this contract shall be documented so that an experienced programmer can easily make modifications to the software without having to go back to the original vendor for information. Documentation shall be approved by the engineer before final acceptance of the software. Lee County Utilities shall be the owner of the ladder logic program integration and shall have its unlimited use.

- C. All materials, equipment, and devices shall, as a minimum, meet the requirements of UL, where UL Standards are established for those items, and the requirements of NFPA-70. All control panels shall comply with the requirements of UL 508A for Industrial Control Panels. All items shall be new and unused unless specified or indicated otherwise.
- D. Properly store, adequately protect, and carefully handle equipment and materials to prevent damage before and during installation. Handle, store, and protect equipment and materials in accordance with the manufacturer's recommendations. Replace damaged or defective items.
- E. All equipment shall be the latest and proven design. Specifications and drawings call attention to certain features, but do not purport to cover all details entering into design of the instrumentation system. The completed system shall be compatible with functions required and the equipment furnished by the Contractor.
- F. All electrical components of the system shall operate on 120 volt, single phase, 60 Hz power source, except as otherwise noted in the Specifications. Drawings and specifications indicate the energy sources that will be provided. Any other devices necessary to obtain proper operation of the instrumentation and control system from these energy sources shall be furnished with the system.
- G. All necessary fuses or switches required by the instrumentation manufacturer for equipment shall be provided with the equipment. All instruments requiring internal power supply shall have internal on-off switches.
- H. The mechanical, process, and electrical drawings indicate the approximate locations of field instruments, control panels, systems and equipment as well as field mounted equipment provided by others. The CSI shall examine the mechanical, process and electrical drawings to determine actual size and locations of process connections and wiring requirements for instrumentation and controls furnished under this Contract. The CSI shall inspect all equipment, panels, instrumentation, controls and appurtenances either existing or furnished under other Divisions of the Specifications to determine all requirements to interface same with the ICS. The Contractor shall coordinate the completion of any required modifications with the associated supplier of the item furnished.
- I. Instrumentation equipment and enclosures shall be suitable for ambient conditions specified. All system elements shall operate properly in the presence of telephone lines, power lines, and electrical equipment.
- J. Inside control rooms and climate-controlled electrical rooms, the temperature will normally be 20 to 25 degrees C; relative humidity 40 to 80 percent without condensation and the air will be essentially free of corrosive contaminants and moisture. Appropriate air filtering shall be provided to meet environmental conditions (i.e., for dust).
- K. Other indoor areas may not be air conditioned/heated; temperatures may range between 0 and 40 degrees C with relative humidity between 40 and 95 percent.
- L. Field equipment, including instrumentation and panels, may be subjected to wind, rain, lightning, and corrosives in the environment, with ambient temperatures from -20 to 40 degrees C and relative humidity from 10 to 100 percent. All supports, brackets and

interconnecting hardware shall be aluminum, 316 stainless steel, or as shown on the installation detail drawings.

2.2 FILTER SYSTEM OPERATION

- A. Refer to specification section 13360, Functional Descriptions, for the filter system operations, which include local-manual control, semi-automatic control, via PLC logic, and remote control and monitoring, via Plant SCADA system. The CSI shall utilize these descriptions for the PLC program development of the filter control system and for modifying the existing Plant SCADA filter system graphic screens.

2.3 PROGRAMMABLE LOGIC CONTROLLER (PLC) CONTROL SYSTEM

- A. The CSI shall furnish programmable controller a PLC control system for the Filters as specified herein and as shown on the Drawings. The PLC shall be provided complete with rack, power supply, I/O cards, special function cards, instructions, memory, input/output capacity, and appurtenances to provide all features and functions as described herein. PLC I/O cards may be supplied by third party vendors if approved by the PLC manufacturer and the Owner. No substitutions will be permitted.
- B. The programmable controller shall be designed to operate in an industrial environment. The PLC shall operate in an ambient temperature range of 0^o-60^o Celsius and a relative humidity of 5-95 percent, non-condensing. The PLC shall operate on supply voltages of 90-132 VAC at 47-63 Hz and be provided with a battery backup system. An integral fuse shall be provided on the power supply for short circuit protection and shall be front panel accessible. Integral overcurrent and undervoltage protection shall be provided on the power supply.
- C. System configuration shall be as shown on the drawings. The PLC shall be Allen Bradley CompactLogix 1769-L30ERM with Ethernet Network module as manufactured by Rockwell Automation. The PLC shall include provisions for automatically updating time for changes in daylight savings time. Time shall be automatically synchronized with the plant SCADA system every twenty-four hours.
- D. The processor and its associated memory shall be enclosed in a modular enclosure. LED-type indicating lights shall be provided to indicate processor, memory, and battery status. Errors in memory shall be recognized and shall activate the memory error indicating lights. The PLC processor shall monitor the internal operation of the PLC for failure and provide an alarm output.
- E. All discrete and analog data acquisition, pre-processing, storage and process control functions shall be performed at the PLC level.
- F. All PLC processors shall be provided with the latest manufactured firmware revision level installed.
- G. Create a master memory map that shall document every tag that is passed from one PLC to another. Tags that pass directly from the SCADA to a PLC do not need to be placed on this memory map. Memory map shall document which devices or PLC's originate messages, and which devices or PLC's receive messages, and what tags/address are passed back and forth.

2.4 PLC INPUT/OUTPUT SUBSYSTEMS

- A. Input/output hardware shall be Allen Bradley 1769 series point I/O (as appropriate for the CPU) plug-in modules in associated I/O rack assemblies. Each unit shall handle the required number of process inputs and outputs plus a minimum of 10 percent active prewired spares for each I/O type furnished, plus a minimum of 20 percent spare I/O rack space for the addition of future circuit cards or modules.
- B. Discrete inputs shall be 16-point module, 120VAC signal (integral to PLC) from dry field contacts. Discrete input modules shall be CompactLogix, 1769-IA16.
- C. Discrete outputs shall be 16-point, relay type output modules. The PLC shall provide momentary and latched outputs as required to interface with motor controls and external devices. Interposing relays shall be provided where required to interface with field equipment. Discrete output modules shall be CompactLogix, 1769-OW16.
- D. Analog input circuits shall be 4-channel, isolated, 12-bit (minimum) resolution type. Analog input hardware shall be provided as required for all types of analog inputs being transmitted to the PLC. Analog input modules shall be capable of receiving 4-20 mA signals. Each input circuit shall have optical isolation to protect the equipment against high voltage transients. Optical isolation shall be rated at not less than 1500 V RMS. Analog input modules shall be CompactLogix, 1769-IF-4I.
- E. Analog outputs shall be coordinated with the receivers but shall be isolated 24 VDC 4-20 mA outputs powered from the PLC. Analog output modules shall be 4-channel, isolated type. Each output circuit shall have optical isolation to protect the equipment against high voltage transients. Optical isolation shall be rated at not less than 1500 V RMS. Analog output modules shall be CompactLogix, 1769-OF4CI.
- F. Power supplies shall be compatible with the Allen-Bradley CompactLogix PLC. Input shall be 120VAC and shall supply power to the PLC, Communication and I/O Modules. One power supply shall be provided for each I/O module bank. Power supplies shall be Allen-Bradley 1769-PA4
- G. Input/output modules shall be configured for ease of wiring and maintenance. The modules shall be connected to wiring arms which can be disconnected to permit removal of a module without disturbing field wiring. Covers shall be provided to prevent operator personnel from inadvertently touching the terminals. The process interface modules shall be provided with screw-type terminal blocks with barriers between adjacent terminals for connection of field inputs. Terminals shall be suitable for accepting up to and including No. #22...#12 AWG (0.2...4 mm²) wire.
- H. Output failure mode shall be selectable so that upon station or communication system failure, all outputs shall be placed in the non-conducting mode or remain as they were prior to failure. Light-emitting diodes shall be provided for status indication for each input and output point.
- I. Signal and control circuitry to individual input/output boards shall be arranged such that board failure shall not disable more than one half ($\frac{1}{2}$) of the control loops within any group of controlled equipment (e.g., one pump out of a group of three pumps, two pumps out of four, etc.). Where possible, individual control loops and equipment

shall be assigned to individual boards such that failure of the board will disable only one (1) loop or piece of equipment.

- J. External power supplies shall be provided with the PLC as required to meet specified installed I/O power requirements, plus spares. Power supplies shall be modular units, shall be fully redundant and shall alarm to the PLC upon failure. Power supplies shall have a line regulation of 0.05% and meet the environmental and power requirements specified herein.
- K. Control circuits and signals entering hazardous areas shall be provided with intrinsically safe barriers meeting the requirements of the NEC and UL698.
- L. PLC Control System Spare Parts:
 - 1. Provide as part of this contract a complete compliment of replacement spare parts for all component parts of this PLC control system. It shall be the supplier's responsibility to prepare a detailed suggested replacement parts list for review and approval by the Owner.
 - 2. As a minimum, the CSI shall furnish the following:
 - a. One (1) plug-in module for each type of communications module used in the system.
 - b. One (1) CPU module
 - c. One (1) Analog Input Module
 - d. One (1) Analog Output Module
 - e. One (1) Digital Input Module
 - f. One (1) Digital Output Module
 - g. One (1) of each type power supply

2.5 INDUSTRIAL MANAGED EHTERNET SWITCH

- A. Provide an Ethernet 8-port, SFP Gigabit managed fiber switch at each PLC cabinet for communications over the Ethernet data highway.
- B. The fiber switch shall have up to eight (8) ports, four (4) 10/100/1000 Mbps RJ-45 twisted pair and four (4) combo RJ-45/SFP Gigabit ports. Provide SPF connectors as required for the SCADA network connection.
- C. Input voltage shall be 24VDC, with operating temperature minus 40 to 158 degrees F.
- D. The Ethernet Managed switch shall be Black Box, LEH2004A-4GSFP, or approved equal.

2.6 UNINTERRRUPTABLE POWER SUPPLY (UPS)

- A. UPS unit shall be line interactive unit provided for new Filter PLC control panel as specified herein or shown elsewhere within the Contract Documents.
- B. The UPS unit shall be sized for a minimum of twenty (20) minute backup for all connected equipment. The UPS shall consist of a UPS module and battery modules as required to meet backup run time requirements.

- C. UPS units provided for PLC cabinets shall be provided with a dry contact output to alarm on UPS trouble or failure. This fail output shall be wired into the PLC I/O to represent UPS status.
- D. The UPS shall be located at the bottom of the enclosure but mounted on a raised shelf or platform.
- E. The UPS shall be provided with an Ethernet module.
- F. Each UPS shall be sized to match the maximum power requirements of the associated digital equipment, control panel power supplies and accessories plus twenty (20) percent spare capacity. Upon loss of the AC supply, the inverter shall continue to supply normal power to the device, drawing DC from the batteries.
- G. Each UPS shall meet the following requirements:
 1. Input voltage shall be 120 VAC, single phase, 60 Hz.
 2. Operating temperature range shall be 0 to 40 degree C.
 3. Voltage regulation shall be plus or minus five percent (+/-5%) for line and load changes.
 4. The output frequency shall be phase-locked to the input AC line on AC operation and shall be 60 hertz (+/-0.5%) when on battery operation.
 5. The batteries shall be of the sealed, lead acid or lead calcium gelled electrolyte type, suitable for high temperatures.
 6. Sound absorbing enclosure.
 7. EMI/RF noise filtering.
 8. Surge protection shall be provided on the AC input circuit, which shall have a UL TVSS clamping voltage rating of 400 V with a <5 ns response time.
 9. Adjustment allowed to prevent UPS from going offline when on a standby generator supplied power source.
- H. UPS system shall be APC Smart UPS, SMT3000, with Ethernet module, APC AP9630, or approved equal.

2.7 UPS EXTERNAL BYPASS SWITCH

- A. Provide an external UPS Bypass switch for the Filter PLC Control panel UPS system which safely disconnects the UPS from AC input power when maintenance is required.
- B. UPS shall also be provided with a 3-position with the following functions:

SWITCH POSITION	DESCRIPTION
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LINE	Connects AC input power (line) directly to the load (protected equipment).
OFF	Disconnects the protected equipment from both UPS output power and AC input power.
UPS	Connects the UPS output to the load.

- C. UPS Bypass switch shall be wall or panel mounted with overall dimensions of 13"Hx10"Wx3"D.
- D. UPS Bypass switch shall be Eaton/Cutler Hammer, BPE-01-MBB-AS-1A, with AS400 connector cable BAA-0325, or approved equal.

2.8 TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS)

- A. Refer to specification section 13330, Control Panels, for TVSS requirements.
- B. Provide TVSS protection for all specified spare analog and discrete inputs and analog outputs.

2.9 FLOAT LEVEL SWITCH

- A. A high float level switch shall be supplied for the filter pipe gallery. The level switch shall provide dry contact to alarm on flooding in the pipe gallery. Level switch shall be heavy-duty, NEMA 4 construction.
- B. Mount switch on pipe gallery wall with stainless steel mounting bracket in location not subjected to traffic to prevent damage to the switch.
- C. Level switch for flood alarm shall be Square D, 9036 Type G or approved equal.

2.10 SIGNAL TRANSMISSION

- A. The Contractor shall be responsible for providing a signal transmission system free from electrical interference that would be detrimental to the proper functioning of the ICS equipment.
- B. The Contractor shall be responsible for coordinating signal types and transmission requirements between the various parties providing equipment under this Contract. This shall include, but not be limited to, distribution of appropriate shop drawings among the equipment suppliers and subcontractors.
- C. The CSI shall provide 24 VDC power supplies for signals and instruments where applicable and as required inside panels, controls, etc. Where two-wire instruments transmit directly to the instrumentation and control system, the CSI shall provide power supplies at the PLC-equipped control panels for those instruments. Where four-wire instruments with on-board loop power supplies transmit directly to the instrumentation and control system, the CSI shall provide necessary signal isolators or shall otherwise isolate the input from the ICS loop power supply. Similar provisions shall be made when a third element such as a recorder, indicator or single loop controller with integral loop power supply is included in the loop.

- D. Analog signal transmission between electric or electronic instruments, controllers, and all equipment and control devices shall be individually isolated, linear 4-20 mA and shall operate at 24 VDC. Signal output from all transmitters and controllers shall be current regulated and shall not be affected by changes in load resistance within the unit's rating. All cable shields shall be grounded at one end only, at the control panel, with terminals bonded to the panel ground bus. Analog signal isolation and/or conversion shall be provided where necessary to interface with instrumentation, equipment controls, panels and appurtenances.
- E. Non-standard analog transmission systems such as pulse duration, pulse rate, and voltage regulated shall not be permitted except where specifically noted in the Contract Documents. Where transmitters with nonstandard outputs do occur, their outputs shall be converted to an isolated, linear, 4-20 mA signal.
- F. All discrete inputs to equipment and PLC's, from field devices, starters, panels, etc., shall be dry contacts in the field device or equipment, powered from the PLCs, unless specified otherwise. Sensing power (wetting voltage) supplied by the PLC shall be 24 VDC.
- G. All discrete outputs from local control panels and Control and Information System PLCs, to field devices, starters, panels, etc., shall be 120 VAC / 28 VDC 5A dry contacts. Output contacts may be powered from the field equipment, or powered from 24 VDC / 120 VAC sourced from PLCs cabinet power system, as required to interface with field equipment. Outputs to solenoid valves, horns, and strobe lights shall be 120 VAC, powered from the PLC or control panel unless specified or shown otherwise.
- H. Discrete signals between starters, panels, etc. where 120 VAC is utilized shall be clearly identified in the starter, panel, etc. as being powered from a different power supply, than other starter/panel components. Where applicable, warning signs shall be affixed inside the starter, panel, etc., stating that the panel is energized from multiple sources. Output contacts in the starter, panel, etc. which are powered from other locations shall be provided with special tags and/or color coding. Disconnecting terminal strips shall be provided for such contacts. The above requirements shall apply to all starters and panels, regardless of supplier.

2.11 TOOLS, SUPPLIES, AND SPARE PARTS

- A. Provide special tools, other than those normally found in an electronic technician's tool box, required to test, diagnose, calibrate, install, wire, connect, disconnect, assemble and disassemble any digital equipment, instrument, panel, rack, cabinet or console mounted equipment for service and maintenance (i.e., connector pin insertion and removal tools, wire crimping tool, special wrenches, special instrument calibrators, indicator lamp insertion and removal tools, etc.).
- B. Provide tools and test equipment together with items such as instruction manuals, carrying/storage cases, unit battery charger where applicable, special tools, calibration fixtures, cord extenders, patch cords and test leads, which are not specified but are necessary for checking field operation of equipment supplied under this Section.

- C. The CSI shall provide supplies as needed or as required by the Owner during the specified warranty period. All fuses consumed during installation, testing, start-up, the system availability demonstration, and the warranty period shall be replaced by the Contractor.
- D. Provide spare parts for items of ICS equipment as recommended by the manufacturer and in accordance with the Contract Documents.
- E. Furnish all spares in moisture-proof boxes designed to provide ample protection for their contents. Label all boxes to clearly identify contents and purpose.
- F. Refer to individual product specifications for additional requirements specific to those devices.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. The work included in this section consists of furnishing, installing and placing in operation the instruments and appurtenances, including all conduit, wiring and circuitry, necessary to provide the Owner with a fully operable system properly calibrated and installed.
- B. Include the services of a factory trained, qualified service engineer of the equipment manufacturer to inspect the complete equipment installation to assure that it is installed in accordance with the manufacturer's recommendations, make all adjustments necessary to place the system in trouble-free operation and instruct the operating personnel in the proper care and operation of the equipment furnished.
- C. All workmanship utilized in the manufacture and installation of this system shall be of the highest quality and performed in a manner which is consistent with all accepted practices for industrial controls.
- D. Provide continuous protection of the installed instrumentation equipment from the elements, moisture, construction damage, dust, debris, paint spatter or other conditions which will adversely affect the unit operation until such time as the equipment is scheduled for start-up testing.

3.2 MOUNTING OF EQUIPMENT AND ACCESSORIES

- A. Install and mount equipment in accordance with the Contract Documents, manufacturer's instructions and installation detailed shop drawings. Mount equipment so that they are rigidly supported, level and plumb, and in such a manner as to provide accessibility; protection from damage; isolation from heat, shock and vibration; and freedom from interference with other equipment, piping, and electrical work. Do not install field enclosures, cabinets, and panels until heavy construction work adjacent to the equipment has been completed to the extent that there shall be no damage to the equipment.
- B. Locate devices, including accessories, where they shall be accessible from grade, except as shown otherwise.

- C. Coordinate the installation of the electrical service to components related to the system to assure a compatible and functionally correct system. All accessories shall be coordinated and installation supervised by the Contractor.

3.3 CALIBRATION

- A. Calibrate each instrument in the factory before shipping and furnish with the calibration data and the certification of calibration.
- B. The service technician shall calibrate all instruments and components of the instrumentation system with field adjustable ranges and/or settings after installation in conformance with the manufacturer's instructions, the Contract Documents and the reviewed shop drawings. Set each instrument and components for the specific conditions and intended application as specified for this installation. Replace defective instruments and components which cannot achieve correct calibration of stated accuracy, either individually or collectively within the system.
- C. Certify in writing to the Owner that all calibrations have been completed and the instrumentation system is ready to be operated. Provide instrumentation calibration sheets in the O&M manuals for future reference for both factory and field calibration tests. Calibration certification documents shall be available on site at the time of substantial completion. Certification documents shall include the signature of the service technician performing the calibration.

3.4 GENERAL TESTING REQUIREMENTS

- A. All system start-up and test activities shall follow detailed test procedures, check lists, etc., submitted and previously approved by the Engineer. The Engineer shall be notified at least 21 days in advance of factory system tests and reserves the right to have his and/or the Owner's representatives in attendance.
- B. The Contractor shall provide the services of experienced factory trained technicians, tools and equipment to field calibrate, test, inspect, and adjust all equipment in accordance with manufacturer's specifications and instructions.
- C. The Contractor shall maintain master log books for each phase of installation, startup and testing activities specified herein. Log book shall include signal, loop or control strategy tag number, equipment identification, description and space for sign-off dates, Contractor signature and Engineer signature. Example test documentation specific to each phase of testing shall be approved prior to initiation of that testing, as specified here.
- D. All test data shall be recorded on test forms, previously approved by the Engineer. When each test has been successfully completed, a copy of all test results shall be furnished to the Engineer together with a statement that all specified test requirements have been met and that the system is operating in accordance with the Contract Documents.

3.5 START-UP SUPERVISION

- A. The system supplier shall provide a qualified service technician to inspect all final connections and check the system prior to start-up of the system. The service

technician shall coordinate with the owner's representative for functional check-out of the complete system.

- B. A system software engineer shall be provided on site during start-up of the plant to make adjustments to the Control Computer/ Operator Interface and tune the system as deemed necessary by the engineer.
- C. System verification marking end of supplier's on-site start-up obligations will be issued after system functionality can be demonstrated for a period of 168 continuous hours without interruptions due to error on the part of the supplier.
- D. At least two qualified control systems technician shall be provided by the Contractor when loop checkout is being performed and at least one for all other control system startup and test activities.
- E. The control system integrator's startup personnel shall be present and coordinate with all other startup and testing activities especially the pump, standby power system and variable frequency drive startups.

3.6 INITIAL FIELD TESTING

- A. All system start-up and test activities shall follow detailed test procedures, test report, check lists, etc., submitted and previously approved by the Engineer.
- B. Control system start-up and testing shall be performed to ensure that all plant processes shall be systematically and safely placed under digital control in the following order:
 - 1. Primary elements such as transmitters and switch devices shall be calibrated and tested as specified.
 - 2. Each final control element shall be individually tested by Contractor.
 - 3. Each instrument and control loop shall be tested by Contractor.
 - 4. Each control strategy shall be tested under automatic control as specified by Contractor.
 - 5. The entire control system shall be tested for overall monitoring, control, communications, and information management functions, and demonstrated for system availability as specified by Contractor and Engineer.
- C. System start-up and test activities shall include the use of water to establish service conditions that simulate, to the greatest extent possible, normal operating conditions in terms of applied process loads, operating ranges and environmental conditions.
- D. Verify that each instrument, meter, and gage has been properly installed, connected, grounded and calibrated. Perform three-point calibration on continuous elements and systems. Provide calibration records.
- E. Verify that the input/output functions of each instrument conform to the requirements of the application.

- F. Exercise each system as defined by each loop description through operational tests to demonstrate that it performs as intended on a continuing basis and to demonstrate the integrity of the system

3.7 LOOP CHECKS

- A. Prior to control system startup and testing, each monitoring and control loop shall be tested by the Contractor on an individual basis from the primary element to the final element, including the PLC I/O module and PLC data table, for continuity and for proper operation and calibration.
- B. Signals from transducers, sensors, and transmitters shall be utilized to verify control responses. Simulated input data signals may be used subject to prior written approval by the Engineer. All modes of control shall be exercised and checked for proper operation.
- C. The accuracy of all analog inputs shall be verified using field inputs or by manually applying input signals at the final controller, and then reading and recording the resulting analog input data at the PCL or work station.
- D. Final control elements and ancillary equipment shall be tested to verify that proper and stable control is achieved using local area control panels, motor control center circuits, and local field mounted control circuits. All hardwired control circuit interlocks and alarms shall be operational. The control to final control elements and ancillary equipment shall be tested using both manual and local automatic (where provided) control circuits.
- E. Each loop tested shall be witnessed, dated and signed off by both the Contractor and the Engineer/owner upon satisfactory completion.

3.8 INITIAL START-UP TESTING

- A. Perform satisfactory Contractor's initial start-up and functional test prior to demonstration for Owner and Engineer.
- B. After the field testing has been successfully demonstrated, a date for system start up involving the Owner's operating personnel will be scheduled as agreed to by the Owner. Notify Engineer fourteen (14) days prior to initial start-up of each item of equipment.
- C. Have Contract Documents, shop drawings, product data, and operation and maintenance data at hand during entire start-up process.
- D. Provide control diagrams that show actual control components and wiring.
- E. Coordinate sequence for initial start-up of various items of equipment.
- F. Verify control systems are fully operational in automatic and alternate modes of operation.

- G. Start up and test the instrumentation equipment with the entire system operational. Conduct start-up and initial functional testing.

3.9 START-UP AND FUNCTIONAL TESTING, DEMONSTRATION FOR OWNER AND ENGINEER

- A. Perform pre-startup inspection of installation. Perform startup under no-load conditions, if possible. Observe noise, vibration and operation. If all operating characteristics are normal, proceed with startup. Operate equipment and systems under all load conditions and confirm all operating characteristics are normal. If normal operation is observed, proceed with witnessed functional test and performance test as required.
- B. Perform functional and performance tests under supervision of responsible manufacturer's representatives, control system integrator, and Contractor personnel. Representatives of Owner and Engineer shall witness functional test. Perform functional and performance tests on each piece of equipment and Operational system as specified in the individual product sections.
- C. Demonstrate that equipment operates and complies with specified performance requirements. Demonstrate that control panel functions, including failures and alarms operate and comply with specified performance requirements.
- D. Functionally test failures and alarm conditions; or if approved by engineer simulate by jumping failure input terminals. Provide signal generators that simulate control conditions if it is not feasible to create actual conditions. Testing activities shall include the simulation of both normal and abnormal operating conditions.
- E. Use Operation and Maintenance manuals, loop descriptions, submittals, graphic screens, etc., to demonstrate operation of equipment. Use actual as-built control diagrams in demonstration of functions.
- F. Each control strategy shall be tested by the Engineer to verify the proper operation of all required functions. The control system start-up and test activities shall include procedures for tuning all control loops incorporating PID control modules, and for adjusting and testing all control loops as required to verify specified performance.

3.10 WARRANTY

- A. All products mentioned herein must be warranted by the supplier for a period of Two (2) years from the date of system turnover; final acceptance.
- B. An unconditional warranty shall be provided for all equipment supplied for Two years from date of final acceptance of system by the owner. THIS WARRANTY SHALL INCLUDE ANY DAMAGES CAUSED BY LIGHTNING INDUCED ELECTRICAL SURGES; ONLY DAMAGES CAUSED BY DIRECT LIGHTNING STRIKES TO THE BUILDING STRUCTURE (AS DETERMINED BY THE ENGINEER) SHALL BE EXCLUDED FROM THE WARRANTY. Theft, fire, vandalism and floods shall be excluded from the warranty except for fire damage which originates at equipment which is provided as part of this work.

- C. The Contractor shall issue two copies of a written warranty to the Owner.
 - 1. The warranty shall be a legal and binding document.
 - 2. Warranty shall include the start and end date of the warranty period.
 - 3. Warranty shall include the Owner's and Contractor's name.
- D. Warranty calls shall be broken into two categories, emergency and non-emergency. Whether the warranty call is emergency or non-emergency shall be dictated by the Owner.
 - 1. An emergency warranty call shall be responded to within 8 hours of the call, whether during business hours or not.
 - 2. A non-emergency warranty call shall be responded to within 48 hours of the call, whether during business hours or not.
- E. Telephone support for operating procedures and non-hardware problems shall be provided on an unlimited basis during the warranty period.

3.11 TRAINING

- A. The system supplier shall provide a minimum of three (3) days of training instruction to the Owner's personnel to include; one day operator training; and two days PCP and Controls system maintenance training including software maintenance training.
- B. Training shall not occur until after completion of successful functional testing and performance testing. Provide training while equipment is fully operational.
- C. Training shall not occur until after review and approval of system O&M manuals. Use accepted Operation and Maintenance manuals as the basis of instruction.
- D. Submit to Owner not less than 14 days prior to each training session an outline of the training program and the qualifications of the trainer(s).
- E. Coordinate services with the Owner, with a minimum of two weeks' notice. Training shall be held to accommodate Owner's schedule.
- F. Training services are exclusive of travel time to and from the facility. The times specified shall not be construed as to relieve the manufacturer of any additional visits to provide sufficient service to insure equipment is in satisfactory and continuous operation.
- G. Trainings should be geared to not only impart knowledge of the control functionality of the new control system but also some background understanding of how and why things work.
- H. Onsite Operations Staff Training Sessions shall be held over two full days. A full day training session shall cover all necessary material. Between the two different days all operations staff should be able to attend at least one training session.
- I. Training Manual:
 - 1. The operations staff training shall be based on the training manual created by the Contractor.
 - 2. All training manuals shall be provided with color graphics.

3. The training manual shall provide DETAILED working knowledge of the control of the plant and how to use the SCADA interface.
4. Each SCADA control object, whether it be a display field, push button, or set point field shall be specifically called out and its purpose explained.
5. The underlying theory of why something is controlled shall be explicitly explained.
6. All faults and permissives that affect the operation of equipment shall be explicitly called out.
7. All set points shall be recorded under a separate section titled "Set Points." An explanation of how the set point value was determined shall also be included next to the set point value.
8. Each section of the training manual shall include a 10 question quiz. Answer key for each quiz shall also be provided, but not as part of the training manual.
9. The training manual will be used as the basis for the INITIAL Operations Staff Training Sessions. At the end of each section covered in the training manual the Contractor shall administer the 10 question quiz. At the end of the quiz the Contractor shall review the quiz with the operations staff and discuss what the correct answer was for each quiz question. Operations staff shall be allowed to keep their quizzes for further study.
10. The training manual will be used as the basis for the Final Operations Staff Training Sessions. At the end of each section covered in the training manual the Contractor shall administer the 10 question quiz. At the end of the quiz the Contractor shall collect all quizzes, seal them in an envelope and give them to Owner Process Control Engineer for grading.
11. The course shall cover the following subjects, as a minimum:
 - a. SCADA overview in which the basic systems design, configuration, and purpose is covered.
 - b. PLC hardware in which the specific hardware elements and specific configurations provided are covered.
 - c. How the actual PLC programs operate.
 - d. Programmer equipment orientation in which the student becomes familiar with the operation and operational maintenance procedures.
 - e. Specific application program instruction covering the overall design and philosophy of the applications as provided under this contract. The intent shall be to make the student fully knowledgeable in all aspect of the system provided, along with the methods for making additions, modifications, and deletions to the SCADA.
 - f. Complete system backup and reload procedures.
 - g. Diagnostic software details including capabilities, usage, and interpretation of results.

END OF SECTION

SECTION 13330
CONTROL PANELS

PART 1 – GENERAL

1.1 WORK INCLUDED

- A. Furnish all labor, equipment, and materials for control panels as indicated on the drawings and specified herein. The panel supplier shall be a UL listed panel shop and all panels shall be UL-508 certified and labeled.
- B. Control panel equipment shall be coordinated to provide all the specified control as indicate in the elementary diagrams or specified herein.
- C. The Contractor shall be responsible for coordinating and interfacing with equipment and instrumentation supplied under other sections of the Contract Documents that are an integral part of the plant control systems. This interfacing shall be incorporated in the detailed systems drawings and data sections to be submitted by the contractor prior to rough-in work.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. In addition to the requirements specified in this section, the requirements of specification Section 13300: Instrumentation and Control System, and the sections referenced therein shall be applied.

1.3 SUBMITTALS

- A. All submittals shall be in accordance with Division 1 and as specified in Section 13300: Instrumentation and Control System. In addition, the following specific submittal items shall be provided.
 - 1. Cabinet sizing in relation to heat dissipation and cooling/heating system sizing calculations shall be submitted for all cabinets containing PLCs and UPS at the request of the Engineer, for all cabinets containing sensitive electronic equipment or chemicals.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS

- A. All enclosures shall fit within the allocated space shown on the Drawings. The Contractor shall examine plans and/or field inspect new and existing structures as required to determine installation requirements and shall coordinate the installation of all enclosures with the Owner, other equipment suppliers, and all affected subcontractors. The Contractor shall be responsible for all costs associated with installation of enclosures, including encloses provided by the other equipment suppliers and all costs associated with the repair of damage to structures (incidental, accidental or unavoidable).

- B. An estimated size is shown on the Drawings. The Contractor shall furnish enclosures of the size and quantity required to house the manufacturers' equipment supplied and all other electrical components installed in the enclosure.
- C. Enclosures (cabinets, panels, boxes, etc.) shall be formed or welded construction, reinforced with Unistrut, Powerstrut or equal to facilitate mounting of internal components or equipment. Sufficient access plates and doors shall be provided to facilitate maintenance and testing of the supplier's equipment. Doors shall be removable. Enclosures with any dimension thirty-six (36) inches or greater shall be provided with removable lifting lugs designed to facilitate safe moving and lifting of the panel during installation. No screws or bolts shall protrude through from the interior enclosure.
- D. All steel enclosures shall be free from dirt, grease and burrs, and shall be treated with a phosphatizing metal conditioner (phosphate conversion coating) before painting. All surfaces shall be filled, sanded, and finish coated by spraying a 1-2 mil epoxy prime coat and smooth, level, high grade textured finish between flat and semi-gloss shine. All stainless steel enclosures shall be polished to a No. 4 finish.
- E. Enclosures shall be prefabricated cabinets and panels by Hoffman, Rittal or Vynckier. The Contractor may optionally provide enclosures custom fabricated by a reputable panel fabrication shop acceptable to the Engineer.
- F. Each panel shall incorporate a removable back panel on which control components shall be mounted. Back panels shall be secured to the enclosures with collar studs. All components shall be of the highest industrial quality and securely mounted to the removable back panels with screw and lock washers. Back panels shall be tapped to accept all mounting screws. Self-tapping screws shall not be used to mount any component.
- G. All enclosures with any dimension twenty-four (24) inches or larger shall be provided with drawing pockets for as-built panel drawings. One (1) laminated copy of the appropriate panel as-built drawings shall be furnished and left in the pocket of each panel.
- H. All enclosures shall be protected from internal corrosion by the use of corrosion-inhibiting vapor capsules as manufactured by Northern Instruments Model Zerust VC, Hoffman Engineering Model A-HCI, or equal.
- I. All metallic enclosures with door mounted equipment shall have the door grounded by means of flexible ground strap.
- J. The enclosure and all interior and exterior equipment shall be identified with nameplates. The equipment shall be mounted such that service can occur without removal of other equipment. Panel mounted equipment shall be flush or semi-flush mounted with flat black escutcheons. All equipment shall be accessible such that adjustments can be made while the equipment is in service and operating. All enclosures shall fit within the allocated space as shown on the Contract Drawings.

- K. Enclosures shall provide mounting for UPS, power supplies, control equipment, input/output subsystems, panel mounted equipment and appurtenances. Ample space shall be provided between equipment to facilitate servicing and cooling. Enclosures shall be sized to adequately dissipate heat generated by equipment mounted inside the panel. Louvered openings fitted with dust filters near the bottom and top of the cabinet shall be provided for NEMA 12 enclosures. If required, cabinets shall be provided with filtered fans, heat exchangers or air conditioners. Only closed loop cooling systems shall be provided for NEMA 4X cabinets. Cooling systems shall be by the cabinet fabricator, McLean Midwest, Noren Products, or approved equal.
- L. Circuit breakers shall be provided for the following internal branch circuits distributed within the panel:
 - 1. Receptacles and power strips.
 - 2. Lighting.
 - 3. UPS System
 - 4. Panel power supplies
 - 5. Ethernet Switch
 - 6. HVAC equipment.
 - 8. Filter valves' power supply distribution
 - 9. PLC power supply and equipment (I/O and communication modules) power supply distribution
- M. Enclosures shall be provided with 120 volt duplex receptacles for service equipment and fluorescent service lights. Loads not requiring transient voltage surge suppression (i.e. receptacles, lighting, HVAC, branch circuits to remote equipment, etc.) shall be connected ahead of the enclosure TVSS device.
- N. Locate equipment, devices, hardware, power supplies, instrumentation and controls, electrical equipment and wiring to be installed inside the enclosures and/or as facial features on the enclosures, so that connections can be easily made and so that there is ample room for servicing each item. Every component in and on the enclosures shall be able to be removed individually without affecting the other components and without the need to move other components. Support and restrain all internally, as well as panel mounted components to prevent any movement.
- O. All cabinets and/or enclosures shall be NEMA rated for the environment in which it is to be installed and as noted in the Drawings.
- P. Materials and equipment used shall be U.L. approved wherever such approved equipment and materials are available.
- Q. Control panels shall be built in accordance with UL508A Industrial Control Panels and NEC Article 409 Industrial Control Panels. Control panels for areas classified as Hazardous shall be built in accordance with UL698 Industrial Control Equipment for Use in Hazardous Locations. Control panels shall be UL508A and/or UL698 labeled and marked as defined in NEC 409.110 with the following:

1. Manufacturer's name and contact information (i.e. address, phone, website, email, etc.).
 2. Supply voltage, phase, frequency and full-load current.
 3. Short-circuit current rating of the industrial panel based on one of the following:
 - a. Short-circuit current rating of a listed and labeled assembly.
 - b. Short-circuit current rating established utilizing an approved method.
 - c. Electrical wiring diagram numbers or the index sheet to the electrical wiring diagrams.
 - d. The enclosure type number (i.e. NEMA 1A, 3R, 12, 4X, 7, 9, etc.).
 4. If the industrial control panel is intended as service equipment, it shall be marked to identify it as being suitable for use as service equipment.
- R. All work shall be performed in a professional manner and in consideration of allowing ease of future troubleshooting and maintenance. All equipment should be mounted so as to minimize crowding within the panel. All devices shall be mounted and wired in a neat and workmanlike manner. Each component shall be prominently identified with the use of permanent engraved legend plates.
- S. Grounding: All suppressors shall be grounded per the suppressor manufacturer's recommendations. Furnish control panels with an integral copper grounding bus for connection of suppressors and other required instrumentation. Provide single point connection of all grounds to grounding bus using the shortest possible path. Each grounded object shall have a separate connection to the ground bus. Do not connect cable shields to suppressor ground terminal or daisy chain ground connections. Provide 1 inch wide by 1/8 inch thick copper ground bus as a minimum.

2.2 PANEL ENCLOSURE MATERIAL AND CONSTRUCTION

A. GENERAL

1. The filter electrical control system equipment shall be mounted within a two-door NEMA Type 4X Stainless Steel dead-front enclosure with outer doors, constructed of not less than 316 stainless steel powder coated white and shall be equipped with a 3-point latch with all hardware and exterior components construction of 300 series stainless steel. The enclosure shall be equipped with a removable, aluminum back panel on which control components shall be mounted. Back panel shall be secured to enclosure with collar studs. All hardware shall be stainless steel. Gaskets shall be polyurethane.

B. TERMINALS

1. Terminal blocks s Terminal strips shall be provided for all signals as indicated on the drawings plus all spare conductors as specified.

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Terminal strips shall be switch type with integral fuses equal to Allen Bradley 1492-H6. Wiring from the control panel to the terminal strips shall be factory installed. All spare conductors shall be terminated and identified. All terminals over 200V phase to phase shall be covered with approved plastic shields.

2. Terminals shall be marked with a black waterproof, permanent, continuous marking strip. One side of each terminal shall be reserved exclusively for field incoming conductors. Common connections and jumpers required for internal wiring shall not be made on the field side of the terminal.

C. WIRING

1. All wiring shall be bundled and run open or enclosed in vented plastic wireway, as required. All conductors run open shall be bundled and bound with nylon cable ties, at regular intervals, with intervals not to exceed 12 inches. Adequately support and restrain all wiring runs to prevent sagging or other movement. Care shall be taken to separate communication, network, electronic signal, AC discrete signal, DC discrete signal and power wiring. Wiring to equipment mounted on doors or where movement of the equipment will take place, shall be installed in nylon spiral wrapping sheaths.
2. Wires shall be color coded as follows:
 - a. Equipment Ground - GREEN
 - b. 120 VAC Power Distribution - BLACK
 - c. 120 VAC Power Neutral - WHITE
 - d. 120 VAC Control (Internally Powered) - RED
 - e. 120 VAC Control (Externally Powered) - YELLOW
 - f. 24 VAC Control - ORANGE
 - g. DC Power (+) - BLUE
 - h. DC Power (-) – BLUE/WHITE
 - i. DC Control - BLUE
 - j. Analog Signal (+) - BLACK
 - k. Analog Signal (-) - WHITE
3. All wiring shall comply with accepted standard instrumentation and electrical practices. Field wiring for power, control and signal wires shall comply with Division 16 of the specifications. For each pair of parallel terminal blocks, the field wiring shall be between the blocks.
4. Internal panel wiring shall be as follows:
 - a. AC power wiring: 14 AWG minimum, stranded copper conductors, THHN/THHW wire rated for 600 volts and 90 °C. For wiring carrying more than 15 amps, use sizes required by NEC.

- b. AC control and DC power and control wiring: 16 AWG minimum, stranded copper conductors, THHN/THHW wire rated for 600 volts and 90 °C.
- c. Instrument signal wiring: 18 AWG stranded conductors, tinned copper, twisted pair or triad, overall one hundred percent (100%) aluminum foil shield with 20 AWG stranded drain wire, plenum rated 300V 60°C FEP insulated wire with FEP jacket, equal to Belden 88760.
- d. All stranded wire shall have a minimum of sixteen (16) strands, except for drain wires.

D. IDENTIFICATION

- 1. Provide a laminated black nameplate with beveled edges and ½ inch white letters to identify each console, panel or cabinet on the front of the enclosure.
- 2. Provide laminated, beveled edge, plastic legend plates and nameplates, with 1/4 inch letters, for each dead-front panel mounted device as shown on the Drawings. Color shall be white lettering on black background. Attach front panel nameplates with both a permanent adhesive and stainless steel machine screws into tapped holes.
- 3. Tag all interior instruments and other components with engraved, laminated plastic nameplates with 1/8 inch, minimum, lettering. Legends shall be consistent with wiring and layout drawings. Nameplates shall be attached with permanent adhesive to the panel, near the device or on the device itself or as otherwise approved by the Engineer.
- 4. Number and label each wire in the systems. Every unique wiring node shall have its own individual unique number. Numbers shall be shown on all submitted drawings. All wires shall be labeled at each termination and junction of the wire and at 30 inch intervals along the wire. All multi-conductor cables shall be labeled at each end and at 30-inch intervals with CBL-XXX and also label each conductor at both ends. Labeling shall be self-laminating white/transparent self-extinguishing vinyl strips (Brady DAT 7 292 or equal) with clear heat shrink tubing over the markers. Length shall be sufficient to provide at least two and one-half (2 ½) wraps. All labels shall be machine-printed with wire and/or cable numbers.

E. RELAYS

- 1. Control circuit switching shall be accomplished with relays. These relays, for interfacing and control applications, shall be the compact general purpose plug-in type having low coil inrush and holding current characteristics. An LED status-indicating light shall be provided with each relay. Contact arrangements shall be as noted or shown, and shall be rated for not less than 10 amperes at 120V ac or 28V dc. Coil voltage shall be as noted or shown. Non-latching relays shall have a single coil.

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Latching relays shall have two coils, unlatching being accomplished by energizing one coil, and latching being accomplished by energizing the other coil. Relays shall have plain plastic dust covers, test buttons, and mounting sockets with screw terminals and holddown springs. Relays shall be UL recognized. Relays shall be Potter and Brumfield, Struthers-Dunn, or equal.

2. Time delay functions shall be accomplished with Square-D 9050JCK60V20 timer relays. Units shall be adjustable time delay relays with the number of contacts and contact arrangements as shown. A neon status-indicating light shall be provided with each relay. Contacts shall be rated for 10 amperes at 120V ac. Integral knob with calibrated scale shall be provided for adjustment of time delay. Initial setting shall be as shown with time delay range approximately three times the initial setting. Time delay rangeability shall be at least 10:1. Operating voltage shall be 120V ac, plus 10 percent, -15 percent at 60-Hz. Operating temperature shall be -20 degrees F to 165 degrees F. Repeat timing accuracy shall be plus or minus 10 percent over the operating range. Units shall be Amerace Corp., Control Products Division, Agastat Series 7000, Cutler-Hammer Series D87, or equal.
3. All relays shall have a screw terminal interface with the wiring. Terminals shall have a permanent, legible identification. Relays shall be mounted such that the terminal identifications are clearly visible and the terminals are readily accessible.

F. PANEL OPERATING CONTROLS AND INSTRUMENTS

1. All operating controls and instruments shall be securely mounted on the control compartment door or interior dead-front as detailed on panel enclosure drawings. All controls and instruments shall be clearly labeled to indicate function.
2. Indicator lamps shall be LED pilot lights (PL) shall be 30mm LED full voltage push to test type and mounted in NEMA 4X Square D, 9001 series. Lamp modules shall be equipped to operate at 24 or 120 volt input. Lamps shall be easily replaceable from the front of the control compartment door without removing lamp module from its mounted position. Units shall be heavy-duty, oiltight, push to test industrial type with screwed on prismatic glass lenses in colors as shown, and shall have factory engraved legend plates. LED's shall be high illumination type (5ma at 130V ac).
3. Control operators such as pushbuttons (PB), selector switches (SS), shall be Square D, 9001 series. Control operators shall be 30 mm, round, heavy-duty, oil tight NEMA 4X corrosion resistant. Operators shall be black knob type. Units shall have the number of positions and contact arrangements and spring return function (if any) as shown. Units shall be single-hole mounting, accommodating panel thickness from 1/16-inch minimum to 1/4-inch maximum.

4. Control operators shall have legend plates as specified herein, indicated on the Contract Drawings, or otherwise directed by the Engineer. Legend plates shall be plastic, white field (background) with black lettering. Engraved nameplates shall be securely fastened above each control operator. If adequate space is not available, the nameplate shall be mounted below the operator.
5. Process meters shall a loop powered display designed for a 4-20MA current loop. Provide minimum 0.5" high, 4-1/2" digit LED display to indicate amplitude of current in the current loop. The meter shall be provided with programmable internal scaling adjustment. Provide units with NEMA-4X faceplate rating constructed of silicone coated Lexan and gasketed for NEMA 4 requirements; circuit boards coated for moisture resistance. Provide panel meters for each analog process variable. Digital Indicators shall be Yokogawa, Red Lion, or approved equal.
6. Signal isolators/boosters/converters shall be solid state electronic type with RFI protection. Signal isolators/boosters/converters shall accept a current, voltage, frequency, temperature, or resistance and provide a current or voltage output as shown on the drawings and specified herein. Signal isolators/boosters/converters shall have complete isolation between input circuitry, output circuitry, and the power supply and shall be suitably mounted inside an enclosure. Signal isolators/boosters/converters shall be Yokogawa, VJH7, or approved equal.
7. The control panel 24 VDC power supply shall be din-rail mount type and sized per the guidelines of UL508 and UL508A. Power supply shall be Rhino, PSM24, or approved equal.
8. Provide a front-panel mount indicating controller for the backwash control valve. Control shall have 14-segement large color LCD display with navigation keys for local control or to set in automatic control from PLC control system. Controller shall be Yokogawa, UT55A, or approved equal.

G. Transient Voltage Surge Suppression (TVSS)

1. Transient voltage surge suppressors shall be provided at the following minimum locations:
 - a. At any connections between AC power and electrical and electronic equipment, including panels, assemblies and field mounted instruments.
 - b. At both ends of all analog signal circuits that have any portion of the circuit extending outside of the control panel.
 - c. At the control panel of all discrete signal circuits that have any portion of the circuit extending outside of the control panel.
 - d. At both ends of all copper-based communications cables that extend outside of a building.

CONTROL PANELS

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- e. At all specified spare analog inputs and outputs in PLCs and RTUs.
2. These protective devices shall be external to and installed in addition to any protective devices built into the equipment. Power and signal protection shall be installed in either in a NEMA 4X enclosure or in the enclosure that houses the equipment to be protected.
3. All surge arrestors shall be mounted and wired per the manufacturer's recommendations including local grounding for surge energy dissipation. For surge suppressors use No. 8 cable for ground connection or install suppressor directly on ground bus using grounding screw. Provide 1 inch wide by 1/8 inch thick copper ground bus as a minimum.
4. Panel-mounted power circuit protectors shall be provided in all enclosures powered by 120 VAC. The protector shall be a 3-stage hybrid, solid-state power line protector with noise filtering, common mode and normal mode suppression and nanosecond reaction time. The unit shall include a replaceable fuse to remove the load (protected equipment) from the line if the unit is either overloaded or the internal protection fails. TVSS devices shall be EDCO HSP-121BT-1RU or approved equal.
5. Panel-mounted signal circuit protectors shall be made for mounting on a terminal block rail. Each TVSS shall include a moveable grounding link to allow each signal cable shield to be individually grounded to the panel via the mounting rail through the TVSS for that cable without the use of any additional grounding wire or to be isolated from ground at the TVSS. Each mounting rail shall be grounded to the panel by the use of rail mounting screws at approximately one-foot intervals. Protection shall be from line to line and from each line to ground. Protection shall also be from shield to ground where the shield is not grounded at the protector. Each TVSS shall have the ability to protect against surge currents greater than 10,000 amperes. Each TVSS shall add no more than 22 ohms per signal wire to the total signal loop resistance of the analog signal loop in which it is installed. TVSSs shall not introduce error-producing ground loop currents into the instrumentation signal circuits. TVSS devices shall be ERICO, Critec UTB Series, or approved equal.
6. Signal circuit TVSS for 2-wire field instruments shall be a conduit connected/pipe nipple type and shall have characteristics equal to the panel mounted devices. Units shall be mounted to a transmitter conduit entry point where available. When not available or practical, then these devices shall be mounted in NEMA 4X enclosures located at the field devices. TVSS devices shall be EDCO SS65-036 or approved equal.
7. Signal circuit TVSS for 4-wire field instruments shall be a separate enclosure unit capable of providing protection on both the power and signal side. The unit shall contain the characteristics of the line power protector and signal circuit protectors discussed above. Units shall be enclosed in a manufacturer assembled NEMA 4X polycarbonate

enclosure with a clear polycarbonate cover. TVSS devices shall be EDCO SLAC-12036 or approved equal.

8. TVSS devices antenna cable signal protection shall be an in-line panel mount type unit rated for 50 Ohms and with dc blocking. Unit shall be rated for the appropriate frequency range and have an insertion loss of 0.1 dB. TVSS device shall be Polyphaser IS-50 series or approved equal.
9. TVSS device specifications and ratings for signal or communications types not defined herein shall be as specified elsewhere or of a type recommended by the manufacturer of the device being protected. TVSS devices shall be EDCO, or approved equal.

2.3 TOOLS, SUPPLIES, AND SPARE PARTS

- A. Tools, supplies, and spare parts shall be provided as specified in Section 13300: Instrumentation and Control, General Requirements and as specified for each equipment item. In addition, the following items shall be provided.
 1. One (1) of each type of panel mounted equipment (i.e., indicators, signal converters, etc.) provided under this Contract.
 2. Three (3) of each type of interposing relay provided under this Contract.
 3. One (1) of each type of power TVSS device used
 4. Two (2) of each type of signal TVSS device used
 5. One (1) of each type power supply used.

PART 3 – EXECUTION

3.1 REQUIREMENTS

- A. In addition to the requirements specified in this section, refer to Section 13300, Instrumentation and Control System.
- B. Floor mounted enclosures shall be installed on 1/4 inch thick rubber type pads. These pads shall completely cover the area of the base that is against the floor.
- C. Keep enclosures clean at all times. Keep enclosures doors closed except when actually working in the enclosure. Protect all equipment during installation, including hole punching for conduit connection. Remove all filings and thread cuttings from enclosures. Careful attention must be paid to provide installations which are both functional and esthetically acceptable.
- D. All conduits used in conjunction with control panels or instrumentation of any kind shall be sealed using a suitable duct-sealing compound to minimize the possible damage caused by vapors or wetness. It shall be the responsibility of the CSI to verify that this is accomplished early in the project, so that corrosion damage does not occur during the time of construction.

- E. The Contractor shall provide the Engineer a periodic written report detailing construction progress. This report shall include specific tabulations of equipment on which construction/installation has been completed.
- F. Equipment shall be located so that it is accessible for operation and maintenance. The CSI shall examine the Contract Drawings and Shop Drawings for various items of equipment in order to determine the best arrangement for the work as a whole and shall supervise the installation of all equipment.

3.2 WIRING AND GROUNDING

- A. The following wiring practice guidelines shall be used in order to minimize ground loops, minimize the effects of electromagnetic interference/radio frequency interference (EMI/RFI) and to provide maximum practical immunity from damage resulting from lightning-induced transients.
- B. Common wires or conductors shall not be utilized (either within panels or external to panels, or for grounding of field devices) for signal shielding, signal grounding, or safety grounds.
- C. Exposed wire lengths extending from within shielded signal cables shall be minimized to reduce pick-up of EMI/RFI by signal circuits. Exposed lengths of less than one inch is preferred with a maximum exposed length of two inches only permitted where necessary. No splicing of signal wires shall be permitted.
- D. All signal wiring shall be shielded, both within panels and external to panels. Unless otherwise specified, all signal wiring shall be No. 16 AWG stranded tinned two-conductor twisted pair with 100 percent coverage of aluminized Mylar or aluminized polyester shield and tinned copper drain wire.
- E. The shield on each process instrumentation cable shall be continuous from source to destination, and grounded at one end only. In general, grounding of signal cable shields shall be done at the control panel end. No signal cable shall share a common cable shield grounding wire with any other signal cable or other circuit. The exposed length of cable shield grounding wires shall not exceed two inches prior to termination with less than one-inch maximum length preferred.
- F. All outdoor instruments and all outdoor enclosures shall be grounded using the practice defined in Section 800.40 of the National Electric Code.

END OF SECTION

SECTION 13350
FIBER OPTIC COMMUNICATION SYSTEM

PART 1 – GENERAL

1.1 QUALITY ASSURANCE

A. Fiber Optic Cable Manufacturer

1. The cable manufacturer shall be ISO 9001 or Quality Management System TL 9000 registered.

B. Installer

1. The fiber optic cable installer shall be certified by the cable manufacturer and adhere to the engineering, installation and testing procedures and utilize the authorized manufacturer components and distribution channels in provisioning the Project.
2. The Contractor directly responsible for this work shall be a Premise Distribution contractor who is, and who has been, regularly engaged in the providing and installation of commercial and industrial telecommunications wiring systems of this type and size for at least the immediate past five years.
3. The Contractor shall be experienced in all aspects of this work and shall be required to demonstrate direct experience on recent systems of similar type and size. The Contractor shall own and maintain tools and equipment necessary for successful installation and testing of optical and have personnel who are adequately trained in the use of such tools and equipment.

1.2 RELATED WORK SPECIFIED ELSEWHERE

- A. In addition to the requirements specified in this section, the requirements of specification Section 13300: Instrumentation and Control System, and the sections referenced therein shall be applied.

1.3 SUBMITTALS

- A. Submittals shall be provided in accordance with the requirements set forth in Division 1.

B. The fiber optic shop drawing submittals shall include the following:

1. Cable schedule showing cable identification, fiber counts for each cable and identification of used fiber pairs.
2. Component Data:
 - a. Manufacturers and model number.
 - b. Data sheets
3. System block diagram.
4. Detailed Test Procedure to be implemented including all tests to be conducted and list of equipment to be used.

- C. Operation and Maintenance Submittal shall include the following:
 - 1. All shop drawing data revised for as built conditions.
 - 2. Manufacturers user manuals and installation instructions.
 - 3. Fiber Optic Cable Test Results.

1.4 SCOPE OF WORK

- A. Fiber optic cabling shall be provided between the filter building, MCC-2 building, and WWTP control room as specified herein and shown on drawings. Furnish and install complete with all accessories a TIA/EIA Fiber Optic Cabling System (FOCS). The FOCS system shall provide a SCADA connection between the New Filter PLC Control System panel and Plant Control Room as described herein and shown on the drawings.
- B. The FOCS shall utilize a network of fiber optic cabling. Cables and terminations shall be provided and located as shown and in the quantities indicated on the drawings. Cables shall be terminated inside the control room's existing rack mounted Fiber Distribution Centers (FDC's) and new patch panels, located at MCC-2 and Filter Buildings, as shown on the drawings. All cables and terminations shall be identified at all locations. All terminations shall comply with, and be tested to TIA/EIA and Gigabit Ethernet fiber optic standards.
- C. Major work items include but are not limited to:
 - 1. Fiber optic cable and patch cords
 - 2. Fusion splicing
 - 3. Splice enclosures
 - 4. Fiber Optic Patch Panels
 - 5. Installation of fiber optic cable
 - 6. Fiber optic terminations
 - 7. Testing of the fiber optic cable including:
 - a. On-the-reel fiber optic cable testing
 - b. OTDR testing on installed fiber optic cable.
- D. Environmental Specifications:
 - 1. Outside Plant Fiber Optic Cable operation and storage -40 degrees C to +70 degrees C.
 - 2. Equipment Outside above ground -40 degrees C to +80 degrees C.

PART 2 – PRODUCTS

2.1 GENERAL

- A. Cables placed below grade shall be certified by the manufacturer for that environment. Cables installed in vertical risers between floors shall be U.L. listed riser type cable. Cables installed in plenum spaces shall be listed for that environment.

2.2 MULTI-MODE FIBER OPTIC CABLE

- A. Provide 62.5/125-micron OM1 Class IVa Graded-Index Multi-mode Optical Fiber for the SCADA fiber network connection.
- B. Fiber Characteristics:
 - 1. Reduced Water Peak
 - 2. Maximum Attenuation: 850/1300nm: 3.5/1.5dB/km
 - 3. Color coded buffer tube
 - 4. Color coded fiber
 - 5. Loose Tube
 - 6. Maximum Transmission: 1 Gbps Ethernet; 300m at 850nm and 600m at 1300nm.
 - 7. Minimum Bend Radius 4.1" long term, 8.2" during installation.
- C. Cable Characteristics:
 - 1. Fiber Count-12 or 24 fibers per cable as specified.
 - 2. Loose Tube Cable with PFM Gel filled buffer tubes.
 - 3. Up to 12 fibers per buffer tube.
 - 4. UV resistant Outer Jacket.
 - 5. The buffer tubes shall be resistant to external forces and shall meet the buffer tube cold bend and shrink-back requirements.
 - 6. Buffer tubes shall be stranded around a dielectric central member using a reverse oscillating lay.
 - 7. Top and bottom ends of cable shall be available for testing.
 - 8. Both ends of cable shall be sealed during shipping to prevent ingress of moisture.
 - 9. The jacket shall be free of holes, splits and blisters. It shall also contain non-metal elements and shall be of consistent thickness.
 - 10. Maximum Tensile Loading: 2700N (600lbf) during installation and 890N (200lbf) long term.
- D. Manufacturers:
 - 1. Superior Essex Series 11
 - 2. Corning
 - 3. Berk-Tek

2.3 FIBER OPTIC TERMININATION PATCH PANELS

- A. Control Panel Mounted Field Panels: Fiber optic cabling shall be terminated in wall mount fiber patch panel enclosures as described herein. Enclosures shall include swinging side doors with latching mechanism and routing guides. Provide blanking modules in all unused connection ports. Fiber patch panels shall be provided for existing PLC-2 Control Panel, located inside MCC-2 building, and the New Filter Control System PLC panel, with SC style connectors. Patch panels shall be provided with mounting hardware allowing the unit to be mounted inside a panel enclosure.

- B. General: Provide blanking modules in all unused connection ports on the panels. All panels shall include strain relief points where fiber optic cable strength members shall be securely attached.
- C. Labels: Labeling for fiber cabling shall be by the color suffix designating which fiber is terminated. Die cut acetate labels or Kroy labels shall be considered acceptable the purpose
- D. Accessories: Provide duplex fiber optic patch cords with SC connectors at each termination point.
- E. Manufacturers:
 - 1. Lightwave
 - 2. Blackbox
 - 3. Corning

2.4 FIBER OPTIC CONNECTORS

- A. General: Provide field installable, single mode SC type connectors. Connectors shall be Glass-in-Ceramic, with a maximum loss of 0.2 dB.
- B. Manufacturers:
 - 1. Corning

2.5 FIBER OPTIC PATCH CORDS

- A. General: All patch cords shall be of the same manufacturer as provided with the patch panels and shall comply with manufacturers approved testing and warranty statements.

PART 3 – EXECUTION

3.1 INSTALLATION

- A. Fiber Optic Cable
 - 1. Install cable in accordance with cable manufacturer recommendations for bend radius and pulling tension. Do not exceed limits specified by the manufacturer.
 - 2. Utilize break away swivel set at 600lbs for straight pulls greater than 100' and all pulls which are not in a straight line.
 - 3. Identify cable on both ends, in pull boxes and at all terminations.
 - 4. Terminate all fibers in each cable to a connector.
 - 5. Provide slack fiber coiled neatly in cable management at all fiber termination centers, converters and switches.
 - 6. Terminate cables using manufacturer supplied break-out kits.
 - 7. Fan out fiber to allow direct connection with connectors. Provide strain relief with fan out collar.

3.2 TESTING

- A. Fibers in fiber optic cable shall be tested for correctness of termination and overall transmission loss using an approved fiber optic transmission loss test instrument (OLTS) and optical time domain reflectometer instrument (OTDR). System loss measurements shall be provided at 1310 nm and 1550 nm for single mode fiber, at 850 and 1300 nanometers for multimode fiber. A certification report shall be provided listing both the calculated and measure loss for each fiber optic circuit and submitted with the close out documents.
- B. All cabled fibers greater than 1000 meters in length shall be 100% attenuation tested. The Attenuation of each fiber shall be provided with each cable reel.
- C. Perform OLTS testing in both directions of installed backbone and horizontal fiber.
 - 1. Submit test report which includes:
 - a. Fiber Identification
 - b. Length of each fiber vs calculated length.
 - c. Copy of the OTDR printouts.
 - d. Pass or fail status of length under test.
- D. Provide OTDR on-the-reel tests for each fiber strand upon delivery to the project site.
 - 1. Test each fiber optic strand for continuity and loss using an OTDR with disk storage capabilities.
 - 2. Submit test report for each reel which includes:
 - a. Reel Identification
 - b. Manufacturers product test data.
 - c. Copy of the OTDR printouts
 - d. Pass or fail status of each fiber on the reel.
- E. Provide OTDR post installation tests for each installed fiber strand upon installation of the fiber optic cable.
 - 1. Test each installed fiber optic link for continuity and loss using an OTDR with disk storage capabilities.
 - 2. Submit test report for each cable which includes:
 - a. Cable Identification
 - b. ID
 - c. Copy of the OTDR printouts
 - d. Pass or fail status of each fiber on the reel.

END OF SECTION

SECTION 13360
FUNCTIONAL DESCRIPTIONS

PART 1 – GENERAL

1.1 THE REQUIREMENT

- A. The functional requirements specified herein contain the necessity for furnishing and installing labor and materials that may not appear elsewhere in the contract documents. The Contractor shall coordinate the work of this specification section with all other suppliers and subcontractors under the supervision of the CSI in order to meet the requirements specified herein.
- B. Where changes or deviations have been made by the Contractor from the functional requirements as specified herein to that which is needed to accommodate the supplier, equipment, and materials furnished, all deviations or changes shall be identified in writing and documented. The Contractor shall not be entitled to a change in the work based on changes or adjustments made for coordination of the work.

1.2 RELATED WORK SPECIFIED ELSEWHERE:

- A. In addition to the requirements specified in this section, the requirements of specification Section 13300, Instrumentation and Control, General Requirements and the sections referenced therein shall be applied.
- B. Unless specifically stated otherwise, all interconnected wiring between all instruments, panels, controls and other devices as required to provide all functions specified herein, shall be furnished by the Electrical Contractor under Division 16. The Electrical Contractor shall provide all cable and conduit required to carry all signals listed on the Contract Drawings and specified herein. Special cables that are required for interconnection between sensors or probes and transmitters shall be furnished with the instrumentation devices by the equipment supplier.

1.3 SUBMITTALS:

- A. The CSI shall provide submittals as specified in Section 13300, Instrumentation and Control System. In addition, the following specific submittals items shall be provided.
 - 1. Functional Control Descriptions: CSI shall submit Functional Control Descriptions which completely and adequately describe the functional control(s) for Filter Control System.
 - 2. Operational Set points and Parameters List Design: Calculations shall be submitted for all process variables and set points not determined by the Engineer within the Contract Documents.

3. All software and configuration programs shall be complete and tested prior to the respective equipment being shipped to site.

PART 2 – PRODUCTS

2.1 GENERAL REQUIREMENTS:

- A. The operation of the filters and associated process equipment and valves will be via new Programmable Logic Controller (PLC) located inside the Filter building. The new Filter system PLC shall perform all logic operations necessary to accomplish the selected control. The PLC shall monitor and control all I/O specified under the PLC I/O schedules provided under Attachments A & B under specification section 13300 and as specified herein. The contractor will be responsible for coordinating with the Engineer and Lee County on all settings for the new Filter PLC. All settings shall be approved by Lee County and the Engineer prior to initial setup.
- B. Each filter level will be monitored via each filters' existing ultrasonic level transmitter and a high level alarm shall be generated through PLC logic. All filter high levels shall be operator adjustable and have operator configurable (password protected) time delays.
- C. All alarms shall be allowed to be disabled from the SCADA system, disabling the alarm will disable the logic in the PLC which created the alarms.
- D. The Filter PLC shall monitor all analog signals. The PLC will transmit an alarm if a field transmitter signal is more than a 2% percent (0.4ma) above or below the 4-20ma operating range. In addition to the parameters listed within the PLC- I/O list, provide through the Plant control system operator interface the capability of setting virtual set point parameters for control of any parameter. For example, Filter high level alarm.
- E. The Filter PLC shall monitor all digital signals indicated on the PLC list. In addition to the parameters listed within the PLC-I/O list, provide through the Plant control system operator interface the capability of setting virtual set point parameters for control of any parameter. For example, High PLC panel temperature alarm time delay.
- F. The CSI shall utilized Allen Bradley RSLogix5000, Version 21 PLC software for programming the new Filter PLC control system.
- G. The CSI shall utilize LCU's Add-On Instructions, where applicable, for the new Filter PLC control system.

2.2 FILTER SYSTEM CONTROL OPERATION

- A. Filter PLC Panel – Local Controls & Indication:

1. Filter Auto/Man Selector Switch:

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- a) Auto Select – Remote-automatic control of Filters (Refer to Paragraph D below).
 - b) Man. Select – Manual-Local or Semi-auto control of Filters (Refer to Paragraphs B & C below).
2. Filter In Remote Indicating Light (Typ. of 4): Each Filter In Remote indicating light will illuminate when all respective filter valves (Influent, Effluent, Clean Backwash, Dirty Water, & Backwash Air Valve) are in Auto position.
 3. Filter Select 1/OFF/2 and 3/OFF/4 Selector Switch: Manual-Local Filter Select control to Bump or Backwash filter. (Off position is selected for Filter normal operation).
 4. Filter Out of Service 1/OFF/2 and 3/OFF/4 Selector Switch: Local Filter Select control to take Filter out of service (All valves closed and PLC logic disabled).
 5. Backwash Valve Control and Indication:
 - a) Backwash Valve In Auto Indicating Light: Backwash valve is controlled by PLC logic.
 - b) Backwash Valve Controller, Local-Manual Control Mode: Local (position) control of Backwash valve is provided locally at the controller via keypad controls.
 - c) Backwash Valve Controller, Local-Auto Control Mode: Local automatic (position) control of Backwash valve is provided locally at the controller via process value (PV) input. Set point is provided locally at the controller.
 - d) Backwash Valve Controller, Auto Control Mode: PLC controlled. Set point is provided locally at controller.

B. Filter Manual-Local Control:

1. When the Filters are placed in manual mode, via Auto/Man selector switch located on the Filter local control panel, manual-local control of filters is accomplished via Filter PLC Control Panel. Filter control include normal operation, Bump mode, and Backwash mode.
 - a) Filter Normal Operation: Open Filter Influent and Effluent valves. Close Filter Clean Backwash, dirty water, and backwash air valves.
 - b) Filter Bump Mode Operation:
 - i. Select filter via Filter selector switch.
 - ii. Close (Selected) Filter Influent and Effluent valves. Open Clean Backwash valve.
 - iii. Turn backwash pump (#1 or #2) on (Hand position). Run pump for 2 – 5 minutes until bubbling stops in filter.

- iv. Switch backwash pump (#1 or #2) back to remote position.
- v. Close Filter Clean Backwash valve and open Filter Influent and Effluent valves for normal operation.

c) Filter Backwash Mode Operation:

- i. Select filter via Filter selector switch.
- ii. Close Influent Valve. Wait for filter level to drop at 3.2 ft. (Open Dirty Water Valve if required to drain filter quickly).
- iii. Open Clean Backwash, Dirty Water, and Backwash Air Valves.
- iv. Close Effluent Valve when Filter level is below 3.20 Ft.
- v. Turn Blower (#1 or #2) on (Hand position). Wait at least one minute before blow off of CW valve.
- vi. Close Clearwell Aeration valve. Run with air for at least five minutes.
- vii. Turn Backwash Pump (#1 or #2) on (Hand Position). Run with air and water for additional 5 minutes (Vigorous bubbling visible and dirty water overflows into trough and out to mudwell).
- viii. Turn Blower (#1 or #2) back to Remote position.
- ix. Open Clearwell Aeration Valve. Run Backwash pump 7-10 minutes until the Filter dirty water turns clear. The dirty water without air flows over trough out to mudwell.
- x. Switch Backwash Pump (#1 or 2) back to remote position.
- xi. Close Backwash Air, Dirty Water, and Clean Backwash valves. Open Effluent and Influent valves for normal operation.
- xii. Switch Filter Selector switch into the Off position.

C. Filter Semi-Automatic Control: When the Filters are placed in manual mode, via Auto/Man selector switch located on the Filter local control panel, Filter Bump or Backwash is initiated locally at the Filter PLC panel via Semi-Auto (Bump or Backwash) control selector switches, and controlled via PLC timer logic control.

D. Filter Remote-Automatic Control: When the Filters are placed in Auto mode, via Auto/Man selector switch located on the Filter local control panel, Filter bump or backwash automatic control is initiated from the Plant SCADA computer:

1. Bumping or Backwash Filters Automatic Procedure:

- a) Click on Fiesta Village tab on top left corner of plant monitoring computer screen.
- b) Select Filters tab.
- c) Click on Filter # in Plant Diagrams (A Filter Controls box opens – e.g., FILTER1, FILTER2, FILTER3, FILTER4).
- d) Review correct Bump or Backwash Filter run times.
Example:

TASK DESCRIPTION (RUN TIME) DURATION

FUNCTIONAL DESCRIPTIONS

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Bump Duration	2.0 Min.
Backwash Air Duration	10.0 Min.
Backwash Water Start Delay	5.0 Min.
Backwash Water Duration	12.0 Min.
High Level Shutdown	11.5 Ft.
Mudwell High Level	12.0 Ft.
Mudwell Level Reset	11.5 Ft.
Clearwell Low Level	3.0 Ft.
Clearwell Level Reset	10.0 Ft.

- e) Click on Bump Start or Backwash Start to begin automatic process.

2.3 DATA ACQUISITION AND GENERAL CONTROL LOGIC

- A. Not in AUTO Alarms: Before operating any field device, the PLC program shall check to see that the device has been switched to the AUTO mode. If the device is not in AUTO, the PLC shall set an error bit and suspend control of the device until it is switched to AUTO.
- B. No Response Alarm: If at any time a field device fails to respond to an output command from the PLC, the PLC shall set an error bit. The SCADA shall use the error bit to log a "No Response" alarm (e.g., Valve Fail-to-Open or Fail-to-Close).
- C. Adjustable Timers: The preset values for all PLC timers shall be adjustable through the HMI software by the operator under security password clearance.
- D. PLC Diagnostic Alarms: In addition to the alarm conditions shown on the P&IDs, each PLC shall monitor its CPU and I/O modules. When the CPU or any I/O module fails, the PLC shall generate a PLC FAIL alarm.
- E. Process Variable Filtering: Each analog process variable being transmitted to the SCADA shall have adjustable digital filtering applied.
- F. Totalizer Current Average Value: The current average flowrate for each totalized value shall be provided for each flowrate input.
- G. Flowrate Integration: Flowrate integration shall be provided for each analog flowrate input.
- H. Daily Average: Daily average calculations shall be provided as required to support displays and reports.
- I. Daily Totalizer Counter: Accumulate daily total over Ethernet signal. The totalizer shall be reset daily when the daily reports are produced.
- J. Monthly Totalizer Counter: Accumulate daily total flow over Ethernet signal. The totalizer shall be reset monthly when the monthly reports are produced.

- K. Cumulative Totalizer Counter: Accumulate total over flow over Ethernet signal.
- L. Run Time: Each piece of equipment shall have a run timer, which accumulates time.

2.4 PLANT HMI SOFTWARE INTEGRATION

- A. The control system integrator will modify the existing HMI graphics for the proposed Filter System PLC Upgrade which will include additional monitoring and control points into the existing HMI system.
- B. Create internal registers and signals as required to link real signals to graphics for monitoring and keyboard for control. Each new signal shall be individually defined and assigned to a new device file.
- C. Modify existing and create new graphics for the proposed system. Screen presentation shall be similar and comparable to the existing graphics screens with full use of dynamic colors, levels and numeric values and tied to real time data. All analog values shall be displayed in engineering units. Graphic levels and running motors shall be animated. Animate levels in blue that raise or lower in proportion to their signal values. Critical analog and digital values shall flash amber when outside normal limits or when in an alarm state. Running motors shall be animated in color green and display "running". Non-running available motors shall be red and display "stopped". Unavailable equipment (not in auto; not ready) shall be silver.
- D. Incorporate all required signals into the database and set limits and alarm values based on owner requests and operational testing. All modifications to the software shall be compatible with the existing format.
- E. Create new and modify existing reports for all proposed flow rates, flow totals, level, pressure, and other analog values.
- F. Provide Historical logging, Trending and Reporting of all data received. Provide historical trending screens for operator selected parameters from the historical files; hourly, daily, weekly, monthly and yearly averages and peak values. Submit copies of historical trending graphics and operator procedures for review.
- G. Elapsed running time values shall be maintained in the distributed database for all pumps, blowers, and compressors. This data shall be expressed in hours and tenths of hours and shall be updated every sixty seconds using the last scanned value for each associated discrete input. Provide a password protected runtime reset button.
- H. Create an alarm log and/or modify existing to include type of alarm, time stamp for time of alarm, time stamp for acknowledgement of alarm and time stamp of when alarm was cleared.

- I. For reporting purposes, the database shall perform averaging and integration on a point basis over one of the following time periods: one minute, five minutes, hourly, shift, or daily, weekly, monthly with the following averages provided.
 - 1. One minute - Derived from readings accumulated at scan rates.
 - 2. Five minutes - Derived from above one minute values.
 - 3. Hourly - Derived from above five minute values.
 - 4. Shift - Derived from above one hour values.
 - 5. Daily - Derived from above shift values.
 - 6. Weekly - derived from above daily values.
 - 7. Monthly - Derived from above daily values.

- J. Modify Existing Citect Global central server at LCU central operations facility located on College Parkway. Provide an expanded version for the additional tags as required.

- M. Create and/or modify alarm set points screen.
 - 1. LCU will provide Citect Library.
 - 2. Arrange alarm set point information in Tabular format. Rows are the different process conditions. Columns are the different alarm types available for that process condition.

END OF SECTION

SECTION 15100
VALVES AND APPURTENANCES

PART 1 GENERAL

1.1 SCOPE OF WORK

- A. Furnish all labor, materials, equipment and incidentals required and install complete and ready for operation all valves and appurtenances as shown on the Drawings and as specified herein.
- B. All valves and appurtenances shall be of the size shown on the Drawings and to the extent possible, all equipment of the same type shall be from one manufacturer.
- C. All valves and appurtenances shall have the name of the maker and the working pressure for which they are designed cast in raised letters upon some appropriate part of the body.
- D. The equipment shall include, but may not be limited to, the following:
 - 1. Butterfly Valves
 - 2. Control Valves
 - 3. Air Release Valves
 - 4. Valve Boxes
 - 5. Flange Adapter Couplings
 - 6. Solid Sleeve Couplings
 - 7. Restraining Clamps
 - 8. Manual Valve Actuators
 - 9. Motorized Valve Actuators
 - 10. Swing Check Valves

1.02 DESCRIPTION OF SYSTEMS

- A. All of the equipment and materials specified herein are intended to be standard for use in controlling the flow of potable water, reclaimed water, chemicals, wastewater, etc., depending on the applications.

1.03 QUALIFICATIONS

- A. All of the types of valves and appurtenances shall be products of well established reputable firms who are fully experienced and qualified in the manufacture of the particular equipment to be furnished. The equipment shall be designed, constructed and installed in accordance with the best practices and methods and shall comply with these Specifications as applicable.

1.04 TOOLS

- A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

PART 2 PRODUCTS

2.01 BUTTERFLY VALVES

- A. Butterfly valves in sizes 2-20" (50-200mm) shall have single-offset disc and shall be of the lugged style. All valves shall be suitable for use with ANSI class 150 flanges, or specify. Valve shall provide bi-directional bubble-tight shutoff at pressures to 250 psi (200 psi with 316 stainless steel disc/shaft).
- B. Discs shall be offset to provide an uninterrupted 360 degree seating edge and shall be 316 stainless steel. The disc/shaft connection shall be splined.
- C. Bodies shall be ductile iron. Lugged body valves shall provide bubble-tight shutoff up to the full valve rating on dead end service without the use of downstream flange.
- D. Elastomer seats shall fully line and be permanently bonded to the valve body. Seats shall be EPDM. Seats shall have integral flange seals so flange gaskets are not required.
- E. Shafts shall be one-piece 316 stainless steel when valves have 316 stainless steel disc. Shaft diameters shall meet the AWWA C504, class 75B standard. Multiple shaft seals shall be provided to prevent leakage.
- F. Three shaft bearings made of heavy-duty aluminum bronze shall be provided to ensure smooth, reliable valve operation. Bearings are located adjacent to the top and bottom of the disc, and a third bearing at the top of the valve neck to support loading from actuators.
- G. New valves must fit the exact face to face dimensions of existing valves.
 - 16" Configuration 4
 - 14" Configuration 2/1
 - 12" Configuration 2/1
 - 10" Configuration 1/4
- H. For Manually operated valves:
 - I. Lever operators for valves 2" through 6" shall provide automatic, positive latching closed and eight intermediate positions.
 - J. Gear actuators shall be provided on valves 8" and larger. Actuators shall have cast iron weatherproof or buriable construction, and shall have adjustable open and closed position stops. Operating shaft to be supported axially and radially at the input end by permanently lubricated thrust and sleeve bearings.
 - K. Motor Operated valves: see electric valve motor operator specification. Motor operator shall be mounted and tested by valve maker and shall be unit responsibility of valve maker.
 - L. Two Year Warranty shall be provided for all valves and actuators.

- M. Resilient seated butterfly valves shall be model BOS-US as manufactured by DeZURIK.
- N. All valves shall be subject to hydrostatic and leakage tests at the point of manufacture. The Class 150 valves shall be tested in conformance with AWWA C504. During the hydrostatic test there shall be no leakage through the metal, the end joints or the valve shaft seal. No adjustment of the valve disc will be necessary after pressure test for normal operation of valve.
- O. In general, the butterfly valve operators shall conform to the requirements of Section 11 of the AWWA Standard Specifications for Rubber Seated Butterfly Valves, Designation C504, insofar as applicable and as herein specified.
- P. Gearing for the operators shall be totally enclosed in a gear case in accordance with the above mentioned AWWA Standard Specification.
- Q. Operators shall be capable of seating and unseating the disc against the full design pressure or velocity, as specified for each class, into a dry system downstream, and shall transmit a minimum torque to the valve. Operators shall be rigidly attached to the valve body.
- R. All valve operators shall conform to Section 11 of the AWWA Standard Specification and shall be manual unless otherwise shown or specified and shall have permanently lubricated, totally enclosed gearing with handwheel and gear ratio sized on the basis of actual line pressure and velocities. Operators shall be equipped with handwheel, position indicator, and mechanical stop-limiting locking devices to prevent over travel of the disc in the open and closed positions when valve is located above grade. They shall turn counterclockwise to open valves. Manual operators shall be of the traveling nut, self-locking type and shall be designed to hold the valve in any intermediate position between fully open and fully closed without creeping or fluttering. Operators shall be fully enclosed and designed to produce the specified torque with a maximum pull of 80 pounds on the handwheel or chainwheel when valve is located above grade. Operator components shall withstand an input of 450 foot pounds for 30" and smaller and 300 foot pounds for larger than 30" size valves at extreme operator position without damage. Valves located above grade shall have handwheel operators, and valves located below grade shall be equipped with a two-inch (2") square AWWA operating nut located at ground level and cast iron extension type valve box. Valve operators shall conform to AWWA C504, latest revision.
- S. The manufacturer shall certify that the required tests on the various materials and on the completed valves have been satisfactory and that the valves conform to all requirements of the specifications and the AWWA standard.
- T. Where indicated on the Drawings, extension stems, floor stands, couplings, stem guides, and floor boxes as required shall be furnished and installed.

2.02 MOTORIZED VALVE ACTUATORS

- A. Where scheduled or shown on the Drawings, butterfly valves shall be fitted with a motorized actuator for remote and automated operation of the valve. Motorized

valves shall be supplied, assembled, and tested as a unit, valve and actuator, either by the valve manufacturer or shipped to the actuator manufacturer's facility for assembly and testing as a unit prior to shipping to the site. Verification of unit responsibility and factory testing shall be submitted for review in order for the motorized valve assembly to be accepted at delivery.

B. Actuator Drive:

1. Actuator drive shall have integrated electronics and be able to operate in ambient temperatures of -40°F (-40°C) to 185°F (85°C).
2. The drive shall be furnished with a 120 volt AC, single phase, 60 Hz, synchronous motor. Motor shall be capable of withstanding 60 starts / stops per minute or a temporary stall condition without overheating. Design of the motor shall be such that electrical and thermal overloads are not required.
3. Motor bearings shall be maintenance-free. Motor shall be non-coasting with instant magnetic braking, and shall be self-locking and self-releasing without the use of a separate brake winding, mechanical brake or worm gear mechanism. Control drive shall be designed to stay in place upon loss of power and shall be capable of holding a load equal to at least 200% of the its rated output without AC power. The drive motor shall be TENV with Class H insulation.
4. Control drive shall be rated for 550 lb-ft torque output. Stall torque shall be self-limiting, not exceeding two and one half times the rated torque; torque switches shall not be required. Drive shall operate CW on increasing signal, with timing of 68 seconds for 90° rotation. Gear train shall have high efficiency spur gears constructed of heat treated alloy steel or ductile iron only. Readily available gear modules shall provide for a range of torque and timing combinations within the drive's rated capacity, and shall be field interchangeable. Drive train parts shall be lubricated with a premium, heavy-duty lithium-based lubricant. No oil baths shall be used for lubrication. Control drives shall be able to operate in any mounting orientation.
5. Two SPDT over-travel limit switches shall be provided for over-travel protection. In addition, both the open/close drives and modulating drives shall have two auxiliary SPDT switches, adjustable over the full range of travel but set for remote indication of full open and full close status. Switches shall be rated for 6 amps at 120 volts AC. Drive shall have integral mechanical stops capable of limiting travel of the drive and load. Drive shall also be provided with a dry contact for remote indication of actuator trouble, including loss of power, loss of control signal, over travel, and/or over torque with LED indicator lights on the actuator to indicate which condition has caused the alarm.
6. Drive shall include a low-speed, disc-type motor hand wheel to permit manual operation of the drive without electrical power and without a declutching mechanism.

7. A five-position, drive-mounted electric hand switch shall be provided to permit local electrical operation of the unit for control adjustment or operation on loss of control signal. With the hand switch in AUTO mode, drive shall respond to remote control signals automatically. Auxiliary contacts on the hand switch shall be provided for remote indication for when the switch is in AUTO.
 8. Drives shall be located such that the hand switch and hand wheel for each drive is easily accessible from the access platform or ground without need of a ladder or other portable access device.
 9. Enclosure shall be totally enclosed, cast, weatherproof, dust-tight, NEMA 4X construction. All field connections shall be made in one terminal compartment. Separate conduit entrances shall be available for power and control wiring.
 10. For modulating drives, the drive shall provide modulating control through an integral, digital control module which positions the drive in proportion to the a 4-20 mA control input signal. The control module shall be capable of initiating shaft movement in steps down to 0.1°. Upon loss of input signal, the drive shall be field configurable to move to any predetermined position.
 11. For modulating drives, the drive shall be equipped with a contactless position sensing device and be capable of providing an isolated 4–20 mA feedback signal in linear proportion to the 0-100% valve position. The sensing device shall have infinite resolution.
- C. Manufacturer: Motorized valve actuator shall be Harold Beck & Sons, Inc., 11 Terry Drive, Newtown, Pennsylvania, 18940, phone 215-968-4600, factory representative for Lee County area, David Sylvanus, extension 166.
- D. Model: Open/Close valves shall be Beck Model 11-263 or 11-363 based on valve size. Modulating valve shall be Beck Model 11-269. Contractor to confirm model with engineer before ordering.

PART 3 EXECUTION

3.01 INSTALLATION

- A. All valves and appurtenances shall be installed in the location shown, true to alignment and rigidly supported. Any damage to the above items shall be repaired to the satisfaction of the Engineer before they are installed.
- B. After installation, all valves and appurtenances shall be tested at least two hours at the working pressure corresponding to the class of pipe, unless a different test pressure is specified. If any joint proves to be defective, it shall be repaired to the satisfaction of the Engineer.

- C. Flanged joints shall be made with high strength, low alloy Corten bolts, nuts and washers. Mechanical joints shall be made with mild corrosion resistant alloy steel bolts and nuts. All exposed bolts shall be painted the same color as the pipe.

3.02 SHOP PAINTING

- A. Ferrous surfaces of valves and appurtenances shall receive a coating of rust inhibitive primer. All pipe connection openings shall be capped to prevent the entry of foreign matter prior to installation.

3.03 FIELD PAINTING

- A. (Hold for discussion. Is there a Lee County Paint Spec?)

END OF SECTION

SECTION 16050
BASIC ELECTRICAL MATERIALS AND METHODS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: General requirements for providing basic electrical materials and methods.
- B. Related Work Specified in Other Sections Includes:
 - 1. Certain items of equipment, and various control devices including conduit and wiring which are indicated on electrical drawings to be connected, but are specified in other sections pertaining to plumbing, heating, ventilating, air conditioning, temperature control systems, process equipment, process control systems, and instrumentation. Install and connect these items to the electrical system as indicated or required in accordance with the Contract Documents.
- C. Overall Application of Specifications: This Section applies to all sections of Division 16 and to other sections that include electrical equipment requirements except when in these individual sections requirements are otherwise specified to provide and install all materials necessary for a complete operational system.
- D. Temporary Requirements: This Section applies to any temporary circuits, overcurrent devices, conduit, wiring, and other equipment required during changeover from existing to a new electrical system. This Section also applies to temporary rewiring of lighting and power circuits, instruments and devices.

1.2 DEFINITIONS

- A. Hazardous Areas: Hazardous areas as defined by the NEC as Class I, Division 1, Group D, or Class I, Division 2, Group D hazardous are as follows:
 - 1. Class 1, Division 1
 - a. Wet Well
 - b. Other areas as determined by NFPA/NEC Standards
 - 2. Class 1, Division 2
 - a. Pump Room and Dry Well
 - b. Other areas as determined by NFPA/NEC Standards
- B. Wet Locations: Installations underground or in concrete slabs or masonry in direct contact with the earth; in locations subject to saturation with water or other liquids, such as vehicle washing areas; and in unprotected locations exposed to weather.

- C. Damp Locations: Locations protected from weather and not subject to saturation with water or other liquids but subject to moderate degrees of moisture.
- D. Dry Locations: A location not normally subject to dampness or wetness. A location classified as dry may be temporarily subject to dampness or wetness, as in the case of a building under construction.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design requirements are specified in the applicable sections
- B. Performance Requirements: Performance requirements are specified in the applicable sections.

1.4 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Product Data and Information: Provide complete list of electrical equipment and materials to be furnished showing manufacturer, catalog number, size, type, voltage rating and other pertinent information.
 - 1. Provide catalog data on manufacturer's standard equipment and materials. Clearly indicate on catalog cuts the equipment and devices being proposed.
 - 2. Identification: Provide complete schedule and listing of system and equipment identification labels with legends.
- C. CONTRACTOR's Shop Drawings: Provide shop drawings on items manufactured for the Contract.
 - 1. Provide connection diagram and schematic for each piece of electrical equipment. A manufacturer's standard connection diagram or schematic showing more than one method of connection is not acceptable unless it is clearly marked to show the intended method of connection.
 - 2. Provide diagrams showing connections to field equipment. Clearly differentiate between manufacturer's wiring and field wiring.
 - 3. Provide raceway layout drawings showing conduits, boxes, and panels which contain the conductors to be provided. Include schedules listing conduit sizes and conductor content and identification.
 - 4. Where additions and modifications are made to existing equipment, provide drawings which include both retained existing equipment and new Work.

- D. Coordination Drawings: Prepare coordination drawings to a scale of 1/4"=1'-0" or larger; detailing major elements, components, and systems of electrical equipment and materials in relationship with other systems, installations, and building components. Indicate locations where space is limited for installation and access and where sequencing and coordination of installations are of importance to the efficient flow of the Work, including but not necessarily limited to the following:
1. Indicate the proposed locations of major raceway systems, equipment, and materials. Include the following:
 - a. Clearances for servicing equipment, including space for equipment disassembly required for periodic maintenance.
 - b. Exterior wall and foundation penetrations.
 - c. Fire-rated wall and floor penetrations.
 - d. Equipment connections and support details.
 - e. Sizes and location of required concrete pads and bases.
 2. Indicate scheduling, sequencing, movement, and positioning of large equipment into the building during construction.
 3. Prepare floor plans, elevations, and details to indicate penetrations in floors, walls, and ceilings and their relationship to other penetrations and installations.
 4. Prepare reflected ceiling plans to coordinate and integrate installations, air outlets and inlets, light fixtures, communications systems components, sprinklers, and other ceiling-mounted devices.
- E. Record Documents: Prepare record documents, and in addition to the requirements specified in Division 1, indicate installed conditions for:
1. Major raceway systems, size and location, for both exterior and interior; locations of control devices; distribution and branch electrical circuitry; and fuse and circuit breaker size and arrangements.
 2. Equipment locations (exposed and concealed), dimensioned from prominent building lines.
 3. Approved substitutions, and actual equipment and materials installed.
- F. Maintenance Manuals: Prepare maintenance manuals, and in addition to the requirements specified in Division 1, include the following information for equipment items:

1. Description of function, normal operating characteristics and limitations, performance curves, engineering data and tests, and complete nomenclature and catalog numbers of replacement parts.
2. Manufacturer's printed operating procedures to include start-up, break-in, and routine and normal operating instructions; regulation, control, stopping, shutdown, and emergency instructions; and summer and winter operating instructions.
3. Maintenance procedures for routine preventative maintenance and troubleshooting; disassembly, repair, and reassembly; aligning and adjusting instructions.
4. Servicing instructions and lubrication charts and schedules.

1.5 QUALITY ASSURANCE

- A. Codes: Provide all electrical Work in accordance with applicable local codes, regulations and ordinances. If there is a conflict between the requirements specified in the Contract Documents and the codes, follow the more stringent requirements as determined and approved.
- B. Testing: As a minimum, provide standard factory and field tests for each type of equipment. Other tests may be specified in the applicable equipment section.
- C. Labeling: Provide all electrical equipment and materials listed and approved by Underwriters Laboratories with the UL label or other OSHA recognized testing laboratories attached to it.
- D. Standard Products: Unless otherwise indicated, provide electrical materials and equipment which are the standard products of manufacturers regularly engaged in the production of such materials and equipment. Provide the manufacturer's latest standard design that conforms to these Specifications. When two or more units of the same class of material and equipment are required, provide the products of the same manufacturer.

1.6 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle all products and materials as specified in Division 1 and as follows:
- B. Shipping and Packing: Provide materials and equipment suitably boxed, crated or otherwise completely enclosed and protected during shipment, handling, and storage. Clearly label such boxes, crates or enclosures with manufacturer's name, and name of material or equipment enclosed.
- C. Acceptance at Site: Conform to acceptance requirements as required in Division 1. Repair or replace all materials and equipment damaged by handling and storage as directed at no additional Contract cost.

- D. Storage and Protection: Protect materials and equipment from exposure to the elements and keep them dry at all times. Handle and store to prevent damage and deterioration in accordance with manufacturer's recommendations.

1.7 PROJECT CONDITIONS

- A. General: The Drawings indicate the extent and general arrangement of the principal electrical elements, outlets and circuit layouts. Connect and install all electrical elements and devices to form a workable system as required by the Contract Documents whether the connections and installations are specifically stated in the Specifications or shown. Provide necessary materials and installation wherever required to conform to the specific requirements of the furnished equipment and for proper installation of the Work.
- B. Schematics: In general the runs of feeders are shown schematically and are not intended to show exact routing and locations of raceways. Verify actual and final arrangement, equipment locations, and prepare circuit and raceway layouts before ordering materials and equipment. Equipment locations are approximate and are subject to modifications as determined by equipment dimensions.
- C. Coordination of Work: Coordinate the Work so that the electrical equipment may be installed without altering building components, other equipment or installations.
- D. Departure from Design: If departures are deemed necessary due to structural conditions, obstructions or other problems, provide details of such departures and the reasons for requesting approval as soon as practicable but not later than the submittal of the raceway layout drawings. Do not make any departures without written approval.

PART 2 PRODUCTS (NOT USED)

PART 3 EXECUTION

3.1 ROUGH-IN

- A. Final Location: Verify final locations for rough-ins with field measurements and with the requirements of the actual equipment to be connected.

3.2 ELECTRICAL INSTALLATIONS

- A. Sequence, coordinate, and integrate the various elements of electrical systems, materials, and equipment. Comply with the following requirements:
 - 1. Coordinate electrical systems, equipment, and materials installation with other building components.
 - 2. Verify all dimensions by field measurements.

3. Arrange for chases, slots, and openings in other building components during progress of construction, to allow for electrical installations.
4. Coordinate the installation of required supporting devices and sleeves to be set in cast-in-place concrete and other structural components, as they are constructed.
5. Sequence, coordinate, and integrate installations of electrical materials and equipment for efficient flow of the Work. Give particular attention to large equipment requiring positioning prior to closing in the building.
6. Where mounting heights are not detailed or dimensioned, install systems, materials, and equipment to provide the maximum headroom possible.
7. Coordinate connection of electrical systems with exterior underground and overhead utilities and services. Comply with requirements of governing regulations, franchised service companies, and controlling agencies. Provide required connection for each service.
8. Install systems, materials, and equipment to conform with approved submittal data, including coordination drawings, to greatest extent possible. Conform to arrangements indicated by the Contract Documents, recognizing that portions of the Work are shown only in diagrammatic form. Where coordination requirements conflict with individual system requirements, refer conflict to the ENGINEER for resolution.
9. Install systems, materials, and equipment level and plumb, parallel and perpendicular to other building systems and components, where installed exposed in finished spaces.
10. Install electrical equipment to facilitate servicing, maintenance, and repair or replacement of equipment components. As much as practical, connect equipment for ease of disconnecting, with minimum of interference with other installations.
11. Install access panel or doors where units are concealed behind finished surfaces.
12. Install systems, materials, and equipment giving right-of-way priority to systems required to be installed at a specified slope.

3.3 CUTTING AND PATCHING

- A. Perform cutting and patching as specified in Division 1. In addition to the requirements specified in Division 1, the following requirements apply:
 1. Perform cutting, fitting, and patching of electrical equipment and materials required to:

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- a. Uncover Work to provide for installation of ill-timed Work.
 - b. Remove and replace defective Work.
 - c. Remove and replace Work not conforming to requirements of the Contract Documents.
 - d. Remove samples of installed Work as specified for testing.
 - e. .Install equipment and materials in existing structures.
 - f. Locate existing structural reinforcing with a pachometer where core drilled penetrations are required so as not to cut the steel reinforcing.
2. Cut, remove, and properly dispose of selected electrical equipment, components, and materials as indicated, including but not limited to removal of electrical items indicated to be removed and items made obsolete by the new Work. Deliver all the existing removed to the OWNER as directed.
 3. Protect the structure, furnishings, finishes, and adjacent materials not indicated or scheduled to be removed.
 4. Provide and maintain temporary partitions or dust barriers adequate to prevent the spread of dust and dirt to adjacent areas.
 5. Protection of Installed Work: During cutting and patching operations, protect adjacent installations.
 6. Patch finished surfaces and building components using new materials as specified for the original installation and experienced Installers. Installers' qualifications refer to the materials and methods required for the surface and building components being patched.

END OF SECTION

SECTION 16110
ELECTRICAL RACEWAY SYSTEMS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing electrical raceway systems as indicated, in accordance with the Contract Documents.
- B. Related Work Specified in Other Sections Includes:
 - 1. Section 09900 – Painting and Coating

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ANSI C80.3 - 2015 Electrical Metallic Tubing – Steel (EMT-S)
 - 2. ANSI C80.5 - 2015 Electrical Rigid Metal Conduit – Aluminum (ERMC-A)
 - 3. ANSI C80.6 - 2015 Electrical Intermediate Metal Conduit (EIMC)
 - 4. NFPA 70 - 2014 National Electrical Code
 - 5. NEMA RN1 - Polyvinyl Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
 - 6. NEMA TC2 -Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80)
 - 7. UL 1 - Flexible Metal Conduit
 - 8. UL 6A - Electrical Rigid Metal Conduit – Aluminum
 - 9. UL 651- Schedule 40 and 80 Rigid PVC Conduit and Fittings
 - 10. UL 797- Electrical Metallic Tubing – Steel
 - 11. UL 797A Electrical Metallic Tubing – Aluminum and Stainless Steel
 - 12. UL 1242 Electrical Intermediate Metal Conduit - Steel
 - 13. Federal Specifications:
 - a. A-A-50553A - Fittings, For Conduit, Metal, Rigid
 - b. A-A-50563A Conduit Outlet Boxes, Bodies, and Entrance Caps, Electrical

- c. A-A-52440A Conduit, Metal, Flexible: Electrical Shielded
- d. A-A-50552 Fittings For Cable, Power, Electrical and Conduit, Metal
- e. A-A-55810 Conduit, Metal, Flexible
- f. W-C-571C Conduit and Fittings, Nonmetal, Rigid

1.3 SUBMITTALS

- A. Provide all submittals, including the following, as specified in Division 1 and Section 16050.

1.4 QUALITY ASSURANCE

- A. Codes: Provide all materials and workmanship to meet the requirements of NFPA 70 National Electrical Code.
- B. Regulatory Requirements: Provide UL listed components.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle all products and materials as specified in Division 1.

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

- 1. Rigid nonmetallic conduits:

- a. Carlon
- b. National Pipe and Plastics

- 2. Aluminum Conduits:

- a. Wheatland Tube Company
- b. American Conduit by Sapa
- c. Patriot Aluminum Products

- 3. Conduit Fitting and Connectors

- a. Appleton Electric Company
- b. Thomas & Betts
- c. Crouse Hinds Company
- d. OZ/Gedney
- e. Killark
- f. Adalet-PLM

4. Boxes and Enclosures:
 - a. Appleton Electric Company
 - b. Raco/Bell
 - c. Crouse Hinds Company
 - d. Steel City
 - e. Hoffman
 - f. Hope

5. Strut Channel and Fittings
 - a. Allied Tube & Conduit
 - b. B-Line Systems, Inc.
 - c. Kindorf
 - d. Enduro
 - e. Strut Tech
 - f. Unistrut

6. Fire Stop System
 - a. 3M/Electrical Products Division
 - b. Nelson Electric

2.2 RACEWAYS

- A. General: Provide minimum 3/4-inch raceways.

- B. Raceway Requirements: Provide raceways meeting the following requirements:
 1. Provide rigid steel, heavy wall, hot-dip galvanized in accordance with the requirements of UL-6 and ANSI C80.1.

 2. Provide rigid nonmetallic Schedule 80 PVC electrical conduit in accordance with the requirements of UL Standard 651 and NEMA Standard TC2 with solvent cement joints.

 3. Provide liquidtight flexible single strip steel, hot-dip galvanized conduit with PVC jacket in accordance with requirements of UL 1. Provide a continuous copper bonding conductor wound spirally between convolutions on the inside of the conduit meeting requirements of UL 360 for conduit sizes 1-1/4-inch and smaller.

2.3 FITTINGS

- A. General: Provide fittings of similar material as raceways.

- B. Fittings Requirements: Provide fittings meeting the following requirements:
 1. Set screw or indenter type fittings are not acceptable. Use threaded connectors for all rigid or intermediate metal conduits.

2. Use solvent cement connections for all rigid nonmetallic conduits.
3. Use insulated connectors for liquidtight flexible conduit.
4. Expansion/Deflection Fittings: Use a deflection and expansion coupling for rigid and intermediate metal conduits that provide a 3/4 inch movement in all directions from normal and a 30 degree angular deflection. Use coupling that includes internal bonding jumper. Use a nonmetallic expansion coupling for nonmetallic conduits that provides a 4- inch maximum expansion.
5. Bushings
 - a. Provide insulated nonmetallic bushing rated 105 degrees C for all installations where bonding is not required.
 - b. Provide insulated metallic grounding and bonding bushing rated 150 degrees C where bonding is required.
6. Fittings for Hazardous Locations:
 - a. Provide fittings that conform to the requirements of NEC Chapter 5 for Class I, Division 1, Group D hazardous locations.
 - b. Provide seal fittings suitable for either horizontal or vertical installation.

2.4 WALL AND FLOOR PENETRATIONS

A. Watertight:

1. For individual conduit penetrations in new exterior walls or floors provide watertight sealing sleeves consisting of a steel sleeve with pressure ring and clamps.
2. For individual conduit penetrations in existing walls or floors, provide watertight sealing bushing consisting of a neoprene sealing ring between two PVC coated steel pressure discs. Provide stainless steel captive screws for sealing ring compression.

2.5 BOXES AND CABINETS

A. Outlet Box Requirements:

1. Provide cast aluminum boxes for aluminum conduit systems.
2. Provide galvanized cast iron boxes for galvanized rigid steel conduit systems.
3. Provide nonmetallic boxes and covers in PVC conduit systems.

4. Provide watertight gasketed covers held with nonferrous screws for all cast metal boxes.

B. Junction and Pull Box Requirements:

1. Provide cast aluminum boxes with mounting lugs, threaded hubs and gasket covers for surface mounted boxes
2. Provide fabricated sheet metal boxes when cast metal box weight exceeds 50 pounds. Construct box from 1/8-inch thick galvanized sheet steel or aluminum with sides return channel flanged around cover opening. Provide angle or channel supporting frame. Provide continuously welded and ground smooth seams. Provide mounting lugs and threaded conduit hubs.
3. Provide cast steel or fabricated 10-gauge Type 316 stainless steel for boxes either partially or fully encased in concrete. For partially encased boxes provide sides return channel flanged around cover opening. For fully encased boxes provide flush covers. Provide continuously welded and ground smooth seams. Provide mounting lugs and threaded conduit hubs.
4. Provide watertight gasketed covers held with nonferrous captive knurled head screw slot bolts.
5. Provide two padlocking hasps for boxes containing medium voltage cables.
6. Construct all fabricated boxes located indoors to NEMA 13 requirements.
7. Manufacture all boxes located outdoors to NEMA 4 requirements.
8. Manufacture all boxes located in hazardous areas to NEMA 7 requirements

C. Terminal Box Requirements:

1. Provide minimum 12 gauge stainless steel fabricated box with mounting lugs, floor stand, and hinged doors.
2. Equip the door with continuous piano hinge and 3 point lockable latch. Provide print pocket on inside of door.
3. Fabricate back plate of 12 gauge minimum steel with white enamel finish for mounting terminals and wire troughs.
4. Provide wire troughs consisting of plastic ducts with snap slot design and removable covers. Run all wiring within wire troughs.
5. Furnish a schedule of terminals with the following information
 - a. Source

- b. Type of Signal
 - c. Function
6. Provide removable jumpers to allow operation of the equipment.
 7. Separate analog terminals from all other terminals.
 8. Provide number of terminals shown. Where the number of terminals are not shown, provide sufficient terminals for each wire entering the terminal box plus 20 percent but not less than 10 spare terminals.
 9. Terminals:
 - a. All catalog numbers refer to Phoenix Contact Type for the purpose of establishing the standard of quality and general configuration desired.
 - b. Provide symmetrical type steel mounting rails, DIN-EN50022.
 - c. Analog Signals: Provide terminals in enclosed housing suitable for wires from 22 to 12 AWG rated 600 volts with gray body, knife disconnect and test connection socket on both sides of disconnect, Phoenix Contact Type UK 5-MTK-P/P.
 - d. Control and Alarm Signals: Provide terminals suitable for wires from 18 to 8 AWG rated 50 amperes at 600 volts, blue body, Phoenix Contact Type UK10.

2.6 SUPPORTING DEVICES

- A. Raceway Supports: Provide raceway supports meeting the following requirements:
 1. Do not use perforated straps or plumbers tape for conduit supports.
 2. Provide expansion bolts or inserts for fasteners in concrete, toggle bolts for hollow masonry or frame construction, and preset inserts for prestressed concrete.
 3. Conduit Straps and Backs:
 - a. For metallic conduits, use steel or malleable iron.
 - b. For nonmetallic and PVC coated conduits, use PVC coated malleable iron.
 4. Conduit Hangers
 - a. For metallic conduits, use steel adjustable conduit hangers or clevis hangers.

- b. For nonmetallic and PVC coated conduits, use PVC coated adjustable conduit hangers.
- 5. Beam Clamps:
 - a. For metallic conduits, use malleable iron with steel bolt.
 - b. For nonmetallic and PVC coated conduit, use PVC coated malleable iron with stainless steel bolt.
- 6. Trapeze Hangers:
 - a. For metallic conduits use 12 gauge 1-1/2-inch square steel channels with steel channel straps to secure conduits.
 - b. For nonmetallic or PVC coated conduit, use either PVC coated 12 gauge 1-1/2-inch square steel channels or 1-5/8-inch square fiberglass channels. Use PVC coated straps with stainless steel bolts for securing conduits.
 - c. Provide addition channels welded together to limit the deflection to 1/240th of span.
- 7. Thread Rod
 - a. Provide thread rod with the minimum size as follows:
 - (1) Conduit Hangers
 - (a) 3/4-inch to 1-1/2-inch conduit: 1/4-inch thread rod
 - (b) 2-inch to 3-1/2-inch conduit: 3/8-inch thread rod (c) 4-inch and larger: 1/2-inch thread rod
 - (2) Trapeze Hangers: Provide thread rod of sufficient size to support the load. Use a minimum of 3/8-inch thread rod.
 - b. For Metallic Conduit Systems: Use continuous threaded galvanized steel rod.
 - c. For Nonmetallic or PVC Coated Conduit Systems: Use a continuous threaded PVC coated galvanized steel rod.

PART 3 EXECUTION

3.1 PREPARATION

- A. General: Install electrical equipment and material of the size, type and general routing as shown or required.
- B. Coordination with Reinforcing: Install raceway, fittings, boxes and cabinets free from direct contact with reinforcing steel.

- C. Alignment: Provide fasteners, anchor bolts, anchorage items and supports as required to insure proper and rigid alignment. Attach equipment with fasteners sized according to size and weight of the equipment and the thickness of the supporting surface.
- D. Aluminum Coating: Where aluminum is placed in contact with dissimilar metal or concrete, separate contact surfaces with gasket, nonabsorptive tape or coating as specified in Section 09900 to prevent corrosion.
- E. Grounding: Make metallic raceways electrically and mechanically continuous and ground as required. Install conduits continuous between outlets, boxes, cabinets and panels.

3.2 INSTALLATION

- A. General: Unless otherwise indicated, install conduits exposed, parallel or perpendicular to building floors, ceilings and walls, and to avoid interference with other work. In architecturally finished areas, conceal conduits within finished walls, ceilings and floors. Cut conduits square and deburr the cuts to the same degree as the conduit manufacturer. Saw cut aluminum conduit to prevent reduction in internal area. Fasten conduit securely to outlets, junction, pull and terminal boxes. Provide caps and seals to prevent the entrance of foreign material and moisture during installation and before pulling wire.
 1. Where conduit size is not shown, provide conduits one size larger than indicated in Table 4, Chapter 9 of the NEC.
 2. Support raceways concealed above suspended ceilings from the slab above suspended ceiling in same manner as exposed raceways. Do not support raceways from suspended ceiling supports.
 3. Keep conduit at least six inches away from high temperature piping, ducts, flues and surfaces. For mounting on concrete and masonry surfaces provide a minimum of 1/4 inch air space between conduit and mounting surface. Support and fasten conduit to building structural members spaced in accordance with electrical codes. Support conduit at least every eight feet or less in accordance with NEC requirements.
 4. When two or more exposed conduits are in the same general routing, provide parallel installation with symmetrical bends and for three or more provide trapeze hangers. Size trapeze hangers with space for 25 percent additional conduits.
 5. Make changes in direction with bends or fittings. Make field bends and offsets with a hand bender or conduit-bending machine.
 6. Run conduit in buildings with no more than the equivalent of (three) 90 degree bends between pull points. Provide no more than (125) feet of conduit runs between pull points. Provide pull boxes where shown,

specified or wherever required to install conductors and to meet the above requirement.

7. Install pull and junction boxes in accessible locations with working space in front of and around the installation. Obtain approval to locate boxes in finished areas.
8. Install an expansion fitting when a conduit crosses a building structural expansion joint.
9. Unless otherwise approved, install conduits to cross at right angles to building structural expansion joints.
10. Where approved for encased installation, install conduits in slabs as close to the middle of concrete slabs as practicable without disturbing reinforcement. Do not use conduit with an outside diameter exceeding one-third of the slab thickness. Do not place conduits closer than three diameters on centers, except at cabinet locations where the slab thickness is increased.
11. Pitch conduits to outlet boxes to avoid trapping moisture. Where dips are unavoidable in exposed conduit runs, install drain fitting at low point.

B. Conduit Material Types: Provide conduit as follows:

1. Install rigid nonmetallic Schedule 80 conduits underground and in wet well structures, unless specifically detailed otherwise.
2. Hazardous Locations:
 - a. Hazardous locations include existing and new wet wells and are classified Class 1, Division 1, Group D as defined by NEC.
 - b. Install all conduits and appurtenances in accordance with the requirements of Chapter 5 in NEC.
 - c. Provide seal fittings for all conduits that enter or leave a hazardous location.

C. Connections to Equipment

1. Use double locknuts and bushing for all boxes, enclosures and cabinets located in dry areas.
2. Use watertight hub fittings for all boxes, enclosures and cabinets located below grade and in wet, damp or corrosive areas.
3. Provide rigid conduit connection where equipment is fixed and not subject to adjustment, mechanical movement or vibration. Provide union fittings to permit removal of equipment without cutting or breaking conduit.

4. Use liquidtight flexible conduit connection where equipment is subject to adjustment, mechanical movement or vibration.
5. Coat all threads in steel conduit runs with zinc dust in oil or other corrosion- preventive compound before making connections.
6. Coat all threads in aluminum conduit runs with graphite or other corrosion preventive compound.

3.3 CLEANING AND PAINTING

- A. Shop Paint: Paint conduits meeting the requirements of Section 09900.

END OF SECTION

SECTION 16120

WIRES AND CABLES – 600 VOLTS AND BELOW

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing all wires and cables rated at 600 volts and below for complete electrical systems as shown.
- B. Related Work Specified In Other Sections Includes:
 - 1. Section 16050 - Basic Electrical Materials and Methods
 - 2. Section 16195 - Electrical Identification
 - 3. Section 16950 - Electrical Testing Requirements

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:
 - 1. ASTM B 3 - Standard Specifications for Soft or Annealed Copper Wire

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1 and Section 16050.
- B. Product Data and Information: Provide manufacturer's catalog data for each type of wire furnished.

1.4 QUALITY ASSURANCE

- A. General: Provide wire in accordance with applicable IEEE and NEMA standards, meeting the requirements of the NEC and UL listed.
- B. Tests: Provide cables factory tested prior to shipment in accordance with ICEA standards for the insulation specified.

1.5 DELIVERY, STORAGE AND HANDLING

- A. General: Deliver, store and handle wire and cable in accordance with the manufacturer's instructions and as specified in Division 1.
- B. Store cable reels on concrete or other hard surface or on 2x4 wood laggings.

PART 2 PRODUCTS

2.1 MANUFACTURERS

A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

1. Wire and Cable
 - a. American
 - b. Southwire
 - c. Rome
2. Instrumentation Cable
 - a. Belden
 - b. Dekoron
 - c. Okonite
3. Multiconductor Cable
 - a. Okonite
 - b. Rome
 - c. Southwire
4. Wire Connectors
 - a. Thomas & Betts
 - b. 3 M
 - c. Ideal
5. Color Coding Marker
 - a. Brady
 - b. Thomas & Betts

2.2 MATERIALS

A. Conductors: Provide soft drawn or annealed copper conductors with 98 percent minimum conductivity, meeting requirements of ASTM B 3. Use stranded conductors except solid No. 12 and No. 10 AWG may be used in lighting fixture and convenience outlet wiring.

B. Insulation: Provide wires and cables with insulation as follows:

1. Power, control and lighting wiring

- a. Single Conductor: Provide insulation as follows:

Conductor Size	NEC Type Letter	Insulation Material
Nos. 14, 12 and 10 AWG	XHHW	Cross-linked Polyethylene
No. 8 AWG and Larger	RHW	Cross-linked Polyethylene

- b. Multiconductor Cables: Insulate individual conductors with 15 mils of polyethylene or PVC and 4 mil nylon jacket. Cable wrap the cable conductor with type binder and an outer jacket not less than 45 mils of PVC. Use ICEA Method 1 for color coding wires.

2. Instrumentation Wiring: The use of manufacturers name and catalog number is for the purpose of establishing quality and general configuration designed.
- a. Two conductor or single pair: Stranded No. 16 AWG wire, 600 volt polyethylene insulation, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of PVC. Belden Cat. No. 8719.
- b. Three Conductor: Stranded No. 16 wire, 600 volt polyethylene insulation, tinned copper drain wire, overlapped metalized tape overall shield providing 100 percent shield coverage and outer jacket of PVC. Belden Cat. No. 8618.
- c. Multiple Pairs or Triads: Provide individually shielded pairs or triad of stranded No. 16 AWG wire with overall shield. Insulate each wire for 600 volts with 15 mils of PVC and a 4 mil nylon jacket. Assemble pairs or triads with tinned copper drain wire and metalized tape shield providing 100 percent shield coverage. Cable pair or triad together with tinned copper drain wire and overall metalized tap shield.

- C. Printed Data on Covering: Use wire and cable with the following information surface printed at regular intervals throughout the entire length.

1. Manufacturer or trade name.
2. Size of conductor.
3. Type of insulation.
4. Voltage classification.

2.3 WIRE CONNECTIONS AND CONNECTING DEVICES

- A. Connectors for No. 10 AWG and Smaller: Use insulated compression type butt connectors.

- B. Connectors for No. 8 AWG and Larger: Use UL, Inc. listed compression type tube connectors for parallel or butt splices. Provide companion preformed plastic insulating covers or tape to provide insulation equal to conductor insulation.
- C. Miscellaneous Connectors: Use preinsulated spring connectors for lighting and receptacle splices and pigtails.
- D. Solderless Lugs: Provide solderless terminal lugs for stranded and multiple solid conductors at connection to terminals or use UL listed crimp tool compression style lugs.
- E. Control Wire Terminations: Provide spade lug or pressure type control conductor connection terminations for control wiring terminations. Make lug bolting at devices or bus bars with a flat washer, a Belleville washer and a locknut.

2.4 COLOR CODING

- A. Use a vinyl impregnated cloth tape resistant to oil, dirt and heat for conductor color coding.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Swab new and existing conduits to be used to clear debris and remove moisture before conductor installation. Install conductors in raceways with no splices between boxes.
- B. Pulling Equipment: Pull conductors using proper equipment without exceeding manufacturer's recommendation for maximum pulling tension. Protect conductor insulation jacket at all times from twists, kinks, scrapes, punctures and other damage. Replace damaged conductors. Pull wires and cables into ducts and conduit without the use of lubricants, except where such use is necessary and approved by the cable manufacturer and the ENGINEER. Use UL listed lubricating compound compatible with the conductor insulated jacket and with the raceway.

Use lines of nylon or polypropylene, propelled by carbon dioxide, or compressed air, to snake or pull wire and cable into conduits. Do not use flat steel tapes or steel cables.

- C. Conductor Support: Support conductors in vertical risers with woven grips to prevent loading on conductor connectors.
- D. Seals: Provide a seal between the conductor and conduit for conduits entering buildings or from areas where the temperature change may cause condensation or moisture. Seal the conduits after the conductors are in place.

- E. Identify all cables as specified in Section 16195.
- F. Color Coded Tape: Apply color coding tape at all terminations and splices with overlapping turns for a minimum length of two inches, starting two inches back from the termination point. Provide color code tape in all boxes and manholes.

Provide color coding throughout the entire network for service, feeder, branch, control and low energy signal circuit conductors. Use the following color code for conductors.

COLOR CODING

SYSTEM	PHASE A	PHASE B	PHASE C	NEUTRAL	GROUND
208/120 three phase	Black	Red	Blue	White	Green
480/277 three phase	Brown	Yellow	Orange	Gray	Green
Control and low- energy signal	Orange	---	---	White	Green
Gas and Fire De- tection Systems	Pink	---	---	---	---
Instru- mentation	Tan	---	---	---	---
dc circuits	Olive	---	---	---	---

- G. Terminations: Leave a minimum of six inches of free conductor at each connected outlet and a minimum of nine inches at unconnected outlets.
- H. NEC Requirements: Install wiring in accordance with applicable provisions of National Electrical Code, and as indicated.

- I. Conductor Sizing: Size conductors in accordance with the NEC and the following:
 - 1. Size for branch lighting circuits so that the greatest voltage drop between lighting panel and center of load does not exceed two percent at rated load.
 - 2. Size conductors to limit the maximum conductor temperature to less than 75 degrees C, except where specifically stated otherwise.
 - 3. Use minimum conductor sizes as follows:
 - a. Power and lighting branch circuits, No. 12 AWG.
 - b. 120-volt control circuits, No. 14 AWG.
 - c. Instrumentation and signal wiring, 2 or 3 conductors No. 16 AWG stranded shielded.
 - 4. Size conductors as shown or as required by the actual load to be served, whichever is larger.
- J. Splicing: Pull cables from building or structure to building or structure with no splice in the duct systems. No splicing without prior approval.
- K. Hazardous Areas: Seal all conduits in hazardous areas before admission of hazardous gases to the area.
- L. Accuracy of Information: The number and sizes of wires and conduits indicated are for guidance only and are not necessarily the correct number and sizes necessary for actual equipment installed. Install as many wires and conduits as required and necessary for a complete electrical system, and provide adequately for the equipment actually installed.

3.2 CONDUCTOR IDENTIFICATION

- A. Labeling: Label each wire at both termination points and at each splice point in junction boxes. Carry individual conductor or circuit identification throughout, with circuit numbers or other identification clearly stamped on terminal boards and printed on directory cards in distribution cabinets and panelboards.
- B. Identification: Identify each wire in junction boxes and cabinets where the total number of control and signal wires is three or more and no terminal board is provided, by means of plastic slip on wire marker.
- C. Plastic Tags: In manholes, identify each wire by laminated plastic tag located so it can be easily seen.

- D. Color Coordination: Connect circuit conductors of the same color to the same phase throughout the installation.

3.3 WIRE AND CABLE CONNECTIONS TO EQUIPMENT

- A. Provide electrical connections to all equipment in strict accordance with the manufacturer's approved wiring diagrams, the Plans, or as approved. Repair or replace any damaged equipment resulting from erroneous connections.

3.4 CONNECTOR AND TERMINAL LUG INSTALLATION

- A. UL Requirements: Install all connectors and terminal lugs in accordance with UL requirements and manufacturer's recommendations.

3.5 QUALITY ASSURANCE

- A. Test the following 600-volt wires and cables after installation but before final connections are made up:
 1. All secondary feeders from the substation transformers.
 2. All feeders between and from the low voltage switchgear assemblies.
 3. All feeders from motor control centers to motors 30 hp and larger.
 4. All feeders from variable speed drive units.
 5. All feeders from motor control centers, to lighting panels and dry-type transformers.

For the above listed cables, apply a test voltage of 1,500 volts ac for a period of 1 minute between all conductors in the same conduit, and between each conductors and ground.

- B. Make all tests and submit certified test results. Replace any cables that fail the tests.
- C. Perform continuity test to demonstrate proper cable connection.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 16142
SNAP SWITCHES

PART 1 - GENERAL

1.1 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 16110, Electrical Raceway Systems.
3. Section 16195, Electrical Identification

1.2 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.

1.3 QUALITY ASSURANCE

A. Regulatory Requirements

1. Americans with Disabilities Act

1.4 SUBMITTALS

A. Action Submittals: Submit the following:

1. Product Data: Manufacturer's technical information for switches proposed for use.

PART 2 – PRODUCTS

2.1 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 Hubbell, 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

3.1 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.

3.2 INSTALLATION

- A. Install switches at locations as shown or indicated in the Contract Documents in outlet or device boxes, in accordance with Section 16136, Outlet Boxes.
- B. Mount wall switches 4.0 feet above finished floor, in accordance with the Americans with Disability Act, unless otherwise noted.
- C. Mount wall switches 4.0 feet above finished floor unless otherwise noted.
- D. 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 16150
ELECTRICAL REQUIREMENTS FOR SHOP-ASSEMBLED EQUIPMENT

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing, installing and testing shop-assembled equipment as indicated, in accordance with the Contract Documents. Shop-assembled equipment panels and other items are specified under the driven equipment sections and may require external field connection to ancillary devices and other system components for interlocks and alarms. Provide all field wiring as required by the system and equipment specified under the driven equipment sections. This field wiring may not be specified or shown. This equipment includes but is not limited to the following:

1. Miscellaneous control equipment
2. Valve and gate operators

- B. Related Work Specified in Other Sections:

1. Section 03310 - Cast-in-Place Concrete
2. Section 09900 - Painting
3. Section 16050 - Basic Electrical Materials and Methods
4. Section 16110 - Electrical Raceway Systems
5. Section 16120 - Wires and Cables - 600 Volts and Below
6. Section 16140 - Wiring Devices
7. Section 16195 - Electrical Identification
8. Section 16450 - Grounding

1.2 REFERENCES

- A. Codes and standards referred to in this Section are:

1. NEMA 250 - Enclosures for Electrical Equipment (1000 Volts Maximum)
2. UL 486A - Wire Connectors and Soldering Lugs for Use with Copper Conductors.

1.3 SYSTEM DESCRIPTION

- A. Design Requirements: Design the Shop Assembled equipment using the Components and Appurtenances meeting the requirements specified in Division 16.

1.4 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Product Data and Information: Provide manufacturer's data on all equipment and devices in the assembly, including voltages, number of phases, current ratings, capacities and other relevant data.
- C. Shop Drawings: Provide shop drawings for the shop-assembled equipment, including the following:
 - 1. Layout drawings of the assembly showing accurately scaled basic equipment sections, auxiliary compartments and combination sections. Show special relationships of assemblies to associated equipment, including plan and front views of the equipment. Provide a device summary.
 - 2. Wiring diagrams for assemblies showing connections to electrical power. Clearly differentiate between shop-installed portions of wiring and field installed portions.
 - 3. Provide construction drawings for equipment requiring field assembly. Clearly differentiate between shop-assembled portions and field assembled portions.
- D. Quality Control: Provide manufacturer's test reports and certified performance records of all equipment installed. Provide field test reports after equipment is installed.

1.5 QUALITY ASSURANCE

- A. Codes: Comply with local codes and all other applicable codes.
- B. Regulatory Requirements: Comply with applicable Regulatory Agency requirements.

1.6 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle all products and materials as specified in Division 1.

PART 2 PRODUCTS

2.1 FABRICATION

- A. General: Provide shop-assembled equipment as standard products manufactured by companies regularly engaged in the manufacture of such equipment.
- B. Factory Assembled Requirements: Provide control panels for shop-assembled equipment as complete factory assembled units that require only external connections for installation including main disconnect and all electrical features necessary for the proper operation of the units.

C. Controls:

1. Motor 1/2 Hp and Larger:

- a. Design motors for 480-volt, 3-phase, 60-hertz operation, with all controls at 115 volts or less.
- b. Provide a combination circuit breaker along with all required control transformers, relays, timers, heaters and other necessary incidentals to form a complete functioning unit.
- c. Provide NEMA size 1 or larger starters.

2. Motors less than 1/2 Hp:

- a. Design motors for 120-volt, single phase operation/
- b. Provide manual motor starter with neon pilot light.

3. Provide all controls and equipment as specified in Section 16482.

D. Control Components: Install principal control components in NEMA 250 rated enclosures as follows:

AREA	ENCLOSURE
Above grade indoor	NEMA 12 – Industrial
Outdoor and below grade elevation indoor	NEMA 4 – Watertight
Corrosive areas	NEMA 4X – Watertight and corrosion-resistant stainless steel external hardware. Provide all external operators made of the same materials as that of the enclosure
All areas listed Class I, Division 1, NEMA 7 – Explosion-proof or 2, Group D	

E. Miscellaneous Controls:

- 1. Furnish float switches, pressure switches, limit switches, thermostats and other auxiliary control devices to satisfy the intended service.
- 2. Rate contacts at 10-amperes, 120 volts, 60-hertz ac, unless otherwise specified.
- 3. Provide limit switches to function in accordance with contact development charts.

PART 2 EXECUTION

2.6 INSTALLATION

- A. General: Install shop-assembled equipment as indicated, in accordance with manufacturer's written instructions.
- B. Coordination: Coordinate cabling and wiring as necessary to interface installation of shop-assembled equipment.
- C. Torque Requirements: Tighten electrical connectors and terminals, including screws and bolts, in accordance with equipment manufacturer's published torque tightening values for equipment connectors. Where manufacturer's torque requirements are not indicated, tighten connectors and terminals in accordance with UL Standard 486A.
- D. Grounding Connections: Make equipment grounding connections for the shop-assembled equipment as specified and shown. Tighten connections in accordance with UL Standard 486A to assure permanent and effective grounding.
- E. Adjustments: Make all necessary adjustments to the equipment to provide complete and satisfactory operation upon completion of the Contract.

2.7 CLEANING AND PAINTING

- A. Shop Painting: Paint the shop-assembled equipment enclosures as specified in Section 09900.
- B. Field Painting: Clean and touch up scratched and marred surfaces to match original finish.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 16195

ELECTRICAL IDENTIFICATION

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing materials for the identification of electrical equipment, components, conduits, cables and wiring.
- B. Related Work Specified in Other Sections Includes:
 - 1. Section 09900 - Painting
 - 2. Section 16050 - Basic Electrical Materials and Methods

0.1 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Product Data and Information: Provide manufacturer's catalog data for nameplates, labels and markers.
 - 1. Provide manufacturer's instructions indicating application conditions and limitations of use; and storage, handling, protection, examination and installation of product.
- C. CONTRACTOR's Record Drawings: Provide CONTRACTOR's record drawings accurately showing actual location of markers for underground ducts, handholes and manholes, at completion of the Project.

0.2 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle all products and materials as specified in Division 1.

PART 1 PRODUCTS

1.1 MATERIALS AND COMPONENTS

- A. General: Provide identification materials listed and classified by UL or tested by an acceptable Electrical Testing Company certifying the equivalence of the materials to UL listing requirements and OSHA approved.
- B. Laminated Plastic Nameplates: Provide engraved three layer laminated plastic nameplates with black letters on white background and fastened with corrosion-resistant screws. Use of mounting cement is not acceptable.

1. Provide nameplates with 1-inch high lettering for switchgears, switchboards, motor control centers, control panels, relay panels, contactor panels, panelboards, and similarly grouped equipment, transformers and disconnect switches.
 2. Provide nameplates with 1/2-inch high lettering for individual components of a group such as main breakers, switchgear units, switchboard units, motor control center units and similar devices.
 3. Provide nameplates with 1/4-inch high lettering for remote motor controllers, control stations, relays and similar equipment.
 4. Provide nameplates for each motor identifying service or function and lettering of an appropriate size to suit each motor.
 5. Provide approved laminated directories of circuits with typewritten designations of each branch circuit in each panelboard.
 6. Provide smaller lettering for a neat, legible nameplate where the amount of lettering causes excessively large nameplates.
- C. Wire Markers: Identify wire bundles and each individual wire.
1. Provide a brass or rigid fiber identifying tag engraved with the conduit number where conduits enter motor control centers, switchgear, control panels, terminal boxes and the like. Attach tags to wire bundles with nylon self locking "Ty-Raps".
 2. Provide engraved PVC split sleeve wire markers on each wire at all termination points. Engraving to include conduit number prefix and wire number suffix. Relate wire numbers to termination numbers.
 3. Include wire numbers on all wiring and schematic diagrams and on all record drawings.
- D. Conduit Marking Paint: Provide conduit marking paint for identifying the different conduit systems as follows:
1. 15,000-Volt System
 2. 4,160-Volt System
 3. 2,300-Volt System
 4. 480-Volt System
 5. 208/120-Volt System
 6. 240/120-Volt System
 7. 24/48/125-Volt DC System
 8. Fire Alarm System

- 9. Telephone System
- 10. Paging System
- 11. Security System

- E. Underground Warning Tape: Provide 4-inch wide detectable type plastic tape in red (electric) and orange (communications) colors with suitable warning describing the type of buried electrical lines.

PART 2 EXECUTION

2.1 PREPARATION

- A. Surface Preparation: Degrease and clean surfaces to receive nameplates, labels and marking paint.

2.2 INSTALLATION

- A. General: Install nameplates on the front of equipment, parallel to the equipment lines and secured with corrosion resistant screws.
 - 1. Install laminated nameplates identifying:
 - a. Each electrical equipment enclosure
 - b. Individual equipment and devices
- B. Wire Markers: Install wire markers on each conductor at panelboard gutters, pull boxes, terminal boxes, outlet and junction boxes and at load connection identifying:
 - 1. On power and lighting circuits - branch circuit or feeder number indicated on drawings
 - 2. On control circuits - control wire number on schematic and interconnection diagram on drawings
- C. Conduit Markers: Paint colored marking bands on each conduit longer than 6 feet at intervals of 20 feet on center to identify the wiring voltage system contained in the conduit.
- D. Underground Warning Tape: Install one underground warning tape for each trench up to 18 inches wide. For trenches wider than 18 inches provide two underground warning tapes, one at each edge of the trench. Place the tape or tapes 6 inches below the finished grade.

END OF SECTION

SECTION 16450

GROUNDING

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements for providing a complete grounding system as specified and shown. Grounding includes but is not limited to: motor control centers, electric equipment enclosures, transformers, unit substations, switchgears, switchboards, ground grid systems with grounding rods, grounding conductors, bonding jumpers, grounded conductors, water pipe connections, and building and miscellaneous structure metal frames.
- B. Related Work Specified in Other Sections Includes:
 - 1. Section 16050 - Basic Electrical Materials and Methods
 - 2. Section 16110 - Electrical Raceway Systems
 - 3. Section 16120 - Wires and Cables - 600 Volts and Below
 - 4. Section 16950 - Electrical Testing Requirements

1.2 REFERENCES

- A. Codes and Standards: The following codes and standards are referred to in this Section:
 - 1. NEC - National Electrical Code

1.3 SUBMITTALS

- A. General: Provide all submittals, including the following, as specified in Division 1.
- B. Product Data and Information: Provide manufacturer's catalog data for the following:
 - 1. Grounding and grounded conductors
 - 2. Grounding connectors, clamps and bushings
 - 3. Grounding rods
 - 4. Bonding jumpers
- C. Shop Drawings: Provide shop drawings showing the locations and length of grounding rods. Label the size and material used for grounding rods. Provide details pertaining to grounding electrode conductors, grounding and grounded conductors, grounding connections and the ground grid for buildings, structures, lighting units, manholes and handholes.
- D. Quality Control: Provide a field report of the system ground impedance test results.

1.4 QUALITY ASSURANCE

- A. Construct a complete grounding system in accordance with applicable ANSI, a IEEE standards and the NEC and local codes.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver, store and handle all products and materials as specified in Division 1 (and as follows:)

PART 2 PRODUCTS

2.1 MANUFACTURERS

- A. Acceptable manufacturers are listed below. Other manufacturers of equivalent products may be submitted.

- 1. Grounding and Grounded Conductors

- a. Southwire Company
- b. Rome Cable

- 2. Grounding Connectors, Clamps and Bushings

- a. Burndy Corporation
- b. O-Z/Gedner Company
- c. Erico Products
- d. Thomas and Betts
- e. Bridgeport Fittings

- 3. Grounding Rods

- a. Harger Lightning & Grounding Inc.
- b. Thompson Lightning Protection, Inc.
- c. Galvan Industries, Electrical Products Division
- d. Erico International Corp.

2.2 MATERIALS

- A. General: Provide conductor sizes as shown or required.
- B. Materials: Use conductors in accordance with the requirements specified in Section 16120.
- C. Bare conductors: Use bare copper conductor where buried in earth, embedded in concrete or exposed.

- D. Insulated Conductors: Use copper conductor with green color insulation rated at 600 volts where installed in conduits or other enclosed raceways.

2.3 CONNECTORS

- A. Grounding Clamps and Bolted Connectors: Use grounding clamps and bolted connectors suitable for devices or cables being connected.
- B. Welding: Use the exothermic welding process for buried, concealed and accessible connections to structural members, ground rods, and case grounds. Clean and paint welds embedded in the ground or encased in concrete with asphalt base paint.
- C. Bolted Connectors: Use bolted connectors for grounding of ground buses and equipment.
- D. Pipe Grounding: Use copper, brass, or bronze grounding clamps for grounding pipes. Do not use strap type clamps for this purpose.
- E. Grounding Bushings: Provide grounding bushings for conduits where conduits are not effectively grounded by firm contact to the grounded enclosure.

2.4 GROUNDING RODS

- A. Length and Size: Provide grounding rods 3/4-inch in diameter and 10 feet long.
- B. Grounding Rod Material: Stainless steel.

PART 3 EXECUTION

3.1 INSTALLATION

- A. General: Install conductors to preclude exposure to physical damage. Install connections firm and tight. Arrange conductors and connectors without placing strain on the connections. Bury equipment grounding conductors as shown, or at a minimum of 12 inches below grade. Bring loops or taps up for connection to equipment or other items to be grounded.
 1. Install an insulated grounding conductor in all conduits.
 2. When raceways are used to contain and protect grounding conductors, install in accordance with Section 16110 and NEC.

3. Where conductors are installed in nonmetallic raceway, install the grounding conductor in addition to the neutral wire, for system sized in accordance with NEC or as scheduled.
 4. Perform exothermic welding with properly sized molds.
- B. Grounding Rod Installation:
1. Install grounding rods as shown with the top of the rod a minimum of 12 inches below grade.
 2. Drive grounding rods into permanently moist soil.
 3. Provide additional ground rod sections as required to reach permanently moist soil.
 4. Install cast iron junction box without bottom for access to grounding rod and conductor where shown.
- C. Equipment Grounding: Ground each piece of electrical equipment using a conductor in the raceway feeding the equipment in accordance with NEC.
1. Unless specified otherwise, connect transformer enclosures and neutrals to the grounding system. Connect the neutral ground connection at the transformer terminal. Provide two separate, independent, diagonally opposite connections for power transformers so removal of one connection will not impair continuity of the other. Make the connection from the ground grid to the ground bus and enclosures of switchboards, switchgears and motor control centers, lighting and distribution panelboards, control, relay and instrumentation panels.
- D. Grounding Conductors: Connect the grounding conductor between the equipment and the grounding system. Where a ground bar is furnished with the panelboard, connect the grounding conductor to the bar.
- E. Miscellaneous Grounding: Provide grounding for the following:
1. Ground receptacles and switches and their metal plates through positive ground connection to the yoke/strap, outlet box and grounding system grounding wire installed in the conduit.
 2. Ground racks, supports, frames, covers and metal parts in manholes or handholes, controllers, motor frames, surge capacitors, arrestors, lighting fixtures, metal structures, exposed noncurrent carrying metal, mechanical equipment, hoist beams, cranes and similar items.

3.2 FIELD QUALITY CONTROL

- A. Tests: Conduct a witnessed test to determine the ground impedance for the entire system using a ground loop impedance tester. Provide a maximum impedance of 2 ohms at any point of the test. Add additional grounding rods if necessary to meet this requirement.

END OF SECTION

(NO TEXT FOR THIS PAGE)

SECTION 16950

ELECTRICAL TESTING REQUIREMENTS

PART 1 GENERAL

1.1 SUMMARY

- A. Section Includes: Requirements of field testing and certification of electrical equipment and materials provided under various other sections to assess their equivalence to UL Inc. listing/labeling.
- B. Related Work Specified in Other Sections Includes:
 - 1. All relevant electrical sections.

1.2 REFERENCES

- A. General: Codes and standards referred to in this section are:
 - 1. ANSI - American National Standards Institute
 - 2. IEEE - Institute of Electrical and Electronics Engineers
 - 3. NEC - National Electrical Code
 - 4. NEMA -National Electrical Manufacturers Association
 - 5. NFPA - National Fire Protection Association
 - 6. NETA - International Electrical Testing Association Inc.
 - 7. UL - Underwriters' Laboratory, Inc.

1.3 SUBMITTALS

- A. General: Provide all submittals including the following, as specified in Division 1 and Section 16050.
 - 1. UL Testing: Furnish standard test parameters in accordance with the acceptable codes and standard for all the equipment and materials tested for equivalence to UL listing.
 - 2. Test Reports and Certificates: Furnish test reports and certificates for all equipment and materials tested for equivalence to UL listing for approval.

PART 2 PRODUCTS

2.1 TESTING COMPANIES

A. General: Acceptable testing companies are as listed below:

1. MET Electrical Testing Co., Inc.
2. UL Underwriters Laboratories, Inc.
3. Other OSHA approved testing facilities

2.2 SOURCE QUALITY CONTROL

A. Tests: Furnish all testing and certification in accordance with the latest NETA, ANSI, IEEE and NEMA Standards to meet the UL listing requirements in conformance with NFPA Standard and NEC.

PART 3 EXECUTION

3.1 PREACCEPTANCE TEST AND CERTIFICATION

A. General: Obtain the test reports and certifications for UL equivalence prior to acceptance of all materials and equipment requiring such tests and certification.

END OF SECTION