Loxahatchee River Environmental Control District

Irrigation Quality 511 (IQ-511) Pump Station Piping Improvements

Contract Documents and Technical Specifications

HUNRONMENT HUNRONMENT

100% Design



November 2020

# CONTRACT DOCUMENTS AND TECHNICAL SPECIFICATIONS

FOR

# IRRIGATION QUALIY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

# LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT

November 2020

**Prepared by:** 



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# NOTICE TO CONTRACTORS

#### Bid # 21-004-00103 IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

Sealed Bids will be received by the Loxahatchee River Environmental Control District (the "District,") via DemandStar until **2:00 p.m.** local time on **January 19, 2021.** Any Bids received after **2:00 p.m.** local time on **January 19, 2021**, will not be accepted under any circumstances. Any uncertainty regarding the time a Bid is received will be resolved against the Bidder. The Bids will be publicly opened and read aloud on **January 21, 2021** at **2:00 p.m.** local time in the Governing Board room of the District, at the above address. The Work to be performed is located in Palm Beach County, and consists of furnishing all labor, tools, materials, and equipment necessary to investigate the condition of the existing 24-inch ductile iron ball and socket, subaqueous force main as shown on the Contract Plans and Specifications and as specified herein to include:

The total work for the Irrigation Quality 511 (IQ-511) Pump Station Piping Improvements consists of furnishing all labor, materials, equipment and all incidentals and appurtenances for the installation of approximately 75 LF of 36-inch DIP reclaimed water main, bypass influent bay structure, connection to the existing wet well at the IQ-511 pump station and improvements at Diversion Structure "B" including replacement of a sluice gate, pedestal, stem cover, lighting and the addition of an electric actuator with associated power and controls. The affected roadway shall be milled and overlaid. Construction also includes dewatering, testing and all restoration work for a complete and operating system. The work will be on private property owned by the District.

The District reserves the right to determine material elements of the Bid and to award the Contract, if at all, to the lowest, qualified, responsive, and responsible Bidder. The District further reserves the right to reject any and all Bids; to not proceed with the Project; and/or to waive any irregularities contained in a Bid.

A pre-bid conference will be held at **2:00 p.m.**, local time on **January 5**, **2021** via Microsoft Teams. A meeting invite will be distributed to all plan holders prior to the scheduled date and time. If a bidder downloads Bid Documents from the District's website the bidder must send a request to be included in the pre-bid conference meeting invite to **purchasing@lrecd.org**. All contractors planning to submit Bids on this Project are encouraged to attend.

Bid Documents may be downloaded at the District's website, <u>https://loxahatcheeriver.org/governance/purchasing-bids/</u> or DemandStar. Bid Documents will be available on **December 14, 2020** after **8:00 a.m.** local time. The Bid Documents are made available on the above terms solely for the purpose of obtaining Bids and do not confer a license or grant for any other use.

Character and amount of security to be furnished by each Bidder are stated in the Instruction to Bidders. The Bidder shall hold its Bid open for acceptance by the District for a period of not less than ninety (90) calendar days following the date of the Bid opening.

The solicitation Invitation to Bid **21-004-00103** has been issued as an Electronic Bid with the same title on DemandStar. To submit a response for this bid electronically follow the instructions on

DemandStar. Electronic responses are the only method allowed for Bidders to respond to this solicitation. Bids shall be submitted on or before the date and time specified.

### LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT

Stephen B. Rockoff, Chairman

#### **INSTRUCTIONS TO BIDDERS**

#### **ARTICLE 1**

1. The following defined terms shall govern this Section and all other Contract Documents unless otherwise noted in the Contract Documents:

- a. "Bid" shall mean the documents that comprise the submission for the Work of this Project.
- b. "Bid Period" shall mean the time period from when the Bid Documents will become available to the deadline for submitting Bids.
- c. "Bidder" shall mean one who submits a Bid directly to the District, as distinct from a subbidder, who submits a Bid to the Bidder.
- d. "Bid Documents" include the Advertisement for Bids, Instructions to Bidders, Proposal, Questionnaire, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipts of Bids).
- e. "Change Order" shall mean a written change, addition, or deletion to the Contract Documents signed by both Contractor and the District.
- f. "Contract" shall mean the agreement between the Successful Bidder and the District for performance of the Work.
- g. "Contract Documents" shall mean all documents that comprise the agreement of the parties related to the Project. The Contract Documents include the Notice to Contractors, Instructions to Bidders, Proposal, Questionnaire, Bid Security, Contract, Public Construction Bond, Sworn Statement of Public Entity Crimes, Opinion of District's Attorney, Releases of Liens, Special Conditions, General Conditions, Technical Specifications, Standard Details and Plans, Plans and Specifications including all modifications, addenda, and Change Orders contained in any documents before or after execution of the Contract.
- h. "Contract Sum" shall mean the total amount due to Contractor as a result of the Work performed on the Project, including any amounts due as a result of Change Orders.
- i. "Contract Time" shall mean the time to complete the Project as set forth in the Contract Documents. Reference to "days" shall mean calendar days unless otherwise noted.
- j. "Contractor" shall mean the Successful Bidder with whom the District executes a contract for the Work or its duly authorized agents.
- k. "County" shall mean Palm Beach County, as may be applicable.
- 1. "Defective" shall mean the Work does not conform to the Contract Documents or does not meet the requirements of any applicable inspection, reference standard, test, or approval.

- m. "District" shall mean the Loxahatchee River Environmental Control District, acting through its properly authorized representatives.
- n. "Engineer" shall mean the engineer designated by the District as its engineering representative during the course of construction to make appropriate inspection and computation of payments, whether acting directly or through properly authorized agents, inspectors or representatives of the Engineer, acting within the scope of duties entrusted to them. The Engineer may or may not be an employee of the District.
- o. "Final Completion" shall mean the time when Engineer determines that all of the Work and associated punch list items have been completed in accordance with the Contract Documents.
- p. "Notice of Award" shall mean the District's notification of award of the Contract to the Successful Bidder.
- q. "Plans" shall mean any and all drawings, plans, sketches, diagrams, designs, lists, or other graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work for the Project.
- r. "Project" shall mean the entire construction to be performed as provided in the Contract Documents.
- s. "Specifications" shall mean the written requirements for materials, equipment, systems, standards, and workmanship for the Work, and performance of related services.
- t. "Substantial Completion" shall mean the date as certified by Engineer when the construction of the Project is sufficiently completed, in accordance with the Contract Documents, so that the Project can be utilized for the purposes for which it was intended; or if there be no such certification, the date when final payment is due in accordance with the Contract.
- u. "Successful Bidder" shall mean the lowest, qualified, responsible, and responsive Bidder to whom the District, based on the District's evaluation hereinafter provided, makes an award.
- v. "Work" shall mean any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by Contractor under the Contract Documents, including all labor, materials, equipment, services, and other incidentals and the furnishing, installation, and delivery thereof and all Work reasonably inferable therefrom.

2. **Bids**: Sealed Bids will be received by the Loxahatchee River Environmental Control District (the "District,") via DemandStar until **2:00 p.m**. local time on **January 19, 2021**. Any Bids received after **2:00 p.m**. local time on **January 19, 2021**, will not be accepted under any circumstances. Any uncertainty regarding the time a Bid is received will be resolved against the Bidder. The Bids will be publicly opened and read aloud on **January 21, 2021** at **2:00 p.m**. local time in the Governing Board room of the District, at the above address. The Bidder shall hold its Bid open for acceptance by the

District for a period not less than ninety (90) calendar days following the date of the Bid opening.

Bid Documents may be downloaded at the District's website, https://loxahatcheeriver.org/governance/purchasing-bids/ or via DemandStar. Bid Documents will be available on **December 14, 2020** after **8:00 a.m.** local time. The Bid Documents are made available on the above terms solely for the purpose of obtaining Bids and do not confer a license or grant for any other use.

A pre-bid conference will be held at **2:00 p.m.**, local time on **January 5**, **2021** via Microsoft Teams. A meeting invite will be distributed to all plan holders prior to the scheduled date and time. If a bidder downloads Bid Documents from the District's website the bidder must send a request to be included in the pre-bid conference meeting invite to purchasing@lrecd.org. All contractors planning to submit Bids on this Project are encouraged to attend.

All Bids shall be made on the blank form of proposal attached hereto. All blanks on the Bid Forms must be printed in blue or black ink or typed. Completed Bid Forms shall be scanned to PDF format and uploaded to DemandStar. The Bid shall contain an acknowledgment of receipt of all Addenda. A single Bid shall be submitted for all portions of the Work. Bids by corporations must be executed in the corporate name by the president or a vice president (or other corporate officer accompanied by evidence of authority to sign) and the corporate seal must be affixed and attested by the secretary or an assistant secretary. The corporate address and state of incorporation must be shown below the signature. Bids by partnerships must be executed in the partnership name and signed by a general partner, whose title must appear under the signature. The official address of the partnership must also be shown below the signature. If requested, the person signing a Bid for a corporation or partnership must produce evidence satisfactory to the District of the person's authority to bind the corporation or partnership. All names must be typed or printed below the signature. The address and telephone number for communications regarding the Bid must be shown.

After commencement of the Bid Period, no Bidder, or its agents, representatives, or persons acting at the request of such Bidder shall contact, communicate with or discuss any matter relating to the Bid with any District officer, agent, Board member, or employee other than Engineer or their designee. This prohibition ends upon execution of the final contract for the Work or when the Bid has been cancelled. A Bidder who violates this provision will be to subject discipline, including at a minimum a written reprimand and up to and including rejection of its Bid and/or cancellation of the Contract.

3. **Bid Security**: Each Bid must be accompanied by bid security in the form of a certified check or Bidder's Guaranty Bond ("Bid Bond") issued by a surety meeting the requirements of this Instruction to Bidders Section 3 and payable to the District for ten percent (10%) of the total amount of the Bid ("Bid Security"). Bidders will send the ORIGINAL Bid Bond to the District immediately after the Bid Due Date. The District will hold all bids unopened for 48 hours from the Bid Due Date. The original Bid Bond is to be received within 48 hours of the Bid Due Date or the bid will be deemed non-responsive. The Bid Security of the Successful Bidder will be retained until the Bidder has executed the Contract and furnished the required payment and performance bonds in the form of a Public Construction Bond, whereupon the Bid Security will be returned. If the Successful Bidder fails to execute and deliver the Contract and furnish the required Bonds within fourteen (14) calendar days after the Notice of Award, the District may annul the Notice of Award and the Bid Security of

that Bidder will be forfeited to the District. The Bid Security of any Bidder whom the District believes to have a reasonable chance of receiving the award may be retained by the District for ninety (90) calendar days after the date of the opening of the Bid. The Bid Security of other Bidders will be returned seven (7) calendar days after the opening of the Bids. The Bid Bond shall be issued by a company having a registered agent in the State of Florida.

4. **Bonds and Qualification of Security Companies**: Upon award of the Contract, Contractor shall execute a Public Construction Bond, in the amount of the total Contract Sum with a qualified surety company, covering performance of the Project and payment of subcontractors, substantially similar in form to that provided in Article 5 of the Contract Documents and in compliance with the requirements of Section 255.05, Florida Statutes.

In order to be acceptable to the District, Bid Bonds, Public Construction Bonds, or Maintenance Bonds shall, at a minimum be written by a surety company that:

- a. is admitted/authorized to do business in the State of Florida and complies with the provisions of Section 255.05, Florida Statutes;
- b. has been in business and has a record of successful continuous operations for at least five (5) years;
- c. files a certified copy of a power of attorney with the signed Bid, Public Construction, or Maintenance bonds;
- d. lists the surety's agency name, address, and telephone number on all bonds; and
- e. has at least the following minimum ratings based on the following contract amounts:

CONTRACT AMOUNT	BEST'S RATINGS
\$ 25,000.00 to \$100,000.00	B+ Class V or better
\$100,000.01 to \$500,000.00	A Class VI or better
\$500,000.01 and over	A Class VII or better

The life of the Construction Bonds or Maintenance Bonds shall extend twelve (12) months beyond the date of Final Completion and shall contain a waiver of alteration to the terms of the Contract, extensions of time, and/or forbearance on the part of the District.

Surety companies executing bonds must appear on the Treasury Department's most current list (Circular 570 as amended).

5. **Subject of Bids**: All Work for the Project shall be constructed in accordance with the Plans and Specifications prepared by Baxter & Woodman, Inc. Bids shall be submitted for furnishing, delivering, and installing all materials, equipment, incidentals and services, including labor for the Work as specified in the Contract Documents and all items reasonably inferable therefrom. Engineer will compute the quantities that will be the basis for payment applications, both progress and final.

All Work shall be done as set forth in the Contract Documents and substantially completed, tested, cleaned, and ready for operation within the periods stated in Article 4 of the Contract, Section 2.

6. **Modification and Withdrawal of Bids**: Bids may be withdrawn or modified by an appropriate document duly executed (in the manner that a Bid must be executed) and delivered to the place where Bids are to be submitted during the Bid Period. A request for withdrawal or a modification must be in writing and signed by a person duly authorized to withdraw or modify the Bid. If signed by a deputy or subordinate, the principal's written authorization to such deputy or subordinate granting the power to act on the principal's behalf must accompany the request for withdrawal or modifications. Withdrawal of a Bid will not prejudice the rights of a Bidder to submit a new Bid within the Bid Period. After expiration of the Bid Period, no Bid may be withdrawn or modified, except as provided below.

If, within twenty-four (24) hours after Bids are opened, any Bidder files a duly signed, written notice with the District and within five (5) calendar days thereafter demonstrates to the reasonable satisfaction of the District that there was a material and substantial mistake in the preparation of its Bid, that Bidder may withdraw its Bid and the Bid Security will be returned. Thereafter, the Bidder will be disqualified from further bidding on the Project.

7. Award, Waiver, and Rejection of Bids: The Contract will be awarded pursuant to the requirements of applicable federal, state, and local laws and regulations. The Contract award will be made to the lowest cost, qualified, responsive, and responsible Bidder whose proposal materially complies with all the requirements. The District reserves the option to award or rebid the Project at any time if deemed to be in the best interest of the District.

It is the intention of the District to award the Contract to a Bidder competent to perform and complete the Work in a timely and satisfactory manner. Additionally, the District may conduct such investigations as the District deems necessary to assist in the evaluation of any Bid and to establish the responsibility, qualifications, and financial ability of Bidders, proposed subcontractors, suppliers, and other persons and organizations to perform and furnish the Work in accordance with the Contract Documents to the District's satisfaction and within the prescribed time.

To the extent permitted by applicable federal, state, and local laws and regulations, the District reserves the right to: determine materiality of Bid components; determine qualifications of the Bidder; determine responsibility of Bidder; determine responsiveness of Bidder; reject any and all Bids; waive any informality or irregularities in any Bid received; or accept the Bid deemed by the District to be in its best interest. Bids may be rejected at the option of the District if the District determines in its sole discretion the Bid is materially incomplete, unbalanced, conditional, or obscure; the Bid contains additions not called for, erasures, alterations, irregularities of any kind; the Bid does not comply materially with the Notice to Contractors and/or Instruction to Bidders; or the Bid is from a Bidder that does not meet pre-bid conference attendance requirements.

Documented poor performance of contractors on previous contracts with the District or other governmental entity will be considered during evaluation and may be sufficient cause not to award.

8. **Construction Schedule**: Prior to signing the Contract, the Successful Bidder shall submit on a form acceptable to the District and Engineer, the overall proposed construction schedule for the Project. The schedule shall conform to the requirements of Special Conditions Section 9.36. This construction schedule shall specify the Project completion date as set forth in the Contract.

9. **Execution of the Contract:** When the District gives a Notice of Award to the Successful Bidder, it shall be accompanied by the required number of unsigned counterparts of the Contract and all other written Contract Documents. Within fourteen (14) calendar days thereafter, Contractor shall sign and deliver the counterparts of the Contract and other written Contract Documents to the District with the required bonds and insurance certificates. Within fourteen (14) calendar days thereafter, the District shall deliver one fully signed counterpart to Contractor. Each counterpart is to be accompanied by a complete set of the appropriately identified Plans and Specifications. Following execution of the Contract by the District, the construction schedule shall be modified to begin upon the execution of the Contract by both Parties of the Contract.

10. **Examination of Contract Documents and Site**: It is the responsibility of each Bidder, prior to submitting a Bid to (a) examine the Bid and Contract Documents thoroughly, (b) visit the site of the Work and become familiar with local conditions that may in any manner affect cost, progress, performance or furnishing of the Work, (c) consider federal, state, and local laws, ordinances, rules, and regulations that may affect cost, progress, performance or furnishing of the Work in any manner, (d) examine the Plans and Specifications, requirements of the Work, and the accuracy of the quantities of the Work to be completed, and (e) notify Engineer of all conflicts, errors, or discrepancies in the Contract Documents.

Bidder may rely upon the accuracy of the technical data contained in the reports of exploration and tests of subsurface conditions at the site of the Work which have been utilized by Engineer in preparation of the Contract Documents. Bidder may not rely upon the completeness of the documents, non-technical data, interpretations or opinions of the reports of exploration and tests of subsurface conditions, for the purposes of bidding and/or construction. Further, information and data reflected in the Contract Documents with respect to underground facilities at or contiguous to the site are based upon information and data furnished to the District and Engineer by the owners of such underground facilities or others. The District does not assume responsibility for the accuracy or completeness thereof unless it is expressly provided otherwise in the Supplementary Conditions. Elevations of the ground are shown on the Plans and Specifications and are believed to be reasonably correct. However, such elevations are not guaranteed and are presented only as an approximation. Bidders shall satisfy themselves as to the correctness of all elevations.

The lands upon which the Work is to be performed, right-of-ways and easements for access thereto, and other lands designated for use by Contractor in performing Work are identified in the Contract Documents. All additional lands and access thereto required for temporary construction facilities or storage materials and equipment shall be provided by Contractor.

Before submitting a Bid, each Bidder shall, at Bidder's own expense, make or obtain any additional examinations, investigations, explorations, tests, studies and any additional information and/or data which pertain to the physical conditions (subsurface, surface and underground facilities) at or contiguous to the site or otherwise which may affect cost, progress, performance, or furnishing of the

Work in accordance with the time, price, and other terms and conditions of the Contract Documents. In advance, the District will provide each Bidder access to the site of the Work at reasonable times to conduct such explorations and tests as each Bidder deems necessary for the submission of the Bid, provided Bidder provides two (2) business days written notice prior to the date access is requested.

The submission of a Bid will constitute an incontrovertible representation by Bidder that Bidder has complied with the requirements as set for in the Instructions to Bidders and all other Contract Documents; the Bid is premised upon performing and furnishing the Work required by the Bid and Contract Documents; the means, methods, techniques, sequences, or procedures of construction as may be indicated in or required by the Bid and Contract Documents will be followed; and that the Bid and Contract Documents are sufficient in scope and detail to indicate and convey an understanding of all terms and conditions of performance and furnishing of the Work.

The Contract Documents contain the detailed provisions required for the construction of the Project. No information, verbal or written, obtained from any officer, agent or employee of the District on any such matter shall in any way affect the risk or obligation assumed by Contractor, or relieve Contractor from fulfilling any of the conditions of the Contract Documents.

11. **Interpretations and Addenda:** All questions about the meaning or intent of the Contract Documents are to be directed to Engineer. All questions must be submitted to Engineer in writing as early as possible during the Bid Period. No oral answers or interpretations will be provided. Interpretations or clarifications considered necessary by Engineer in response to such questions will be issued by addenda mailed to all persons recorded by Engineer as having received the Bid Documents. Questions received less than ten (10) calendar days prior to the deadline to submit Bids will not be answered. Only questions answered by formal written addenda will be binding. Oral responses and other interpretations or clarifications will be without legal effect, and shall not be relied upon by a Bidder.

Addenda may also be issued to modify the Bid Documents as deemed necessary by the District and/or Engineer. Contractor agrees to use the products and methods designated or described in the Plans and Specifications and as amended by any addenda. Addenda shall control in the event of conflict with Contractor's Bid.

12. **Substitute Material and Equipment:** The Contract will be based on material and equipment described in the Plans and Specifications without consideration of possible "substitute" or "equal" items. Whenever it is indicated in the Plans and Specifications that a Contractor may furnish or use a "substitute" or "equal" item of material or equipment, written application for such acceptance will not be considered by Engineer until after the effective date of the Contract. The written application for acceptance of a substitute item of material or equipment will be handled in accordance with the field order procedure.

13. **Subcontractors:** Each Bid must identify the names and addresses of the subcontractors. If requested by the District or Engineer, the Successful Bidder, and any other Bidder so requested, shall, within seven (7) days after the date of the request, submit to the District an experience statement with pertinent information as to similar projects and other evidence of qualification for each such subcontractor, person, and organization. The amount of subcontract work shall not exceed sixty

percent (60%) of the Work. If the District or Engineer, after due investigation, has reasonable objection to any proposed subcontractor, supplier, other person, or organization, either party may, before issuing the Notice of Award, request the Successful Bidder to submit an acceptable substitute without an increase in Contract sum or Contract Time. If the apparent Successful Bidder declines to make any such substitution, the District may award the Contract to the next lowest qualified, responsive, and responsible Bidder that proposes to use acceptable subcontractors, suppliers, and other persons and organizations. Declining to make requested substitutions will not constitute grounds for sacrificing the Bid Security of any Bidder. Any subcontractor, supplier, other person or organization listed and not objected to in writing by the District or Engineer prior to giving of the Notice of Award, will be deemed acceptable to the District and Engineer, subject to revocation of such acceptance after the Effective Date of the Contract. The Successful Bidder shall be solely responsible for all payment to its subcontractors. No Contractor shall be required to employ any subcontractor, manufacturer, other person or organization against whom it has reasonable objection.

14. **Taxes:** Contractor shall pay all applicable sales, consumer, use, and other similar taxes required by law.

15. **Compliance with Laws:** Bidders must comply with all applicable federal, state, or local laws and regulations, including, but not limited to, the Department of Labor Safety and Health Regulations for construction promulgated under the Occupations Safety and Health Act of 1970 (PL 91-956) and under Section 107 of the Contract Work Hours and Safety Standards Act (PL 91-54).

Any chemicals used in the performance of this Project by the Bidder must have prior approval of the Environmental Protection Agency (EPA) and/or United States Department of Agriculture (USDA).

Bidders shall comply with the requirements of Sections 553.60-553.64, Florida Statutes (the "Trench Safety Act") and 29 CFR Section 1926.650 Subpart P (the "Occupational Safety and Health Administration's Excavation Safety Standards"). If the Project provides for trench excavation in excess of five (5) feet deep, the Bidder shall include in its Bid a reference to the Trench Safety Act and the standards that will be in effect during the period of construction of the Project; written assurance by the Bidder, that if selected, the Bidder will comply with applicable trench safety standards; and a separate item identifying the cost of compliance with the Trench Safety Act, in accordance with Section 553.64, Florida Statutes.

16. Liquidated Damages and Additional Delay Damages: Bidder and the District recognize the Work is of a critical nature, that time is of the essence, and the difficulty associated with ascertaining the extent of delay damages the District will suffer as a result of delay in the Work. As a result, if awarded the Contract, Bidder agrees to pay the District as liquidated damages, and not as a penalty, the amount of Liquidated Damages and Additional Delay Damages as outlined in Article 4- Contract Section 2.

17. **Insurance:** Contractor shall provide and maintain throughout the terms of this Contract, liability insurance with all the subject features in accordance with the instruction given in the Special Conditions Section 9.08.

18. **Required Disclosures:** With its Bid submission, Bidder shall disclose all material facts pertaining to any felony conviction or any pending felony charges in the last three (3) years in this state, any other state, or the United States against (i) Bidder, (ii) any business entity related to or affiliated with Bidder, or (iii) any present or former executive employee, officer, director, stockholder, partner or owner of Bidder or of any such related or affiliated entity. This disclosure shall not apply to any person or entity which is only a stockholder, owning twenty percent (20%) or less of the outstanding shares of a Bidder and whose stock is publicly owned and traded.

At its sole discretion the District may reject the Bid of any Bidder whose present or former executive employees, officers, directors, stockholders, partners, or owners are currently accused of or have ever been convicted of bidding violations. The discretion of the District may be exercised based on the disclosure required herein. By submitting a Bid, Bidder recognizes and accepts that the District may reject the Bid based upon the exercise of its sole discretion, and Bidder waives any claim it might have for damages or other relief resulting from the rejection of its Bid based on these grounds.

19. **Public Entity Crime/ Convicted Vendor List:** A person or affiliate who has been placed on the convicted vendor list following a conviction for a public entity crime may not submit a bid on a contract to provide any 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 be awarded or perform Work as a contractor, supplier, subcontractor, or consultant under a contract with any public entity, and may not transact business with any public entity in excess of the threshold amount provided in Section 287.017, Florida Statutes, Category Two, for a period of thirty-six (36) months from the date of being placed on the convicted vendor list.

20. License and Permits: The District has obtained the permits specified within the Contract Documents. Contractor shall obtain and pay for all permits and licenses required for the Work as defined in Section 01010 of the Technical Specifications, including the cost of all Work performed in compliance with the terms and conditions of such permits, whether by itself or others.

No construction Work shall commence until all applicable licenses and permits have been obtained and copies delivered to Engineer.

21. **Protest:** The District is responsible for resolution of protests of contract awards, claims, disputes, alleged patent infringements, alleged license fee(s) and other related procurement matters in accordance with sound business judgment and good administrative practice. By submitting a Bid to the District, Bidders agree to the procedures outlined in the District's Procurement Policy which can be found on the District's website, <u>www.loxahatcheeriver.org/purchasing.php</u>, to resolve all protests.

22. The Contract Documents include various divisions, sections, and conditions which are essential parts of the Work to be provided by the Contractor. A requirement occurring in one is binding as though occurring in all. The Contract Documents are intended to be complementary and to describe and provide for complete Work. In case of discrepancy, the following precedence will govern the interpretation of the Contract Documents prior to award of the Contract:

- 1. Addenda
- 2. Bid Documents, including the Contract
- 3. Special Conditions
- 4. Technical Specifications / Plans and Specifications
- 5. General Conditions
- 6. Bidder's Response

After award, in the event of a conflict, Change Orders, supplemental agreements, and revisions to Plans and Specifications will take precedence over any of the above. Detailed plans shall have precedence over general plans. In the event that any conflicts cannot be resolved by reference to this governing order of Contract Documents provision, then the District shall resolve the conflict in any manner which is acceptable to the District and which comports with the overall intent of the Contract Documents.

23. To render a Bid responsive, the Bidder's Proposal must be accompanied by the Bid Form provided in Article 2 of the Contract Documents. Acceptable references and projects to be included shall be those related to investigations of force mains. References provided shall be from the "owner" of the Project, not the project engineer or Contractor. The District will not award a Bid to any Bidder who cannot prove to the satisfaction of the District that the corporation/partnership/individual identified on the signature of Bidder form has satisfactory written references for similar work. References that are from a parent corporation or affiliated subsidiary will not be considered by the District.

24. **Notice to Proceed:** The Notice to Proceed for this project will be issued within 180 days of the Award of Contract at a time mutually agreed to by the District and lowest responsive bidder.

25. **Health, Safety and Environmental Performance:** The District shall evaluate Bidder's health, safety and environmental performance based on the following performance metrics and documentation reviews. The selected Bidder is solely responsible for all applicable health, safety, and environmental requirements, and the health, safety, and environmental evaluation conducted by the District is not an assumption of any responsibility for health, safety, and environmental requirements by the District. Bidders which fail to submit with their Bid information demonstrating compliance with the following criteria shall be considered non-responsive/non-responsible:

U.S. Department of Labor Occupational Safety and Health Administration (OSHA) Incident Rates and Recordable Injuries:

Total Days Away, Restricted, Transferred (DART)Benchmark4.4(U.S. Bureau of Labor Statistics, Table 1). Incidence rates of nonfatal<br/>occupational injuries and illnesses by industry and case types, 2018,

25<sup>th</sup> percentile or better for size 11-49, NAICS 237110, Water and sewer line and related structures construction). Bidder's DART must be less than or equal to benchmark.

Total Recordable Incident Rate (TRIR)Benchmark6.8(U.S. Bureau of Labor Statistics, Table 1. Incidence rates of nonfatal<br/>occupational injuries and illnesses by industry and case types, 2018,<br/>25th percentile or better for size 11-49, NAICS 237110, Water and<br/>sewer line and related structures construction). Bidder's TRIR<br/>must be less than or equal to benchmark.

Fatalities: **0** Work related fatalities resulting in OSHA citations within the last three years, OR if 1 or more work related fatalities resulting in an OSHA citation exist within the last three years, the contractor must have mitigated risk of recurrence by implementing adequate industry standard safety procedures and training as determined by OSHA by providing such OSHA determination to the District.

Bidder shall submit a health, safety and environmental plan for Construction and General Industry. The health, safety and environmental plan must address the following minimum requirements:

Lockout/Tagout Excavation Trenching and Shoring Permit Required Confined Space Injury Reporting/Investigation Operator Qualifications Hot Work Personal Protective Equipment Electrical Safety Near Miss, Behavioral Based Safety Qualified, Certified and Competent Employees

OSHA Inspection Detail review must show no Serious or Willful violations in the previous 36 months and no unresolved Failure to Abate Prior Violation in the previous 36 months and no active Failure to Abate Prior Violation.

Bidder shall submit with their Bid OSHA Form 300A completed for the previous year, an Experience Modification Rating letter from its insurance carrier for the current period and a copy of its written health, safety and environmental program with training records for the previous 36 months.

26. **Previous Performance on District Projects:** The District has implemented a Contractor Evaluation Report in an effort to document contractor performance on District projects. Bidders who have received Unsatisfactory ratings on previous District projects must submit with their Bid a mitigation plan detailing previous unsatisfactory ratings and measures implemented to address the

unsatisfactory performance. Bidders with unsatisfactory ratings not submitting a mitigation plan with their bid shall be deemed Non-Responsive/Non-Responsible.

27. **Experience:** The District shall evaluate the Bidder's experience relative to the work to be performed based on the following requirements:

Have successfully performed as Prime Contractor on a minimum of 5 similar projects in the past 5 years. Similar projects shall include sanitary force main inspections with a minimum construction contract value of \$100,000. Qualifying projects shall be complete and shall not have been assessed Liquidated Damages, terminated, suspended or defaulted.

Bidder shall submit Project Resumes for all qualifying projects. Resumes shall include project name, description, construction cost, completion date, District's project manager contact information (name, phone number and email), Engineer of Record's contact information (name, phone number and email). See Proposal, Article 2A, Questionnaire.

#### LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT

By:\_\_\_\_

Stephen B. Rockoff Chairman

I hereby acknowledge receipt of the Notice to Contractors and Instruction to Bidders and have familiarized myself with the contents therein and all other Contract Documents

By:\_\_\_\_\_

Bidder

Date

#### PROPOSAL

## **ARTICLE 2**

# LOXAHATCHEE RIVER DISTRICT IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING **IMPROVEMENTS**

To the LOXAHATCHEE RIVER DISTRICT of Jupiter, Florida, a	s the party of the first part:
Proposal made by:as Bidder,	
whose business address is:	
State whether Bidder is an individual, a partnership or a corporation:	
Accompanying this Proposal is a Bid Security for \$	(Numbers)
	(Amount Written)

From: \_\_\_\_\_\_(Name of Surety)

1. The undersigned Bidder hereby declares that the Bidder has carefully examined the Contract Documents relating to the above entitled matter and the Work, and has personally inspected the location of the Work. The undersigned Bidder has correlated the results of all observations, examinations, investigations, tests, reports, and studies with the terms and conditions of the Contract Documents.

2. The undersigned Bidder hereby declares that the Bidder is the only person or persons interested in its Bid; that it is made without any connection with any person submitting another bid for the same Contract; that the Bid is in all respects fair and without collusion, fraud, or mental reservations; that no official of the District or any person in the employ of the aforesaid is directly or indirectly interested in said Bid or in the supplies of Work to which it relates, or in any portion of the profits thereof.

3. The undersigned Bidder does hereby offer and agree to furnish all materials, to fully and faithfully construct, perform and execute all Work in the above entitled matter in accordance with the Plans and Specifications relating thereto, and to furnish all labor, tools, implements, machinery, forms transportation, and materials necessary and proper for the said purpose at the prices named below for the various items of Work.

4. The undersigned Bidder does hereby declare that the prices so stated cover all expenses of every kind incidental to the completion of said Work and the Contract, including all claims that may arise through damages or other cause whatsoever. The undersigned Bidder agrees to complete the Work for the price(s) indicated in the Bid Form.

5. The undersigned Bidder does hereby declare that the Bidder shall make no claim on an account of any variation of the approximate estimate in the quantities of Work to be done, nor on account of any misunderstanding or misconceptions of the nature of the Work to be done or the grounds or place where it is to be done.

6. The undersigned Bidder does hereby agree that it will execute the Contract which will contain the material terms, conditions, provisions, and covenants necessary to complete the Work according to the Plans and Specifications, within fourteen (14) calendar days after receipt of written Notice of Award of this proposal by the District; and if the Bidder fails to execute said Contract within said period of time, that the District shall have the power to rescind said award and also retain for the District the Bid Security accompanying Bidder's proposal which shall become forfeited as liquidated damages.

7. The undersigned Bidder also declares and agrees that the Bidder will commence the Work within ten (10) calendar days after receipt of written Notice to Proceed and will complete the Work fully and in every respect on or before the time specified in the Contract Documents, and so authorize the party of the District in case of failure to complete the Work within such specified time to employ such persons, equipment, and materials as may be necessary for the proper completion of said Work and to deduct the cost therefore from the amount due under the Contract.

8. The undersigned Bidder accepts all of the terms and conditions of the Bid Documents, including without limitation those dealing with the disposition of the Bid Security. The undersigned Bidder also makes all representations required by the Instructions to Bidders.

9. The undersigned Bidder agrees to provide Unit Prices of major construction elements of the Work in order to better determine the value of progress payment, in a format as provided in Article 6 Forms for Use During Construction.

10. The undersigned Bidder hereby agrees that the Bidder will, at Bidder's expense, insure all persons employed by it in prosecuting the Work hereunder against accident as provided by the Workers' Compensation Law of the State of Florida.

11. The price for the Work shall be stated in both words and figures in the appropriate place in the proposal form. Discrepancies in the multiplication of units of Work and unit prices will be resolved in the favor of the unit prices. Discrepancies between the indicated sum of any column of figures and the correct sum thereof will be resolved in the favor of the correct sum. In the event that there is a discrepancy between the price in written words and the price written in figures, the former shall govern.

12. The undersigned Bidder acknowledges receipt of the addenda, if any, as listed herein and agrees that Bidder will be bound by all addenda whether or not listed herein.

No	Date
No	Date
No	Date
No	Date

13. The following documents are attached to and made a condition of this Bid (initial each item in the space provided):

- a. Initial\_\_\_\_\_. Instructions to Bidders, Proposal, Questionnaire, Sworn Statement Under Section 287.133(3)(a), Florida Statues, on Public Entity Crimes, Schedule of Bid Prices
- b. Initial\_\_\_\_\_. Bid Security
- c. Initial\_\_\_\_\_. Power of Attorney (for Surety Bond only)
- d. Initial\_\_\_\_\_. Corporate Authority to execute Bid (any corporate employee other than president or vice president)
- e. Initial\_\_\_\_\_. Copies of current valid license(s) issued in accordance with Florida Statutes and/or appropriate local ordinances is hereby acknowledged.
- f. Initial\_\_\_\_\_. OSHA's Form 300A completed for the previous year
- g. Initial\_\_\_\_\_. Experience Modification Rating letter (issued by insurance carrier) for the current period.

Receipt of Addendum

- h. Initial\_\_\_\_\_. Written health, safety and environmental program with training records for the previous 36 months.
- i. Initial\_\_\_\_\_. Contractor's Unsatisfactory Rating Mitigation Plan (if required, see ITB 26)
- j. Initial\_\_\_\_\_. Project Resume's for qualifying experience (see ITB 27).

	Contractor:
	By:
	Title:
	Address:
(Corporation Seal)	
	Attest:
	Title:
	Contractor's License No:

### BID FORM — BASE BID LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS UNIT PRICES

No.	Description	Unit	Qty	Unit Cost	Total
	GENERAL CONDITIONS				
1	Mobilization, Insurance and Bonds*	LS	1	\$	\$
2	As-Built Record Drawings	LS	1	\$	\$
3	Professional Audio/Video of Construction Site	LS	1	\$	\$
4	NPDES Permit/Erosion Protection Measures	LS	1	\$	\$
	CIVIL				
5	Excavation (Bypass Influent Bay excavation and backfill)	LS	1	\$	\$
6	36" DIP Reclaimed Water Main Pipe, Epoxy-Lined	LF	75	\$	\$
7	Connection to Existing Reclaimed Water Main (36" Tee)	EA	1	\$	\$
8	DIP Compact Fittings (epoxy-lined)	TON	1.0	\$	\$
9	Asphalt Driveway Restoration	SF	250	\$	\$
10	Furnish & Install Bahia Sod	SY	75	\$	\$
11	Dewatering	LS	1	\$	\$
	MECHANICAL				
12	36" Plug Valve, MJ w/ Valve Box	EA	1	\$	\$
13	36" Aluminum Sluice Gate and Stem Cover	EA	1	\$	\$
14	Sluice Gate Electric Actuator and Pedestal	EA	1	\$	\$
15	4'x3' Aluminum Access Hatch	EA	1	\$	\$
	STRUCTURAL				
16	Bypass Influent Bay	LS	1	\$	\$

No.	Description	Unit	Qty	Unit Cost	Total
17	Sawcut Existing Wet Well	LS	1	\$	\$
	ELECTRICAL				
18	Electrical Service to Sluice Gate	LS	1	\$	\$
19	Electrical Controls and Instrumentation	LS	1	\$	\$
20	Lighting Including Concrete Poles and Fixtures	LS	1	\$	\$
	TOTAL BID ITEMS 1-20	-		-	\$

\* Payment for mobilization shall not exceed eight percent (8%) of the contract price.

TOTAL BASE BID, ITEMS 1-20 (in words)

Dollars

Cents

# THE CONTRACT AWARD SHALL BE EVALUATED BASED ON THE TOTAL BASE BID PRICE FOR ITEMS 1 THROUGH 20 AS SUBMITTED BY THE LOWEST, QUALIFIED, RESPONSIBLE, RESPONSIVE BIDDER.

	(Name of Bidder)
	Bidders Name:
	By:
	Print Name of Person signing:
	Title:
	Business Address:
Incorporated or formed under the la	ws of the State of

#### PROPOSAL ARTICLE 2a

### **QUESTIONNAIRE**

#### For

# IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

#### INSTRUCTIONS

- 1. The following information must be filled out by <u>all Bidders</u>.
- 2. Please print legibly, type, or word process. Sign in ink. When attaching sheets, please place the question number to which you are responding in the upper right hand corner of each sheet and number the sheets.
- 3. Note that the person signing this Application must swear that the information provided below is

	1. <u>Basic Information</u>
1	Name of Contractor:
	[Same as on Cover Page of The Proposal]
2	Contact Person(s):
3	Telephone No:      Fax No:
4	Address:
5	Federal Tax ID No:
5	CONTRACTOR'S license: Primary classification:
	State License Number
	Supplemental classifications held, if any:
	Name of Licensee, if different from (1) above:

1.7 Name of person and title who inspected site of proposed WORK for your firm:

Name:	Date of Inspection:	
Title:		

#### 2. Organizational Structure & History

2.1 The Contractor is duly organized under the laws of the State of

2.2 The Contractor has the following organizational structure.

•

() individual () corporation () partnership

() limited liability company () joint venture () other:

2.3 Provide the year the Contractor (and not any Predecessor Entities or Related Entities) was first organized.

\_\_\_\_\_

2.4 List all Predecessor Entities below (or on attached sheets if necessary).

2.5 Please list all Related Entities below (or on attached sheets if necessary).

2.6 If organized in any state other than Florida or in a foreign country, are you in compliance with all laws and regulations necessary to legally do business in the State of Florida?

YES \_\_\_\_\_ NO \_\_\_\_\_

#### 3. Officers and Owners

3.1 Officers: List the name, title, and address of current Officers, Directors, Partners, Members, and any other persons with similar positions, in descending order of degree of control. Name Title Address [Attach additional sheets as necessary.] 3.2 Owners. Please list the name, address, and percentage of ownership of all persons or entities owning 10 percent or more of the Contractor, in descending order of percentage of ownership. Owner Address % [Attach additional sheets as necessary.] Employees. Please list total quantity of employees, # of crews, and discipline of each crew. 3.3 **Crew Discipline** Number of employees in crew % of total firm [Attach additional sheets as necessary.]

#### 4. Experience

4.1 <u>Summary of Contractor Experience</u> With respect to this <u>specific project</u>, list the approximate number of years of experience that the Contractor has as a prime contractor or as a subcontractor with primary responsibility.

Project Type

Years

4.2 <u>Most Recently Completed Contracts</u> Please provide the following information regarding the last ten contracts completed by the Contractor. Please list in reverse chronological order (most recently completed project first, next most recently completed project, etc.). [Please feel free to provide this information on attached sheets in another format as long as it contains all the information requested.]

Contract Amount	Project Type &	Month / Year	Name, Address,
	Location	Completed	Contact Person &
			Tel. # of Owner

4.3 What is the last project similar in nature that you have completed as Prime Contractor for a government entity in Florida? (This <u>must</u> be filled out below or Bid may be considered non-responsive.)

Project: \_\_\_\_\_\_
Project Cost: \_\_\_\_\_\_
Year Complete: \_\_\_\_\_\_
Government: \_\_\_\_\_\_

4.4 ATTACH TO THIS BID the experience resume of the person who will be designated chief construction superintendent or on site construction manager.

4.5 List 5 projects completed as <u>Prime Contractor</u> in last 5 years in Florida involving work of <u>similar type</u> and complexity that you have completed as Prime Contractor for a government entity in Florida. See Instructions to Bidders, Paragraph 27, Experience. If 5 projects have not been completed, Contractor must so state (this <u>must</u> be filled out below or Bid may be considered non-responsive).:

a.	Project Name:
	Contract Price: \$
	Detailed Description of Work:
	Name, Address and Telephone Number of Government/Contact Person:
b.	Project Name:
	Contract Price: \$
	Detailed Description of Work:
	Name, Address and Telephone Number of Government/Contact Person:
c.	Project Name:
	Contract Price: \$
	Detailed Description of Work:
	Name Address and Talanhone Number of Covernment/Contact Person
	Name, Address and Telephone Number of Government/Contact Person.

d. Project Name:

. . ..

Contract Price: \$\_\_\_\_\_

Detailed Description of Work:

Name, Address and Telephone Number of Government/Contact Person:

e. Project Name:

Name, Address and Telephone Number of Government/Contact Person:

4.6 <u>Contracts In Progress</u> Please provide the following information regarding all contracts currently in progress, in descending order of contract amount. [Please feel free to provide this information on attached sheets in another format as long as it contains all the information requested.]

Contract Amount	Project Type & Location	% Completed	Name, Address, Contact Person & Tel. # of Owner

4.7 Provide an alphabetical listing of all state or local government agencies, including telephone number and contact person, that have awarded the Contractor (or any Predecessor Entities and Related Entities) a contract during the last five years. Attach additional sheets as necessary.

- 1.\_\_\_\_\_
   22

   3.\_\_\_\_\_
   4
- 2.\_\_\_\_\_ 4.\_\_\_\_

6.

- 5.\_\_\_\_\_
- **PROPOSAL** Article 2

4.8 <u>Subcontractors</u>. This proposal is being submitted by the CONTRACTOR who proposes to perform the Work as required by the Contract Documents. If the CONTRACTOR will be utilizing a Subcontractor for a category of Work set forth below then the CONTRACTOR <u>must</u> identify the Subcontractor by name and provide the Subcontractor's address and telephone number. Only <u>one</u> Subcontractor may be identified for each category of Work specified, this shall constitute a representation and warranty by the CONTRACTOR that the CONTRACTOR is not utilizing a Subcontractor for such Work and will perform such Work with CONTRACTOR's own employees. After submitting this bid the CONTRACTOR may not add to, subtract from, modify or make substitutions regarding the Supplier/Subcontractor identification and listing without the express written request and consent of the District. Any substitutions must be for legitimate and proper reasons. All Subcontractors listed are subject to the approval of the District.

CONTRACTOR represents and warrants to the District that all of said Subcontractors and their authorized vendors have been made aware of all the appropriate portions of the Contract Documents and agree that their portion of the Work and materials furnished in connection therewith will meet all of the requirements of the Contract Documents and that deliveries will be scheduled so as not to impede the progress of the Work.

Subcontractors:

Surveyor

	Name:
	Address & Telephone No.
Machanical	
Mechanical	Name:
	Address & Telephone No.
Electrical	
	Name:

Address & Telephone No.

Name: Address & Telephone No. Videographer Name: Address & Telephone No. Dewatering Name: Address & Telephone No. Name:

Address & Telephone No.

4.10 Liquidated Damages Within the last five years, has the Contractor (or any Predecessor Entities or Related Entities) had liquidated damages assessed against it?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, please provide full details on attached sheets including the per diem amount of liquidated damages, the original contract time, and the number of days for which liquidated damages were assessed. Please feel free to include a written summary of your position on the matter.

4.11 Terminations / Suspensions / Defaults

Instrumentation

Other

(a) Within the last five years, has a contract of the Contractor (or any Predecessor Entities or Related Entities) been terminated or suspended for cause?

YES \_\_\_\_\_ NO \_\_\_\_\_

(b) Within the last five years, has another party (e.g. surety) completed Work which the Contractor (or any Predecessor Entities or Related Entities) was originally responsible to perform? YES \_\_\_\_\_ NO \_\_\_\_

(c) Within the last five years, has the Contractor (or any Predecessor Entities or Related Entities) been considered in default of a contract that was not cured within the time frame allowed by the contract? YES \_\_\_\_\_ NO \_\_\_\_\_

If the answer to any of questions 4.6(a)-(c) is YES, please provide full details on attached sheets. Please feel free to include a written summary of your position on the matter.

#### 4.12 Denial of Qualification or Award

(a) Within the last 5 years, has any federal, state, or local government or procurement agency denied the Contractor (or any Predecessor Entities or Related Entities) qualification?

YES \_\_\_\_\_ NO \_\_\_\_\_

(b) Within the last 5 years, has any federal, state, or local government or procurement agency, after the Contractor (or any Predecessor Entities or Related Entities) submitted the apparent low bid, refused to award a contract for reasons related to the Contractor's qualifications, experience, competence, or financial situation?

YES \_\_\_\_\_ NO \_\_\_\_\_

If the answer to either of questions 4.7(a) or (b) is YES, please provide full details on attached sheets. Please feel free to include a written summary of your position on the matter.

4.13 <u>Debarments, Etc.</u>

(a) Within the last 5 years, has the Contractor (or any Predecessor Entities or Related Entities) been debarred for any reason by any federal, state, or local government or procurement agencies?

YES \_\_\_\_\_ NO \_\_\_\_\_

(b) Within the last 5 years, has the Contractor (or any Predecessor Entities or Related Entities) refrained from bidding for any reason, such as suspension or agreement not to bid, or as part of the settlement of a Dispute of any type with any federal, state, or local government or procurement agencies?

YES \_\_\_\_\_ NO \_\_\_\_\_

If the answer to either of questions 4.8(a) or (b) is YES, please provide full details on attached sheets. Please feel free to include a written summary of your position on the matter.

4.14 <u>Claims History</u> Within the last 5 years, has the Contractor (or any Predecessor Entities or Related Entities) been a party to a Claim with an originally claimed amount in excess of \$50,000?

#### YES \_\_\_\_ NO \_\_\_

If YES, please provide full details for each Claim on attached sheets including (a) whether the Claim was brought by or against the Contractor (or any Predecessor Entities or Related Entities), (b) the nature of the Dispute underlying the Claim, (c) originally claimed amounts, (d) the resolution of such Claims (including the amount) or if unresolved, the current status of such Claims, and (e) the name, address and phone number of the primary adverse party who is to be contacted for additional information, and (f) a written summary of your position on the matter (if desired).

4.15 <u>Bid or Other Crimes</u> Within the last 10 years, has the Contractor (or any Predecessor Entities or Related Entities), or any officers, owners, or Key Personnel of the same ever been indicted on, convicted of, or plead or consented to a violation of a bid crime including bid collusion or any other crime involving fraud or knowing misrepresentation?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, please provide full details on attached sheets. Please feel free to include a written summary of your position on the matter.

4.16 <u>Quality Control</u> Does the Contractor have a written organizational-level quality control plan (as opposed to project-level plans)?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, please answer the following two questions.

(a) What year was it first adopted?

(b) In what year was its substance last revised?

4.17 <u>Contractor Evaluation Report</u> Has the Contractor performed work with the District where a Contractor Evaluation Report was completed as part of the work?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, did the Contractor receive any UNSATISFACTORY ratings?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, include with the Bid Contractor's UNSATISFACTORY RATING MITIGATION PLAN.

#### 5. Key Personnel

5.1 Please provide the following information for all Key Personnel whose duties consist primarily of one or more the following functions: (a) project management, (b) quality control and (c) safety oversight. [Please feel free to provide this information on attached sheets in another format as long as it contains all the information requested.]

	Name	Job Duties (a-c above)	Relevant Licenses or Certifications	Experience (# of Yrs.)	Education (Degree or # Yrs.)
1				·	
2					
3					
4					
5					
6					

[Attach additional sheets as necessary.]

#### 6. Bonding

6.1 Is the Contractor capable of obtaining from a Qualifying Bonding Company a performance bond and a payment bond each in the amount of the bid prices that the Contractor will be submitting to the OWNER. A Qualifying Bonding Company is an insurance, bonding, and/or surety company rated in accordance with contract requirements.

YES \_\_\_\_\_ NO \_\_\_\_

If NO, please explain why you cannot meet the bonding standards set forth in question 6.1 above on attached sheets.

#### 7. Environmental

7.1 <u>Environmental Record.</u> Within the last 5 years, has the Contractor (or any Predecessor Entities or Related Entities) been found to be in violation of any federal, state or local environmental law or regulation in an administrative, civil or criminal proceeding in which the fact finder found that the Contractor committed the violation and/or failed to comply after having been notified of the violation?

YES \_\_\_\_\_ NO \_\_\_\_\_

If YES, please provide full details, including a summary of your position, on attached sheets.

#### 8. Financial

8.1 ATTACH TO THIS BID an abbreviated financial statement on the attached form, references, and other information, sufficiently comprehensive to permit an evaluation of CONTRACTOR'S current financial condition.
#### 9. Certifications Under Oath

By signing below, the person signing below hereby certifies and swears, **ON OATH**, as follows.

1. I have personal knowledge of all the information contained in this Questionnaire OR I am responsible for the accuracy of all such information.

2. The information contained in this Application is true and complete.

3. I hereby authorize the Loxahatchee River District to contact any person or entity necessary to verify or supplement any of the information requested by or provided in this Application without liability, and I hereby further authorize any person or entity contacted to provide any and all information requested without liability.

4. The Contractor has read, understands, and agrees to all terms of the Qualification Questionnaire.

5. I am duly authorized by law and by the Contractor to sign this Qualification on behalf of the Contractor.

CONTRACTOR

Date

Witness

[Signature]

By: \_\_\_\_\_ [Name and Title Printed]

State of \_\_\_\_\_

County of \_\_\_\_\_

Date: \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_ by \_\_\_\_\_, who is personally known to me or who has produced a valid \_\_\_\_\_ Driver's License as identification and who did take an oath.

[Signature of Notary Public]

Name Printed: \_\_\_\_\_ My Commission Expires: \_\_\_\_\_

#### SWORN STATEMENT UNDER SECTION 287.133(3)(a),

#### FLORIDA STATUTES, ON PUBLIC ENTITY CRIMES

## THIS FORM MUST BE SIGNED IN THE PRESENCE OF A NOTARY PUBLIC OR OTHER OFFICIAL AUTHORIZED TO ADMINISTER OATHS.

1. This sworn statement is submitted with Bid, Proposal or Contract No. \_\_\_\_\_\_ for IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS.

2.	This	sworn	statement	is	submitted	by		
	(name of entity	submitting sworn statemen	t)					
	whose bus	siness address is				and		
	(if applica	ble) its Federal En	ployer Identification	Number (FEI	N) is	<u> </u> .		
	(If the entity has no FEIN, include the Social Security Number of the individual sign sworn statement:							
3.	My name	is		ar	nd my relationship to	the entity		

3. My name is \_\_\_\_\_\_ and my relationship to the entity named <sup>(please print name of individual signing)</sup>

above is \_\_\_\_\_

- 4. I understand that a "public entity crime: as defined in Paragraph 287.133(1)(g), <u>Florida</u> <u>Statutes</u>, 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, any bid or contract for goods or services to be provided to any public entity or an agency or political subdivision of any other state or of the United states and involving antitrust, fraud, theft, bribery, collusion, racketeering, conspiracy, or material misrepresentation.
- 5. I understand that "convicted" or "conviction" as defined in Paragraph 287.133(1)(b), <u>Florida</u> <u>Statutes</u>, 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.
- 6. I understand that an "affiliate" as defined in Paragraph 287.133(1)(a), <u>Florida Statutes</u> 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 officers, directors, executives, partners, shareholders, employees, members, and agents who are active in the management of an 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 for fair market value under an arm's length agreement, shall be prima 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 thirty-six (36) months shall be considered an affiliate.

- 7. I understand that a "person" as defined in Paragraph 287.133(1)(e), <u>Florida Statutes</u> means any natural person or entity organized under the laws of any state or of the United states with the legal power to enter into 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 an entity.
- 8. Based on information and belief, the statement which I have marked below is true in relation to the entity submitting this sworn statement. [Indicate which statement applies.]

\_\_\_\_\_ Neither the entity submitting this sworn statement, nor any officers, directors, executives, partners, shareholders, employees, members, or agents who are active in management of the entity, nor any 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 of more of the officers, directors, executives, partners, shareholders, employees, members, 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.

\_\_\_\_\_ The entity submitting this sworn statement, or one or more of its officers, directors, executives, partners, shareholders, employees, members, or agents who are active in the 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 a subsequent proceeding before a Hearing Officer of the State of Florida, Division of Administrative Hearings 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].

\_\_\_\_\_ There has been a proceeding concerning the conviction before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer did not place the person or affiliate on the convicted vendor list. [Please attach a copy of the final order].

\_\_\_\_\_ The person or affiliate was placed on the convicted vendor list. There has been a subsequent proceeding before a hearing officer of the State of Florida, Division of Administrative Hearings. The final order entered by the hearing officer determined that it was in the public interest to remove the person or affiliate from the convicted vendor list. [Please attach a copy of the final order].

\_\_\_\_\_ The person or affiliate has not been placed on the convicted vendor list. [Please describe any action taken by or pending with the Department of General Services].

(Signature)

(Date)

STATE OF \_\_\_\_\_

COUNTY OF \_\_\_\_\_

The foregoing instrument was acknowledged before me this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_ by \_\_\_\_\_, who is personally known to me or who has produced a valid \_\_\_\_\_ Driver's License as identification and who did take an oath.

Notary Public

Printed/Typed Name

My Commission Expires:

## Condensed current financial statement for (Name of Contractor)

## IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

Condition at close of business	, 20
AS	SETS
1. Cash: (a) On Hand \$ Elsewhere \$	, (b) In bank \$, (c)
2. Notes receivable (a) Due with \$	thin 90 days
(b) Due after 90 da	ays
\$(c) Past Due \$	
3. Accounts receivable from completed s	contracts, exclusive of claims not approved for payment
4. Sums earned on uncompleted contract	ts as shown by Engineer's or Architect's estimate
(a) Amount receiv	able after deducting retainage
(b) Retainage to da \$	ate, due upon completion of contracts
<ol> <li>Accounts receivable from sources othe</li> </ol>	er than construction contracts
<ol> <li>Deposits for bids or other guarantees</li> </ol>	
(a) Recoverable w	ithin 90 days
(b) Recoverable af	iter 90 days

- 7. Interest accrued on loans, securities, etc.
- 8. Real Estate (a) Used for business purposes \$

(b)Not used for business purposes

\$\_\_\_\_\_

\$

10. Materials in stock not included in Item 4:

(a) For uncompleted contracts (present value)

- \$\_\_\_\_\_(b) Other materials (present value)
  \$\_\_\_\_\_
- 11. Equipment, book value \$\_\_\_\_\_
- 12. Furniture and fixtures, book value \$\_\_\_\_\_

<u>\$\_\_\_\_</u>

13. Other assets \_\_\_\_\_\_

TOTAL ASSETS

#### LIABILITIES

1. Notes payable (a) To banks regular

\$\_\_\_\_\_

\$\_\_\_\_\_

(b) To banks for certified checks \$\_\_\_\_\_

(c) To others for equipment obligations

(d) To others exclusive of equipment obligation

\$\_\_\_\_\_

2. Accounts Payable \* (a) Not past due

\_\_\_\_

\$\_\_\_\_\_(b) Past due

\$

3.	Real Estate encumbrances \$	
4.	Other liabilities \$	
5.	Reserves \$	
6.	Capital stock paid up: (a) Common \$	
	(b) Common	
	¢(c) Preferred	
	(d) Preferred	
7.	Surplus (net worth) Earned	\$ Unearned \$
	\$	TOTAL LIABILITIES
	Ψ	
	CO	NTINGENT LIABILITIES
1.	Liability on notes receivable, disc \$	ounted or sold
2.	Liability on accounts receivable, p	bledged, assigned or sold
3.	Liability as bondsman \$	
4.	Liability as guarantor on contracts	s or on accounts of others.
5.	Other contingent liabilities \$	
	\$	TOTAL CONTINGENT LIABILITIES

\*Include all amounts owing subcontractors for all work in place and accepted on completed and uncompleted contracts, including retainage

Certified and Signed By:

Certified Public Accountant

## AUTHORITY TO EXECUTE BID AND CONTRACT

If the Bidder is a Corporation, attach to this page a certified copy of corporate resolutions of the Board of Directors of the Corporation authorizing an officer of the Corporation to execute the Contract contained within this document on behalf of the Corporation.

(End of Article.)

#### **BID SECURITY**

#### **ARTICLE 3**

1. The undersigned Bidder does hereby declare and stipulate that this proposal is made in good faith, without collusion or connection with any other person or persons bidding for the same Work, and that it is made pursuant to and subject to all the terms and conditions of the Notice to Contractors, Instructions to Bidders, the Contract Documents, the Technical Specifications, and the Plans and Specifications pertaining to the Work, all of which have been examined by the undersigned.

Accompanying this proposal is a certified check or standard bid bond in the sum of \$\_\_\_\_\_\_.00, in accordance with the Notice to Contractors and Instruction to Bidders. Such amount shall be equal to ten percent (10%) of the Bid amount.

3. The undersigned Bidder agrees to execute the Contract, and the Public Construction Bond for the total amount of the Bid within fourteen (14) calendar days from the date when written Notice of Award of the Contract is delivered at the address given on this proposal. The name and address of the corporate surety with which the Bidder proposes to furnish the specified Public Construction Bond is as follows:

Bond Company's most recent "Best's Key Rating":

4. The undersigned Bidder agrees to begin the Work with an adequate work force and equipment within ten (10) calendar days from the date of receipt of official Notice to Proceed, and to complete all of the Work within the number of calendar days specified in the Special Conditions from the date of official Notice to Proceed.

5. The Bid Security will be returned to all, except the three (3) lowest qualified responsive, responsible Bidders, within seven (7) business days after the opening of the Bids and the remaining securities will be returned to the three (3) lowest Bidders within forty-eight (48) hours, after the District and Contractor have executed the Contract, or, if no Contract has been so executed, within one hundred twenty (120) calendar days after the date of the opening of Bids upon demand of the Bidder at any time thereafter so long as it had not been notified of the acceptance of the Bid.

7. All the phases of Work enumerated in the Contract Documents Technical Specifications with their individual jobs and overhead, whether specifically mentioned, included by implication or appurtenant thereto, are to be performed by Contractor under the applicable Bid item irrespective of whether it is named in said list.

7.	This Bid is also based	on addenda:	No No No No	Date Date Date Date	
		Contractor:			
		By:			
		Address:			
(SEA)	L)	Contractor's Lice	ense No.		
		Attest:			
		Title:			

#### CONTRACT

#### **ARTICLE 4**

THIS CONTRACT, is made and entered into this	day of	, Two Thousand
and (20), by and between		(the "Contractor"), and
the LOXAHATCHEE RIVER ENVIRONMENTAL CONTR	OL DISTRICT,	(the "District.")

WITNESSETH: That whereas the District has awarded to Contractor the Work of performing certain construction:

<u>SECTION 1</u>. Scope of Work: Contractor shall furnish, install and deliver all of the labor, including engineering design, materials (except District-furnished materials), tools, equipment, services, and everything necessary to perform the Work; and shall construct in accordance with the Contract Documents and the terms of this Contract, the Project known and identified as IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS and shall do everything required by or reasonably inferable from the Contract Documents. The Work is generally described as follows:

The total work for the Irrigation Quality 511 (IQ-511) Pump Station Piping Improvements consists of furnishing all labor, materials, equipment and all incidentals and appurtenances for the installation of approximately 75 LF of 36-inch DIP reclaimed water main, bypass influent bay structure, connection to the existing wet well at the IQ-511 pump station and improvements at Diversion Structure "B" including replacement of a sluice gate, pedestal, stem cover, lighting and the addition of an electric actuator with associated power and controls. The affected roadway shall be milled and overlaid. Construction also includes dewatering, testing and all restoration work for a complete and operating system. The work will be on private property owned by the District.

Applicable reference drawings are entitled IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS as prepared by the District.

<u>SECTION 2</u>. Time of Completion: Construction of the Work must begin within ten (10) calendar days from the date of receipt of official Notice to Proceed. Substantial Completion shall be achieved within one-hundred twenty (120) days consecutive calendar days from the date of Notice to Proceed. For projects with a value of less than ten million dollars (\$10,000,000.00), Final Completion shall be achieved within sixty-five (65) consecutive calendar days from the date of actual Substantial Completion. For projects with a value of more than ten million dollars (\$10,000,000.00), Final Completion shall be achieved within ninety-five (95) consecutive calendar days from the date of actual Substantial Completion. The rate of progress and the time of completion are essential conditions of this Contract.

**Deduction for Not Completing on Time:** The District and Contractor recognize that because the Work is of a critical nature, time is of the essence. Therefore, the District will suffer direct financial loss and damage if the Work is not completed within the times specified above. The District and Contractor also recognize that it is difficult to ascertain the extent of those damages in advance and it will be difficult and expensive to determine those damages in a legal proceeding. Accordingly, Contractor shall pay to the District as liquidated damages, and not as a penalty, the amounts set out in (a) and (b) ("Liquidated Damages") below for each and every calendar day the above deadlines are delayed, as said date may be adjusted as provided in the Special Conditions. Delay shall not include delays caused by factors beyond Contractor's reasonable control, including but not limited to delays because of strikes, lockouts, work slowdowns or stoppages, accidents, acts of God, failure of any governmental or other regulatory authority to act in a timely manner, failure of the District to furnish timely

information or to obtain the cooperation of the District's design professionals and/or Engineer, or delays caused by faulty performance by the District or by Engineer.

- a. **Substantial Completion Delay**. Contractor shall pay to the District as Liquidated Damages, and not as a penalty, **<u>\$500.00</u>** per day for each and every calendar day Substantial Completion is delayed.
- b. **Final Completion Delay**. If Final Completion is not reached within **sixty-five (65) days** of actual Substantial Completion, Contractor shall pay to the District as Liquidated Damages, and not as a penalty, <u>\$150.00</u> per day for each and every calendar day Final Completion is delayed.

In addition Contractor shall be responsible for the costs for engineering and other professional fees, delay damage settlements or awards owed by the District to others, fines or penalties imposed by regulatory agencies, and professional fees, including attorneys' fees, incurred in connection with such settlements, awards, penalties or fines (collectively "Additional Delay Damages"). Engineering and inspection fees shall include direct labor costs, indirect costs, and overhead and profit as specified in Section 01010 of the Technical Specifications of the Contract Documents. The District and Contractor agree that the amounts set out in (2)(a) and (2)(b), above are to be paid by Contractor as Liquidated Damages and represent a reasonable estimate of the District's anticipated expenses for delays, inspection, and administrative costs associated with such delays. However, such amounts do not represent additional District costs for Additional Delay Damages. Therefore, in addition to these Liquidated Damages amounts, there shall be other amounts for Additional Delay Damages incurred by the District caused by avoidable delays by Contractor.

Where Liquidated Damages and Additional Delay Damages in connection with the Work of this Contract are duly and properly imposed against Contractor in accordance with the terms of this Contract, Federal law, State law, and/or governing ordinances or regulations, the total amount that Contractor owes to the District may be withheld and reduced from any monies due or to become due Contractor under the Contract, and when deducted, shall be deemed and taken as payment for such Liquidated Damages and Additional Delay Damages. If monies due from the District are not sufficient to cover such Liquidated Damages, Contractor agrees to immediately pay to the District any balance due.

**SECTION 3.** General: Contractor hereby certifies that it has read each and every clause of the Contract Documents and that it has made such examination of the location of the proposed Work as is necessary to understand fully the nature of the obligation herein made; and will complete the same in the time limits specified herein, in accordance with the Contract Documents. Contractor shall work with and report to Engineer to complete the Work set forth in the Contract Documents. Contractor has given Engineer written notice of all conflicts, errors, and discrepancies in the Contract Documents and the written resolution thereof by Engineer is acceptable to Contractor.

All Work under this Contract shall be done to the satisfaction of Engineer, who shall, in all cases, determine the amount, quality, fitness, and acceptability of the Work and materials, which may arise, as to the fulfillment of the Contract on the part of Contractor, Engineer's decision thereon shall be final and conclusive, and such determination shall be a condition precedent to the right of Contractor to receive any payment hereunder.

At any time during the performance of the Contract, Contractor shall allow and provide the District access to all of the documents, papers, letters or other materials made or received by Contractor in conjunction with the Contract and Work. Should Contractor fail to provide access to these documents in response to the District's request, the District may unilaterally cancel the Contract. At the conclusion of the Contract, Contractor shall provide the District all public records related to the Project or the Work.

Any clause or section of this Contract or the Contract Documents which may, for any reason, be declared invalid, may be eliminated therefrom; and the intent of this Contract or the Contract Documents and the remaining portion thereof will remain in full force and effect as completely as though such invalid clause or section has not been incorporated herein.

No assignment by a party hereto of any rights, responsibilities, or interests in the Contract Documents will be binding on another party hereto without the written consent of both parties. Unless specifically stated to the contrary in a written consent to an assignment, no assignment will release or discharge the assignor from any duty or responsibility under the Contract Documents. Notwithstanding the foregoing, the District may assign this Contract to the State of Florida or any political subdivision, municipality, special district or authority thereof without Contractor's consent and without recourse.

The District and Contractor each binds itself, its partners, successors, assigns and legal representatives to the other party hereto, its partners, successors, assigns and legal representatives in respect to all covenants, agreements, and obligations contained in the Contract Documents.

<u>SECTION 4.</u> Contract Sum: The District shall pay Contractor as just compensation for the performance of this Contract, subject to any additions or deductions as provided in the Contract Documents, based on unit prices, the amounts set forth in the Pricing Schedule attached hereto ("Contract Sum"). The District and Contractor agree that all payments will be processed in accordance with the Local Government Prompt Payment Act, Sections 218.70-218.80, Florida Statutes.

<u>SECTION 5.</u> Progress Payments: On or before the tenth (10th) day of every month, except as provided for in the Special Conditions, Contractor shall prepare and submit on a form approved by Engineer a detailed estimate and invoice to Engineer setting forth the schedule of values of the total amount of the Work which has been completed from the start of the job up to and including the last day of the preceding month and the value thereof, less any percentage retained in accordance with the Special Conditions, and the aggregate of any previous payment ("Progress Payment Application"). Contractor shall provide such supporting evidence as may be required by the District and/or Engineer.

As a strict condition precedent to payment, each Progress Payment Application must be accompanied by: a Contractor's Progress Payment Affidavit submitted by Contractor to Engineer indicating that all lienors under Contractor's direct contract have been paid in full; and a waiver and release of lien upon progress payment ("Partial Release of Lien") from all persons with a potential lien interest in the Project, including but not limited to subcontractors, sub-subcontractors, suppliers, and materialmen.

Upon receipt of the Progress Payment Application, Engineer shall either provide the District with its written approval of the Progress Payment Application, or notify the District in writing that it rejects the Progress Payment Application, the reason(s) for such rejection, and its recommendation as to the amount Contractor is owed, if any, within ten (10) days of receipt of the Progress Payment Application.

The District shall review Engineer's recommendation as set forth above. If the District agrees that the Progress Payment Application is complete and accurately reflects the amount Contractor is owed, the District shall pay Contractor the amount set forth on the Progress Payment Application within twenty-five (25) days of Engineer's receipt of the Progress Payment Application.

In the event the District finds the Progress Payment Application is incomplete or does not accurately reflect the amount Contractor is owed, the District shall reject the Progress Payment Application in writing within twenty (20) days of Engineer's receipt of the Progress Payment Application. The rejection shall state with specificity the reason for the rejection and any action necessary to make the Progress Payment Application acceptable to the

District. If Contractor submits a corrected Progress Payment Application within ten (10) days of the rejection, acceptable to the District, the District shall pay the corrected Progress Payment Application within ten (10) business days after the corrected Progress Payment Application is received.

In the event the District disputes the corrected Progress Payment Application, the District shall notify Contractor in writing of such dispute and pay to Contractor the amount not in dispute, if any, within twenty-five (25) days of the District's receipt of the corrected Progress Payment Application. In exchange for such payment, Contractor shall submit to Engineer a Progress Payment Affidavit indicating that all lienors under Contractors direct contract have been paid in full for the Work related to the non-disputed amount.

Contractor and the District agree that prior to instituting any litigation for damages under this Section 5, the parties shall conduct a non-binding mediation to attempt to resolve their dispute. In the event the parties cannot agree upon a mediator, each party shall select a mediator and such mediators shall select a third mediator who shall serve as the mediator for the dispute. In the event such mediation does not occur within thirty (30) days of a written request of either party, the parties shall be free to pursue litigation without first conducting mediation.

Contractor shall promptly pay each subcontractor and supplier within ten (10) days of receipt of payment from the District. The amount shall be determined in accordance with the terms of the applicable subcontracts and purchase orders. The District shall not have responsibility for payments to a subcontractor.

Contractor warrants that title to all Work covered by the Progress Payment Application will pass to the District no later than the time payment. Contractor further warrants that upon submittal of a progress payment application, all Work previously paid for by the District shall, to the best of Contractor's knowledge, information and belief, be free and clear of liens, claims, security interests or other encumbrances adverse to the District's interests.

A progress payment by the District shall not constitute acceptance of Work not in accordance with the requirements of the Contract Documents.

<u>SECTION 6</u>. Acceptance and Final Payment: When the Work has been fully completed, including all punch list items as provided for in the Special Conditions, in accordance with the terms of the Contract Documents, a Final Payment Application shall be prepared by Contractor and provided to Engineer within thirty (30) calendar days after the date of Final Completion stating the final Work performed to complete the Project plus or minus any Change Orders, and less the aggregate of any previous payment.

As a strict condition precedent to final payment, Contractor shall submit to Engineer with the Final Payment Application:

- 1. a Final Payment Affidavit stating that all subcontractors, suppliers, and other materialmen have been paid;
- 2. Waiver and Release of Lien upon Final Payment ("Final Release of Lien") from Contractor and all persons or entities that have, or potentially have, a lien on the Project, including but not limited to all subcontractors and vendors;
- 3. all close-out documents including, but not limited to the Maintenance Bond, warranties, guarantees, owner's manuals, and start-up certificates by the designer or manufacturer demonstrating that the equipment meets design intent;
- 4. data establishing payment or satisfaction of obligations, such as receipts, claims, security interests or encumbrances arising out of the Contract.

Upon receipt of the Final Payment Application, Engineer will inspect the Work, the Final Payment Application, and supporting documentation. If Engineer finds the Work acceptable, Engineer will issue a certificate of acceptance stating that the quality Work has been fully completed to Engineer's satisfaction in substantial compliance with the Contract Documents. The Certificate of Final Completion shall constitute Engineer's determination as to the quality of the Work only; it shall not include an opinion as to the timeliness of completion of the Work. If the Engineer finds the Contract fully and timely performed, and the Final Payment Application accurately reflects the final amount Contractor is owed, the Engineer shall issue its written approval to the District of the Final Payment Application within ten (10) calendar days of receipt the Final Payment Application.

If Engineer disputes the Final Payment Application, finds the Work unsatisfactory, or determines that amounts should be deducted as Liquidated Damages and Additional Delay Damages, Engineer shall notify the District in writing of its findings, the support for such findings, and its recommendation as to the amount Contractor is owed, if any, within ten (10) calendar days of receipt of the Final Payment Application.

The District shall review Engineer's recommendation as set forth above. If the District finds that the Work is acceptable, the Contract has been fully and timely performed, and the Final Payment Application is complete and accurately reflects the amount Contractor is owed, the District shall pay Contractor the amount of the Final Payment Application within twenty-five (25) calendar days of Engineer's receipt of the Final Payment Application.

In the event the District finds the Work is not acceptable, the Contract has not been fully and timely performed, or the Final Payment Application is incomplete or does not accurately reflect the amount Contractor is owed, the District shall reject the Final Payment Application in writing within twenty (20) calendar days of Engineer's receipt of the Final Payment Application. The rejection shall state with specificity the reason for the rejection and any action necessary to make the Final Payment Application acceptable to the District. If Contractor submits a corrected Final Payment Application acceptable to the District shall pay the corrected Final Payment Application within ten (10) calendar days after the corrected Final Payment Application is received.

In the event the District disputes the corrected Final Payment Application, the District shall notify Contractor in writing of such dispute and pay to Contractor the amount not in dispute, if any, within twenty-five (25) calendar days of the District's receipt of the corrected Final Payment Application. This payment shall constitute a progress payment and shall not be deemed final payment. In exchange for such payment, Contractor shall submit to Engineer a Progress Payment Affidavit indicating that all lienors under Contractor's direct contract have been paid in full for the Work related to the non-disputed amount.

The District and Contractor agree that prior to instituting any litigation for damages under this Section, the parties shall conduct a non-binding mediation to attempt to resolve their dispute. In the event the parties cannot agree upon a mediator, each party shall select a mediator and such mediators shall select a third mediator who shall serve as the mediator for the dispute. Such mediation shall occur within forty-five (45) calendar days of the District's rejection of the corrected Final Payment Application. In the event such mediation does not occur within thirty (30) calendar days of a written request of either party, the parties shall be free to pursue litigation without first conducting mediation.

Acceptance of final payment by Contractor, a subcontractor, or material supplier shall constitute a waiver of claims by the payee.

In the event that a lien is filed or claimed against the Work by any subcontractor, supplier, or laborer, Contractor agrees to immediately (i) pay such subcontractor, supplier, or laborer for work which Contractor has been paid by the District and deliver to the District a Final Release of Lien signed by such subcontractor, supplier, or laborer; or (ii) cause the immediate removal of such lien by providing a bond in accordance with Florida law. If Contractor

fails to do the above, the District may, at is option, and at the sole expense and liability of Contractor, bond such lien or cause the lien to be discharged and deduct the cost of said bond from the amount owed Contractor under any pending invoice or the next invoice. This Section shall survive the termination or expiration of this Contract.

**SECTION 7.** WARRANTY: Contractor warrants to the District and Engineer that (1) materials and equipment furnished under the Contract will be new and of good quality unless otherwise required or permitted by the Contract Documents; (2) the Work will be free from defects not inherent in the quality required or permitted; and (3) the Work will conform to the requirements of the Contract Documents.

**SECTION 8.** CORRECTION OF THE WORK: In addition to the warranties provided for in Article 4 – Contract Section 7, Contractor shall promptly correct Work rejected by Engineer and/or District as failing to conform to the requirements of the Contract Documents. Contractor shall bear the cost of correcting such rejected Work, including the costs of uncovering, replacement, and additional testing.

In addition to Contractor's other obligations including warranties under the Contract, Contractor shall, for a period of one (1) year after Substantial Completion, correct Work not conforming to the requirements of the Contract Documents.

If Contractor fails to correct nonconforming Work within a reasonable time, the District may correct it in accordance with the Contract Documents.

This period of one (1) year shall be extended with respect to portions of Work first performed after Substantial Completion by the period of time between Substantial Completion and the actual performance of the Work. This Section 8 shall survive acceptance of the Work under the Contract Documents and termination of the Contract Documents.

(Remainder of this page left blank intentionally)

IN WITNESS WHEREOF, the parties hereto have executed this Contract this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_\_. All portions of the Contract Documents have been signed or identified by the District and Contractor or by Engineer on their behalf.

ATTEST:	OWNER: LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT
Witness	
Witness	Stephen B. Rockoff Chairman Address for notice: 2500 Jupiter Park Dr. Jupiter, Florida 33458
	CONTRACTOR:
Witness	
Witness	As its:
	Address for notice:
	(Affix Corporate Seal)

#### STATE OF FLORIDA COUNTY OF PALM BEACH

I HEREBY CERTIFY that on this day, before me, personally appeared \_\_\_\_\_\_, as \_\_\_\_\_, to me well known and known to be the person described in or who produced as identification a \_\_\_\_\_\_\_(Form of ID) and who executed and acknowledged to and before on behalf of the District, the foregoing Contract, and that he acknowledged in the presence of two subscribing witnesses freely and voluntarily for the purposes therein expressed.

WITNESS my hand and official seal in the County and State last aforesaid this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_\_.

Notary Public, State of Florida Print Name: Commission No.: My Commission Expires:

(Notary Ink Stamp)

#### STATE OF FLORIDA COUNTY OF \_\_\_\_\_

Ι HEREBY CERTIFY day. before personally that this me. appeared on as (Title) of the (Name of Company), to me well known and known to be the person described in or who produced as identification a (Form who executed and and before on of ID) and acknowledged to behalf of (Company Name), Contractor, the foregoing Contract, and that he acknowledged in the presence of two subscribing witnesses freely and voluntarily for the purposes therein expressed.

WITNESS my hand and official seal in \_\_\_\_\_ County and State last aforesaid this \_\_\_\_\_ day of \_\_\_\_\_, 20 \_\_.

Notary Public, State of Florida Print Name: Commission No.: My Commission Expires:

(Notary Ink Stamp)

## PRICING SCHEDULE — BASE CONTRACT LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS UNIT PRICES

	GENERAL CONDITIONS			
1	Mobilization, Insurance and Bonds*	LS	1	\$ \$
2	As-Built Record Drawings	LS	1	\$ \$
3	Professional Audio/Video of Construction Site	LS	1	\$ \$
4	NPDES Permit/Erosion Protection Measures	LS	1	\$ \$
	CIVIL			
5	Excavation (Bypass Influent Bay excavation and backfill)	LS	1	\$ \$
6	36" DIP Reclaimed Water Main Pipe, Epoxy-Lined	LF	75	\$ \$
7	Connection to Existing Reclaimed Water Main (36" Tee)	EA	1	\$ \$
8	DIP Compact Fittings (epoxy-lined)	TON	1.0	\$ \$
9	Asphalt Driveway Restoration	SF	250	\$ \$
10	Furnish & Install Bahia Sod	SY	75	\$ \$
11	Dewatering	LS	1	\$ \$
	MECHANICAL			
12	36" Plug Valve, MJ w/ Valve Box	EA	1	\$ \$
13	36" Aluminum Sluice Gate and Stem Cover	EA	1	\$ \$
14	Sluice Gate Electric Actuator and Pedestal	EA	1	\$ \$
15	4'x3' Aluminum Access Hatch	EA	1	\$ \$
	STRUCTURAL			
16	Bypass Influent Bay	LS	1	\$ \$
17	Sawcut Existing Wet Well	LS	1	\$ \$

	ELECTRICAL			
18	Electrical Service to Sluice Gate	LS	1	\$ \$
19	Electrical Controls and Instrumentation	LS	1	\$ \$
20	Lighting Including Concrete Poles and Fixtures	LS	1	\$ \$
	TOTAL BID ITEMS 1-20			\$

\* Payment for mobilization shall not exceed eight percent (8%) of the contract price.

#### TOTAL BASE BID ITEMS 1-20 (in words)

Dollars

THE CONTRACT AWARD SHALL BE EVALUATED BASED ON THE TOTAL BID PRICE FOR ITEMS 1 THROUGH 20 AND ANY SELECTED ALTERNATE AS SUBMITTED BY THE LOWEST, QUALIFIED, **RESPONSIBLE, RESPONSIVE BIDDER.** 

(Name of Bidder)

Bidders Name:

Print Name of Person signing:

Title: \_\_\_\_\_

Business Address:

Incorporated or formed under the laws of the State of \_\_\_\_\_.

#### PUBLIC CONSTRUCTION BOND

#### **ARTICLE 5**

Bond No. \_\_\_\_\_

WHEREAS, Principal has entered into a contract (the "Contract") with LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT dated \_\_\_\_\_\_, 2020, in the amount of \$\_\_\_\_\_\_\_) for the IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS, which Contract, is by reference made a part hereof.

THE CONDITION of this Bond is that if Principal:

1. Performs the Contract with the District at the times and in the manner prescribed in the Contract; and

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

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

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

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

6. To a claimant who is not in privity with the Principal and who has not received payment for labor, materials, or supplies, that written notice must be delivered to the Principal. This Bond is furnished pursuant to the statutory requirements for bonds on public works projects, Section 255.05, Florida Statutes. A claimant, except a laborer, who is not in privity with the Principal and who has not received payment for labor, materials, or supplies, is hereby notified that Section 255.05(2), Florida Statutes specifically requires that written notice be given to Principal within forty-five (45) days after beginning to furnish labor, materials, or supplies for the prosecution of the Work that

claimant intends to look to the Bond for protection. Further notice is hereby given to a claimant who is not in privity with the Principal and who has not received payment for labor, materials, or supplies, that written notice must be delivered to the Principal and to the Surety, of the performance of the labor or delivery of the materials or supplies and of the non-payment, within ninety (90) days after performance of the labor or after complete delivery of the materials or supplies (but not before 45 days after the first furnishing of labor, services, or materials), or with respect to rental equipment, within ninety (90) days after the date that rental equipment was last on the job site available for use. No action for the labor, material, or supplies may be instituted against Principal of the Surety unless both notices have been given. Further notice is hereby given that no action for labor, materials, or supplies may be instituted against the Principal or the Surety on the Bond after one (1) year from the performance of the labor or completion of delivery of the materials or supplies.

7. Without modifying the foregoing, this Bond shall require no more and no less of the Principal and Surety than is specified in Section 255.05, Florida Statutes. The notice and time limitation provisions of Section 255.05, Florida Statutes are incorporated herein by reference.

Surety and Contractor, intending to be legally bound hereby, subject to the terms printed above, do cause this Performance Bond to be duly executed on its behalf by its authorized officer, agent or representative.

The provisions and limitations of Section 255.05, Florida Statutes including but not limited to the notice and time limitations in Sections 255.05(2) and 255.05(10), Florida Statutes are incorporated in this bond by reference.

(Remainder of Page Intentionally Left Blank)

By: Signature of Principal	By: As Attorney-in-Fact (Attach Power of Attorney)		
STATE OF FLORIDA COUNTY OF			
Sworn to and acknowledged before	me this day of, 202, by to me who produced as identification a		
	Notary Public, State of Florida		
	Print Name:		
(Notary Ink Seal)	Commission Expires:		
	My Commission Expires:		
COUNTERSIGNATURE			
BY:			

\_\_\_\_\_, 202\_

|--|

Name of Principal

Name of Surety

#### **ARTICLE 6**

## FORMS FOR USE DURING CONSTRUCTION

- 6-1 Notice of Award of Contract
- 6-2 Notice to Proceed
- 6-3 Progress Payment Affidavit
- 6-4 Final Payment Affidavit
- 6-5 Certificate of Substantial Completion
- 6-6 Certificate of Final Completion
- 6-7 Partial Release of Lien
- 6-8 Final Release of Lien
- 6-9 Change Order

**6-10** Application and Certificate of Payment – Contractor shall utilize American Institute of Architect Form G702 and G703

#### 6-1

# **Loxahatchee River District**



Water Reclamation | Environmental Education | River Restoration 2500 Jupiter Park Drive, Jupiter, Florida 33458-8964 Telephone (561) 747-5700 •Fax (561) 747-9929 • www.loxahatcheeriver.org D. Albrey Arrington, Ph.D., Executive Director

[Date]

[Contractor Name] [Contractor Address]

#### SUBJECT: Loxahatchee River Environmental Control District IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS Notice of Award of Contract

Dear \_\_\_\_\_:

I am pleased to advise you that the District Governing Board has elected to Award the Contract for the subject project to your firm. You are the apparent successful Bidder and have been awarded a contract for:

IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

The Contract Price of your Contract is <u>\$</u>\_\_\_\_\_

In accordance with the contract specifications you will have 14 calendar days from the date of this Notice of Award, that is by (Day), (Date), to provide the following:

- a.) 4 executed sets of the attached Contract Documents, and
- b.) A Public Construction Bond with power of attorney in the amount of 100% of the contract (\$\_\_\_\_\_) and
- c.) An insurance certificate for this project in accordance with requirements set forth in Section 9.08, (please make sure coverages and additional insureds are as stated); and
- d.) A schedule of activities (received), and
- e.) Any other paperwork as required by the Contract.

Failure to comply with these conditions within the time specified will entitle District to consider your Bid abandoned, to annul this Notice of Award and to declare your Bid Security forfeited.

Within 20 calendar days after you comply with the above conditions, the District will return 1 fully executed contract after execution.

Your attendance will be requested at an Open House meeting to be held with property owners in the affected area prior to construction. This will provide an opportunity to coordinate activities and provide a schedule of activities and how services will be maintained during construction.

Should you have any questions in regard to this correspondence, please feel free to contact me or [ENGINEER]

Regards,

Kris Dean, P.E. Deputy Executive Director/Director of Engineering Services

Enclosures: 4 sets of Contract Documents

#### 6-2

# **Loxahatchee River District**



Water Reclamation | Environmental Education | River Restoration 2500 Jupiter Park Drive, Jupiter, Florida 33458-8964 Telephone (561) 747-5700 •Fax (561) 747-9929 • www.loxahatcheeriver.org

D. Albrey Arrington, Ph.D., Executive Director

[Date]

[Contractor Name] [Contractor Address]

SUBJECT: IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS Notice to Proceed

Dear \_\_\_\_\_:

You have already received one (1) copy of the fully executed contract for the subject project. With the execution of this document completed by both parties and a Planning Meeting held [DATE], you are hereby provided with **NOTICE TO PROCEED as of [Day]**, [Date].

In accordance with the contract documents, you will have\_\_\_\_\_ consecutive calendar days from \_\_\_\_\_\_ to Substantial Completion, and \_\_\_\_\_\_ calendar days from actual Substantial Completion to Final Contract Completion, therefore:

Substantial Completion Date is:	
<b>Contract Completion Date is:</b>	

We look forward to working with you toward the successful completion of another project.

Should you have any questions in regard to this matter please feel free to contact me or [ENGINEER].

Kris Dean, P.E. Deputy Executive Director/Director of Engineering Services

[ENGINEER]

## **PROGRESS PAYMENT AFFIDAVIT**

STATE OF FLORIDA	
COUNTY OF	

BEFORE ME, the undersigned authority, personally appeared who, after being by me first duly sworn, deposes and says of his personal knowledge that:

1. He/She is the \_\_\_\_\_\_ of \_\_\_\_\_, does business in the State of Florida, hereinafter referred to as "Contractor". which

2. Pursuant to a contract with Loxahatchee River District, Contractor has furnished and will furnish services for the purpose of improving real property, more particularly described as:

**IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS** 

3. This affidavit is executed in accordance with Section 713.06(3)(c), Florida Statutes, for the purpose of obtaining a progress payment in the amount of \_\_\_\_\_\_ Dollars (\$ \_\_\_\_\_\_ ).

4. All lienors under Contractor's direct Contract have been paid in full, except for the following listed lienors:

NAME OF LIENOR (Use blank sheet if necessary)

AMOUNT DUE OR TO BECOME DUE FOR LABOR. SERVICES OR MATERIAL

SIGNED, SEALED, AND DELIVERED this \_\_\_\_ day of \_\_\_\_\_, 20\_\_\_\_.

\_\_\_\_\_

By \_\_\_\_\_ Contractor

SUBSCRIBED AND SWORN TO before me this \_\_\_\_\_ day \_\_\_\_\_ of 20\_\_\_\_, by \_\_\_\_\_, personally known to me or who produced as identification a

	NOTARY PUBLIC, State of
	Print Name:
	Commission No.:
(Notary Ink Stamp)	My Commission Expires:
* THIS FORM SHALL BE SUBMITTE	ED WITH EACH PAYMENT REQUEST.

#### FINAL PAYMENT AFFIDAVIT

STATE OF FLORIDA COUNTY OF \_\_\_\_\_ BEFORE ME, the undersigned authority, personally appeared \_\_\_\_\_ who, after being by me first duly sworn, deposes and says of his personal knowledge that: 1. He/She is the \_\_\_\_\_\_ of \_\_\_\_\_, does business in the State of Florida, hereinafter referred to as "Contractor". which 2. Pursuant to a contract with Loxahatchee River District, Contractor has furnished and will furnish services for the purpose of improving real property, more particularly described as: **IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS** 3. This affidavit is executed in accordance with Section 713.06(3)(c), Florida Statutes, for the purpose of obtaining final payment in the amount of \_\_\_\_\_\_ Dollars (\$ \_\_\_\_\_\_ ). 4. All lienors under Contractor's direct Contract have been paid in full, except for the following listed lienors: NAME OF LIENOR AMOUNT DUE OR TO BECOME DUE FOR (Use blank sheet if necessary) LABOR, SERVICES OR MATERIAL SIGNED, SEALED, AND DELIVERED this \_\_\_\_\_day of \_\_\_\_\_\_, 20\_\_\_\_\_. By \_\_\_\_\_ Contractor SUBSCRIBED AND SWORN TO before me this \_\_\_\_\_ day \_\_\_\_\_ of 20\_\_\_\_, by \_\_\_\_\_, personally known to me or who produced as identification a NOTARY PUBLIC, State of \_\_\_\_\_ Print Name: \_\_\_\_\_ Commission No.:\_\_\_\_\_ My Commission Expires: (Notary Ink Stamp)

FORMS FOR USE DURING CONSTRUCTION – Article 6

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## **Certificate of Substantial Completion**

[Date] [NAME] [ADDRESS]

#### Loxahatchee River Environmental Control District IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS Substantial Completion

Dear [Name]:

On \_\_\_\_\_\_\_ the District, [PARTY NAMES] conducted a Substantial Completion Inspection for the above referenced project. The Substantial Completion inspection resulted in the attached [#] page Punchlist, containing [#] items for completion or correction. Please note per Spec Section 01700, all punch list items are to be corrected prior to Final Payment and before Final Completion is granted.

Based on the above referenced inspection, [name] has <u>deemed the project Substantially Complete</u> as of [date].

Once all of the attached punch list items have been completed or corrected, please contact our office in writing so that we can schedule a time for final inspection.

If you have any questions regarding these items, please call me at \_\_\_\_\_\_.

Sincerely,

[Name] [Title]

Enclosure: Substantial Completion Punchlist

cc: Kris Dean, LRECD Lenny Giacovelli, LRECD

### **Certificate of Final Completion**

## [DATE] [NAME] [ADDRESS]

## Loxahatchee River Environmental Control District IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS <u>Final Completion</u>

Dear [Name]:

On \_\_\_\_\_\_ the Loxahatchee River Environmental Control District, Palm Beach County, \_\_\_\_\_\_, and \_\_\_\_\_\_ conducted a Final Completion Inspection for the above referenced project. Per our inspection, the below listed items were determined to be incomplete:

We have now verified that all of the Punch List Items have been completed. Please accept this letter for your records, that as of \_\_\_\_\_\_has deemed the above referenced project to be fully complete and in compliance with the Contract Documents.

We are currently preparing the Final Balancing Change Order to complete the processing of your Final Payment Application.

If you have any questions regarding these items, please call me at \_\_\_\_\_\_.

Sincerely,

[Name] [Title]

Enclosure

cc: Kris Dean, LRECD Lenny Giacovelli, LRECD

#### WAIVER AND RELEASE OF LIEN UPON PROGRESS PAYMENT:

The undersigned lienor, in consideration of the sum of \$\_\_\_\_\_, hereby waives and releases its lien and right to claim a lien for labor, services, or materials furnished through (insert date) to (insert the name of your customer) on the job of (insert the name of the owner) to the following property:

#### **IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS**

This waiver and release does not cover any retention or labor, services, or materials furnished after the date specified.

DATED on , (year) . (Lienor)

WITNESS:

By: \_\_\_\_\_ Contractor (SEAL)

Attest:

SWORN AND SUBSCRIBED TO BEFORE ME, THIS \_\_\_\_\_ day \_\_\_\_\_ of 20\_\_\_\_, by \_\_\_\_\_, personally known to me or who produced as identification a

NOTARY PUBLIC, State of Florida

6-8

#### WAIVER AND RELEASE OF LIEN UPON FINAL PAYMENT

The undersigned lienor, in consideration of the final payment in the amount of \$\_\_\_\_\_\_\_, receipt of which is hereby acknowledged, hereby waives and releases its lien and right to claim a lien for labor, services, or materials furnished to \_\_\_\_\_\_\_ on the job of the Loxahatchee River Environmental Control District hereinafter referred to as the "District," to the following property IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

WITNESS:

By: \_\_\_\_\_ Contractor (SEAL)

\_\_\_\_\_ Attest: \_\_\_\_\_ SWORN AND SUBSCRIBED TO BEFORE ME, THIS \_\_\_\_\_ day \_\_\_\_\_ of 20\_\_\_\_, by \_\_\_\_\_, personally known to me or who produced as identification a

NOTARY PUBLIC, State of Florida Print Name: \_\_\_\_\_ Commission No.:\_\_\_\_\_ My Commission Expires: \_\_\_\_\_

(Notary Ink Stamp)

#### LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT

2500 JUPITER PARK DRIVE, JUPITER, FLORIDA 33458 (561) 747-5700 FAX (561) 747-9929

#### CHANGE ORDER #1

## PROJECT NAME: IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS

<u>OWNER:</u> Loxahatchee River Environmental Control District

CONTRACTOR:

THE FOLLOWING CHANGES:

**JUSTIFICATION:** 

CHANGE TO CONTRACT PRICE:

Original CONTRACT PRICE:	\$
Current CONTRACT PRICE	\$
CONTRACT PRICE due to this Change Order will be <i>INCREASED/DECREASED</i> by:	\$
The New CONTRACT PRICE including	

CHANGE TO CONTRACT TIME:

this Change Order will be:

The DATE OF COMPLETION of all work will be: UNCHANGED

APPROVED BY CONTRACT	OR:	
		DATE
APPROVED BY ENGINEER		
		DATE
APPROVED BY OWNER:		
	LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT	DATE

\$

#### **ARTICLE 7**

#### **CERTIFICATE OF DISTRICT'S ATTORNEY**

#### **IRRIGATION QUALITY 511 (IQ-511) PUMP STATION PIPING IMPROVEMENTS**

THIS IS TO CERTIFY that on this \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_, I have examined the attached Contract Documents, Surety Bonds, and the execution thereof by the parties thereto, and I am of the opinion that each of the aforesaid agreements has been duly executed by the proper parties thereto acting through their duly authorized representatives; that said representative have full power and authority to execute said agreements on behalf of the respective parties named therein; and that the foregoing agreements as being legally sufficient in form constitute a binding agreement between the parties.

By:\_\_\_

Patrick J. McNamara, Esq. de la Parte & Gilbert, P.A. Attorney for the LOXAHATCHEE RIVER ENVIRONMENTAL CONTROL DISTRICT
**ARTICLE 8** 

# RESERVED

# **SPECIAL CONDITIONS**

## **ARTICLE 9**

	TITLE
9.01	Governing Order of Contract Documents
9.02	Time of Completion and Amount of Liquidated Damages
9.03	Reimbursement of Additional Delay Damages
9.04	Percentage of Progress Payments to be Retained
9.05	Left Blank Intentionally
9.06	Surety Bonds
9.07	Subcontractors
9.08	Contractor's Insurance
9.09	Water Supply
9.10	Pipeline and Manhole Locations
9.11	Elevation Datum
9.12	Easements
9.13	Occupying Private Land
9.14	Work in State, County and Town Rights-of-Way
9.15	Interference with and Protection of Streets
9.16	Traffic Control
9.17	Work Adjacent to Telephone, Power, Cable TV and Gas Company Structures
9.18	Storage of Materials
9.19	Salvaged Materials and Excavated Materials
9.20	Planning Meeting
9.21	Alterations
9.22	Extra and Deleted Work
9.23	Extension of Time on Account of Extra Work
9.24	Changes Not to Affect Bonds
9.25	Non-Assignable
9.26	District Remedies
9.27	Contractor's Remedies

9.28	Discontinuance of Construction
9.29	Contractor's Responsibility
9:30	District's Right to Terminate
9.31	Venue, Disputes and Attorney's Fee
9.32	Coordination with District's Existing Facilities
9.33	Permits
9.34	Coordination of Construction
9.35	Field Layout of Work
9.36	Submittals
9.37	Inspection and Testing
9.38	Utilities and Services
9.39	Security
9.40	Special Controls
9.41	Field Offices, Storage and Construction Areas
9.42	Equipment and Materials
9.43	Project Closeout
9.44	Open Specifications
9.45	Spare Parts List
9.46	Applicable Standards and Codes
9.47	Copies of Plans and Specifications
9.48	Restoration – Special
9.49	Contractor Performance Reviews and Ratings

## 9.01 Governing Order of Contract Documents

In the event of discrepancy, the interpretation of Contract Documents shall follow the order of precedence as identified in Article 1 Instruction to Bidders Section 22.

## 9.02 Time of Completion and Amount of Liquidated Damages

Contractor agrees to commence Work on or before a date to be specified in a written Notice to Proceed. In the event Contractor does not reach Substantial Completion or Final Completion of the Work within the time specified in the Notice to Proceed, Contractor shall pay to the District as liquidated damages, and not as a penalty the amounts set forth in Article 4- Contract Section 2.

## 9.03 Reimbursement of Additional Delay Damages

In the event Substantial Completion and Final Completion of the Work set forth in the Contract Documents and any subsequent modifications, is delayed beyond the time set forth in Article 4-Contract Section 2, Contractor shall also be responsible for Additional Delay Damages as set forth in the Article 4 - Contract Section 2.

#### 9.04 Percentage of Progress Payments to be Retained

The percentage of estimated value to be retained under that heading of the Contract, entitled Progress Payments shall conform to the following schedule:

- a. Retention of up to 10% of payments claimed.
- b. For Projects over \$200,000, when the Project is fifty percent (50%) complete, the retainage amount shall be reduced to 5% from each subsequent progress payment made to the Contractor.
- c. After fifty percent (50%) completion of the Work, Contractor may present a payment application for up to one-half of the retainage held by the District for the first fifty percent (50%) of the Work.
- d. A cash bond or irrevocable letter of credit will be accepted if offered in lieu of cash retainage.

The above retainage reductions shall not require the District to release any amount that is the subject of a good faith dispute or a claim pursuant to Section 255.05, Florida Statutes.

The above retainage reductions shall not apply if the Project is funded, in whole or in part, with federal funds that are subject to federal grantor laws and regulations that are contrary to any provision of the Florida Local Government Prompt Payment Act, or if the retainage reduction is otherwise not required by the Florida Local Government Prompt Payment Act.

## 9.05 Left Blank Intentionally

## 9.06 Surety Bonds

Contractor, at the time of execution of the Contract, must deposit with the District a Public Construction Bond providing for the satisfactory performance and completion of the Work and providing security for payment of all persons performing labor and/or providing materials or supplies

in connection with this Contract. The bond shall be furnished in an amount equal to the amount of the contract award. The form and conditions of the bond and the surety shall be in accordance with the statutory requirements of Section 255.05(2), Florida Statutes, and are subject to the District's approval.

A maintenance bond in the amount of 50% of the contract price guaranteeing the repair of all damages due to improper materials or workmanship for a period of one (1) year after Final Completion will also be required. The maintenance bond shall be submitted with the final payment request.

The bonds shall be written by a surety company that has the following ratings based upon amount of the Contract:

CONTRACT AMOUNT	BEST'S RATINGS	
\$ 25,000.00 to \$100,000.00	B+ Class V or better	
\$100,000.01 to \$500,000.00	A Class VI or better	
\$500,000.01 and over	A Class VII or better	

The surety must be licensed to do business in the State of Florida, and the bonds must be executed by an Attorney-in-Fact for the surety company with a certified copy of its Power of Attorney attached to the bonds.

The Maintenance Bond shall remain in effect for one (1) year beyond the date of Final Completion and acceptance of the entire Work to repair any Defective Work done under the Contract Documents. The Public Construction Bond shall remain in effect to pay valid claims for payment of labor, supplies, and/or materials submitted after completion of the Work and for items covered under the performance aspect of said bond.

## 9.07 Subcontractors

Prior to award of the Contract, Engineer shall notify Contractor of any objection to the subcontractors proposed for the Work, and Contractor shall not employ any subcontractor with whom Engineer or District has an objection.

Contractor shall be responsible to the District for the acts and omissions of any subcontractor and any person directly or indirectly employed by a subcontractor, to the extent Contractor is responsible for the acts and omissions of persons directly employed by Contractor. Nothing contained in the Contract Documents shall create any contractual relation between any subcontractor and the District.

#### 9.08 Contractor's Insurance

Contractor shall maintain and pay for, as applicable, through an insurance company or insurance companies acceptable to the District at Contractor's sole expense: Fire, Extended Coverage, Vandalism and Malicious Mischief coverage on buildings and structures in the course of construction. Such coverage shall include foundations, additions, attachments, and all permanent fixtures belonging to and constituting a part of said buildings or structures. The policy or policies shall also cover machinery, if the cost of machinery is included in the Contract. The amount of insurance must at all times be at least equal to the actual cash value of the insured property.

Contractor shall provide the District, prior to the execution of the Contract, with a satisfactory Certificate of Insurance certifying that the required insurance is in force.

During the life of the Project, Contractor shall provide, pay for and maintain insurance of the types and in the amounts described herein. All such insurance shall be provided by responsible companies with A.M. Best ratings of at least A-, authorized to transact business in the State of Florida, and which are satisfactory to the District. Promptly after the District's issuance of the Notice of Award of this Contract, and prior to commencing the Work, Contractor shall provide evidence of insurance coverages of the types and in the amount required by submitting executed Certificates of Insurance, in the form preferred by the District. Each Certificate of Insurance shall set forth the original manual signature of the authorized representative of the insurance company/companies identified therein and shall have attached thereto proof that said representative is authorized to execute the same. In addition, certified true and exact copies of all required policies shall be provided to the District upon request.

Contractor shall obtain and maintain in full force and effect during the life of this Contract, Worker's Compensation Insurance covering all employees in performance of Work under this Contract. Contractor shall make this same requirement of any of its subcontractors. Contractor shall indemnify and save the District and Engineer harmless from any damages resulting from either Contractor or any subcontractor's failure to secure and/or maintain such insurance.

All policies of insurance required shall require that the insurer give the District thirty (30) days written notice of any cancellation, intent not to renew, or reduction in coverage; and ten (10) days written notice of any non-payment of premium. Such notice shall be delivered by U.S. Registered Mail to: Loxahatchee River District, 2500 Jupiter Park Drive, Jupiter, Florida 33458, Attn: Kris Dean, P.E. In the event of any reduction in the aggregate limit of any policy, Contractor shall immediately restore such limit to the amount required herein.

Receipt by the District of any Certificate of Insurance or copy of any policy evidencing the insurance coverages and limits required by the Contract Documents does not constitute approval or agreement by the District that the insurance requirements have been satisfied or that the insurance policies shown on the Certificates of Insurance are in compliance with the requirements of the Contract Documents.

The insurance coverages and limits required of Contractor under the Contract Documents are designed to meet the minimum requirements of the District. They are not designed as a recommended insurance program for Contractor. Contractor shall be responsible for the sufficiency of its own insurance program. Should Contractor have any questions concerning its exposures to loss under the Contract Documents or the insurance coverages needed therefore, it should seek professional assistance.

If the insurance coverage initially provided by Contractor is to expire prior to the completion of the Work, renewal Certificates of Insurance shall be furnished to the District thirty (30) days prior to the expiration of current coverages.

All liability insurance policies obtained by Contractor to meet the requirements of the Contract Documents, other than the Worker's Compensation and Employer's Liability Policy, shall provide that the District, its officers, employees, and agents, and Engineer and its shareholders, officers, and directors, and any other person or entity designated by the District, shall be named "additional insureds" under the Policy and shall also incorporate a Severability of Interest and Cross Liability provision. All insurance coverages provided under this Special Conditions Section 9.08 shall apply to all of Contractor's activities under the Contract Documents without regard for the location of such activity. The policy shall include a waiver of subrogation provision in favor of the additional insured. This policy shall include, but not be limited to, all of the following coverage in the following minimum amounts:

a.	Vehicle – Owner, Hired, Non-owner – Any Automobile Coverage	
	Injury or death of any one person:	\$1,000,000
	in any one occurrence:	\$1,000,000
	Property Damage- any one occurrence:	\$ 300,000
b.	Comprehensive General Liability, other than vehicle, including: Comprehensive Premises Operations Explosions and Collapse Hazard Underground Hazard Products/Completed Operations Hazard Broad Form Property Damage Independent Contractors Personal Injury	
	Per Occurrence	\$1,000,000
	Aggregate	\$1,000,000
	Injury or death of any one person:	\$1,000,000
	Injury of death of more than one person in any one occurrence:	\$1,000,000
c.	Property Damage: Each occurrence:	\$ 300,000
	Aggregate operations:	\$ 500,000
	Aggregate protective:	\$ 500,000
	Aggregate contractual:	\$ 500,000

Neither Contractor nor any subcontractor shall commence Work under this Contract until they have obtained all insurance required under this Special Conditions Section 9.08, and have supplied the District with evidence of such coverage in the form of the Certificate of Insurance, and such Certificate has been approved by the District in writing. All such insurance policies shall provide for at least thirty (30) calendar days written notice to the District prior to cancellation. Contractor's and subcontractor's insurance shall be primary to any other insurance carried by the District, its

consultants, or Engineer. The District's, its consultants', or Engineer's coverage shall be excess insurance only, and Contractor's insurance policies shall so state.

Contractor shall be responsible for and shall obtain and file insurance certificates on behalf of all its subcontractors within ten (10) calendar day of the subcontractor's start of Work. All Certificates of Insurance shall be filed with the District in the office designated in the Contract Documents.

Should Contractor fail to maintain the insurance coverages required by the Contract Documents, the District may, at its option, either terminate this Contract for default or procure and pay for such coverage, charge Contractor, and deduct the costs from payments due Contractor. A decision by the District to procure and pay for such insurance coverages shall not operate as a waiver of any of its rights under the Contract Documents.

Failure of Contractor to submit the required Certificates of Insurance within the times required by this Special Conditions Section 9.08 may result in a delay in issuing the Notice to Proceed. The parties specifically agree that such a delay is neither excusable nor compensable and will not entitle Contractor to a change in the Contract Sum or time.

## 9.09 Water Supply

Contractor shall, at its own expense, provide all water needed for construction purposes and for testing.

## 9.10 Pipeline and Manhole Locations

Pipelines and manholes will be located substantially as indicated on the Plans and Specifications, but Engineer may make such modifications in locations as may be found desirable to avoid interferences with existing structures or for other reasons.

## 9.11 Elevation Datum

The datum adopted by Engineer is based on National Geodetic Vertical Datum of 1929. All elevations on the Plans and Specifications refer to this datum.

#### 9.12 Easements

The District has obtained, or will obtain, permanent easements and temporary construction easements through private property, where required. The temporary construction easements entitle Contractor to the occupancy and use of the designated area near or adjacent to the Work for purposes related to the Work.

Easements are shown on the Plans and Specifications.

Contractor will not encroach on any property unless it has been established that easements have been obtained or that the property owner has given the District permission in writing. On all other land, Contractor has no rights unless he obtains written consent from the proper parties.

## 9.13 Occupying Private Land

Contractor shall not (except after written consent from the proper parties) enter or occupy with persons, tools, equipment or materials, any land outside the rights-of-way or property of the District. A copy of the written consent shall be given to Engineer.

## 9.14 Work in State, County, and Town Rights-of-Way

Attention is directed to the fact that Work will be going on in County rights-of-way. The District has obtained written consent for Contractor to encroach on these rights-of-way for the Work. Any damage to the areas within these rights-of-way shall be repaired or restored in accordance with their respective standards, specifications, latest revisions and permit requirements.

## 9.15 Interference with and Protection of Streets

Contractor shall not close or obstruct any portion of the street, road, or private way without obtaining permits therefor from the proper authorities. During the course of the Work, if any street or private way shall be rendered unsafe by Contractor's operations, Contractor shall make such repairs or provide such temporary ways or guards as shall be acceptable to Engineer.

Streets, roads, private ways, and walks not closed, shall be maintained passable by Contractor at Contractor's expense, and Contractor shall assume full responsibility for the adequacy and safety of provisions made.

Contractor shall, at least forty-eight (48) hours in advance, notify the proper authorities including, but not limited to, the police, ambulance squad, fire departments, and school district, and any other public authority with jurisdiction in writing, with a copy to Engineer, if a closure of a street is necessary. Contractor shall cooperate with the proper authorities in the establishment of alternate routes. Contractor shall provide adequate detour signs, plainly marked and well lit, in order to minimize confusion. All expenses of street closure shall be the responsibility of Contractor.

Contractor shall, when required by Engineer, schedule its Work so as to interfere as little as possible with the operations of adjacent users and to minimize loss of access by public or private agencies to their place of business.

## 9.16 Traffic Control

For control of traffic, Contractor shall provide an adequate number of flagmen in accordance with the latest revisions of the Florida Department of Transportation specifications. Contractor shall bear the costs of employing such flagmen.

## 9.17 Work Adjacent to Telephone, Power, Cable TV and Gas Company Structures

In all cases where Work is to be performed near telephone, power, water, cable TV, or gas company facilities, Contractor shall provide written notification to the respective companies of the areas in which Work is to be performed, within a minimum of forty-eight (48) hours prior to any Work in these areas. Contractor shall comply with all applicable regulations of the State of Florida regarding the location of underground facilities prior to excavating any area (Sunshine State-One Call of Florida).

## 9.18 Storage of Materials

Suitable storage facilities shall be furnished by Contractor. All materials, supplies and equipment intended for use in the Work shall be stored by Contractor to prevent damage from exposure, contamination by foreign substances, or vandalism. Engineer shall not accept, or sample for testing, materials, supplies or equipment that have been improperly stored. Materials found unfit for use shall not be incorporated in the Work and shall immediately be removed from the construction or storage site.

## 9.19 Salvaged Materials and Excavated Materials

In the absence of special provisions to the Contract, salvage materials, equipment or supplies excavated during the course of the Work are the property of the District and shall be cleaned and stored as directed by Engineer.

All excavated materials needed for backfilling operation shall be stored on site. Contractor shall take the appropriate steps to secure any necessary additional area for stockpiling. Contractor shall include in its bid price the removal of such material from site to an area designated by Engineer. The haul distance shall not exceed six (6) miles each way. All excess materials not wanted by the District shall be hauled and disposed of at an approved site, at Contractor's expense.

## 9.20 **Pre-Construction Meeting**

Within ten (10) calendar days after the execution of the Contract and prior to start of construction, a planning meeting will be scheduled by Engineer which must be attended by Contractor. This conference will include representatives of Contractor, Engineer, the District, local utilities, regulatory agencies, other contractors performing Work in the area for the District, and any other party that the District may deem as necessary for the orderly performance of the Contract. However, this does not relieve Contractor of the responsibility of contacting local utilities and any other necessary agencies as the circumstances may require. At this meeting the parties shall coordinate the sequence of construction.

## 9.21 Alterations

Engineer may make alterations in the line, grade, plan, form, dimensions, or materials of the Work or any part thereof, either before or after the commencement of construction of the Work. If such alterations increase or diminish the quantity of Work to be done, compensation for increased Work shall be made at the Contract Unit Prices or under the item for extra Work. For decreased Work, Contractor shall allow the District a credit based on the Contract Unit Prices or by such other means as determined by Engineer. If such alterations diminish the quantity of Work to be done, they shall not warrant any claim for damages or for anticipated profits on the Work that is eliminated.

# 9.22 Extra and Deleted Work

Contractor shall perform any unforeseen additional Work necessary to the proper completion of the Contract and not otherwise provided for herein, when and as ordered in writing by Engineer and approved by the District ("Extra Work"). For Extra Work, Contractor shall be compensated either:

- a. At the price agreed upon before the Extra Work is commenced and named in the order for the Work, or
- b. If Engineer so elects, for the reasonable cost of said Work, as determined by Contractor and approved by Engineer, plus a percentage of such cost, as set forth below, or
- c. At the unit price indicated in the Contract.

Contractor must submit written notification to Engineer within fifteen (15) days of any event Contractor claims to result in a change in the Scope of the Work or in Extra Work, and Contractor shall quantify such change within thirty (30) days of the event. The District shall provide a response to the Contractor within thirty (30) days from receipt of Contractor's quantification of the change. The cost of Extra Work performed shall include the cost to Contractor of materials used, equipment installed, common and skilled labor and foremen, and the fair rental price of all machinery used on the Extra Work for the period of such use.

At the request of Engineer, Contractor shall furnish itemized statements of the cost of the Work ordered and give Engineer access to all accounts, bills, and vouchers relating thereto.

Contractor may include in the cost for Extra Work the amounts of additional premiums paid to obtain and maintain the required insurance on account of such Extra Work, including but not limited to: Social Security or other direct assessments upon Contractor's payroll by Federal or other properly authorized public agencies; and other approved assessments made by Contractor directly to Contractor's employees, which are recognized to be part of the cost of doing Work.

Compensation for the rental of machinery used for Extra Work shall be based upon an appropriate fraction of the approved monthly rate schedule. The cost of transportation, not exceeding a distance of one hundred (100) miles, of such machinery to and from the Work shall be added to the compensation for rental property provided; however, compensation for rental property shall only apply to machinery or equipment used for Extra Work and not already required to be furnished under the terms of the Contract.

Contractor shall not include in the cost of Extra Work, any cost or rental of small tools, buildings, or any portion of the time of Contractor, its superintendent, or its office and engineering staff.

Contractor may add up to fifteen percent (15%) to the cost of Extra Work done by Contractor's own forces to cover its overhead allowance for use of capital the premium on the Bond as assessed upon the amount of this extra Work, and profit.

Where Extra Work done is performed by a subcontractor, the subcontractor shall compute the cost for the Extra Work, as stated above plus fifteen percent (15%). Contractor shall be allowed an additional five percent (5%) of the subcontractor's charge for the Extra Work to cover the cost of Contractor's overhead, use of capital, the premium on the Bonds as assessed upon the amount of this Extra Work, and profit.

If Extra Work is done, Contractor and/or subcontractor shall keep daily records of such Extra Work. The daily record shall include the names of persons employed, hours worked, materials and

equipment incorporated, and machinery used, if any, in the execution of such Extra Work. This daily record shall be signed by Contractor's authorized representative and approved by Engineer, verifying that such Work has been done. A separate daily record shall be submitted for each Extra Work order.

Notwithstanding anything contained herein the markup to Contractor and/or subcontractor, for overhead, profit, use of capital, and the premium on the Bonds as the same relates to Extra Work within the scope of Section 01020 of the Technical Specifications, shall not exceed twenty percent (20%).

# 9.23 Extension of Time on Account of Extra Work

When Extra Work is ordered at any time during the progress of the Work which requires, in the opinion of Engineer, an unavoidable increase of time for the completion of the Contract, additional time shall be certified in writing by Engineer.

## 9.24 Changes Not To Affect Bonds

It is distinctly agreed and understood that any changes made in the Plans and Specifications for this Work (whether such changes increase or decrease the amount thereof) of any change in the manner of time of payments made by the District to Contractor shall in no way annul, release, or affect the liability and surety on the bonds given by Contractor.

## 9.25 Non-Assignable

Neither the Contract Documents, nor any monies due hereunder, or any part thereof, shall be assigned, transferred, or sublet by Contractor; nor shall the District be liable to any assignee or transferee, or sub-lessee, without the written consent of the District. Any assignment, transfer, or sublease, shall not release or discharge Contractor from any obligation hereunder.

# 9.26 District Remedies

If Contractor defaults or neglects to carry out any of its obligations under this Contract, or should liens be filed, bills of sale, conditional bills of sale, chattel mortgages, assignments of this Contract without the consent of Contractor, or orders for the payment of money for materials or labor or either, or should Contractor become insolvent or file Bankruptcy, the District shall have the right, in addition to any other rights and remedies provided by law, to (a) perform and furnish through itself or through others any such labor or materials for the Work and to deduct the cost thereof from any money due or to become due to Contractor for all or any portion of the Work; (b) enter upon the premises and take possession for the purpose of completing the Work of all equipment, scaffolds, tools, appliances, and any other items thereon; and (c) to employ any person or persons to complete the Work and provide all labor services, materials, equipment, and other items required therefor. In case of such termination of the employment of Contractor, Contractor shall not be entitled to receive any further payment under this Contract. However, if the unpaid balance of the amount to be paid under this Contract shall exceed the cost and expense incurred by the District in completing the Work, such excess shall be paid by the District to Contractor; but if such cost and expenses shall exceed the unpaid balance, Contractor shall promptly pay the difference to the District on demand. Said cost and expense shall include not only the cost of completing the Work to the satisfaction of the District and of performing and furnishing all labor, services, materials, equipment, and other items required

therefor, but all losses, damages, costs and expenses including attorney's fees sustained, incurred, or suffered by reason of or resulting from Contractor default, or by reason for litigation over this Contract.

## 9.27 Contractor's Remedies

If the District fails to make a payment as provided for in the Contract Documents for a period of thirty (30) days after the date the payment is due, through no fault of Contractor, Contractor may, upon seven (7) additional days' written notice to the District terminate the Contract and recover from the District payment for Work executed including reasonable overhead and profit and costs incurred by reasons of such termination.

## 9.28 Discontinuance of Construction

Contractor agrees and guarantees to perform the above mentioned Work in accordance with the terms herein, irrespective of any strikes, lockouts, or stoppages and Contractor shall not employ persons, means, materials, or equipment which may cause strikes, Work stoppages, or any disturbances by workmen employed by Contractors.

In the event the District is prevented from proceeding with any or all of this Work as stated in this Contract, due to a declaration of war, or national emergency, by the United States government, whereas the construction of the type contracted for herein is specifically prohibited by statute or governmental edict, or due to the stoppages of construction caused by any governmental agency, State, City, Town, or County regulations, orders, restrictions, or due to circumstances beyond the District's control, or for any reasons whatsoever, then the District herein reserves the right to either suspend the Work to be done for an indefinite period of time or to cancel this Contract outright by giving notice by registered mail for such intention to Contractor herein. In the event of any conditions above mentioned occurring after the Work herein has already been commenced, then the District herein shall be liable only for the Work completed up to the cancellation or suspension without the addition of prospective profits or other charges whatsoever.

## 9.29 Contractor's Responsibility

It is specifically agreed, that all materials shall be supplied and Work shall be done in accordance with the rules, requirements, regulations and directives of various Building Departments, other State, County, or Town departments having jurisdiction over the same; mortgagees, if any; and the Federal Housing Administration or the Veteran's Administration, or their Bureaus, Agencies, Subdivisions, or Agencies or any other governmental bureau, agency, or department interested in this job directly or indirectly.

Contractor shall, at its own cost, obtain all necessary permits, licenses, inspections and certificates pertaining to the Work and shall comply with all Federal, State, Municipal and local laws, ordinances, rules, regulations, orders, notices and requirements, whether or not provided by the Plans, Specifications, General Conditions or other Contract Documents without additional expense to the District. Contractor shall also be responsible for and correct at its own cost and expense, any violations thereof resulting from and in connection with its performance of its Work. Engineer shall not be responsible for the means, methods, techniques, sequences or procedures of construction selected by Contractor or the safety precautions and programs incident to the Work of Contractor. Engineer's efforts will be directed toward providing assurance for the District that the completed

Project will conform to the Contract Documents, but Engineer shall not be responsible for the failure of Contractor to perform the construction Work in accordance with the Contract Documents.

Engineer shall have the authority to reject Work which does not conform to the Contract Documents, and shall have authority, but not the obligation, to stop the Work in the event of any unsafe conditions or unsafe practices on the part of Contractor, any subcontractor or any of their employees. Engineer's ability to stop the Work shall not affect Contractor's liability for the existence of unsafe conditions or practice.

## 9.30 The District's Right to Terminate

The District may terminate this Contract and take possession of all or some of Contractor's materials, tools, equipment and appliances and complete the Work by any means the District deems fit if any of the following occur: if at any time there shall be filed by or against Contractor in any court a petition in bankruptcy, insolvency, for reorganization, or for the appointment of a receiver or trustee of all or a portion of Contractor's property, where Contractor fails to secure a discharge within thirty (30) days of any such petition; if Contractor makes an assignment for the benefit of creditors or petitions for or enters into an agreement or arrangement with its creditors; if Contractor fails to prosecute the Work properly, fails to complete the Work entirely on or before any date established for partial or final completion; fails to make prompt payment to subcontractors, for materials or labor; or without limitation, fails to perform any provisions of this Contract. The District may terminate this Contract by giving Contractor seven (7) calendar days prior written notice of any such default to Contractor. Such termination shall be without prejudice to any other remedy that the District may have. In case of termination, Contractor shall not be entitled to receive any further payment until the Work is finished. If the unpaid balance of the Contract Sum shall exceed (1) the expense of completing the Work including compensation for additional managerial and administrative services, plus (2) the District's losses and damages because of Contractor's default, such excess shall be paid to Contractor. If such expense, plus the District's losses and damages shall exceed such unpaid balance, Contractor shall pay the difference to the District promptly on demand.

The District may terminate this Contract without cause by giving seven (7) calendar days prior written notice to Contractor, and in such event, the District will pay Contractor for that portion of the Contract Sum, less the aggregate of previous payments, allocable to the Work completed as of the date of termination. The District also will reimburse Contractor for all costs necessarily incurred for organizing and carrying out the stoppage of the Work and paid directly by Contractor, not including overhead, general expenses or profit. The District will not be responsible to reimburse Contractor for any continuing contractual commitments to subcontractors or materialmen or penalties or damages for canceling such contractual commitments inasmuch as Contractor shall make all subcontracts and other commitments subject to this provision.

In the event of termination by the District, the District may require Contractor promptly to assign to it all or some subcontracts, construction, plant, materials, tools, equipment, appliances, rental agreements, and any other commitments which the District may in its sole discretion, choose to take by assignment, and in such event Contractor shall promptly execute and deliver to the District written assignments of the same. The District may, at any time, terminate the Contract for the District's convenience and without cause. Contractor shall be entitled to receive payment for Work executed and costs incurred by reason of such termination

## 9.31 Venue, Disputes and Attorney's Fees

This Contract shall be governed by the laws of the State of Florida as now and hereafter in force. The venue for actions arising out of this Contract is fixed in Palm Beach County, Florida.

Contractor and the District agree that prior to instituting any litigation for damages under this Special Conditions Section 9.31, the parties shall conduct a non-binding mediation to attempt to resolve their dispute. In the event the parties cannot agree upon a mediator, each party shall select a mediator and such mediators shall select a third mediator who shall serve as the mediator for the dispute. In the event such mediation does not occur within thirty (30) days of a written request of either party, the parties shall be free to pursue litigation without first conducting mediation.

In any dispute arising out of the Contract Documents and/or relating to the Work, the Prevailing Party shall be entitled to recover all costs and expenses incurred, including, without limitation, attorneys' and paralegals' fees and costs whether before suit is filed, after suit is filed, on any appeal, and in any bankruptcy proceedings.

# 9.32 Coordination with District's Existing Facilities

Contractor shall cooperate and coordinate its activities with those of the District when connecting to the existing District facilities, while working on the District plant site, and as specified in the Contract Documents.

The District has adopted a Standard Operating Procedure (SOP) for System Shutdowns and Bypass included in the Appendix and made part of this Contract. The Contractor is responsible for compliance with the SOP including planning all work requiring system shutdowns and/or bypasses to be completed within the Low Risk Holding Time and the Contractors Wastewater Management/Spill Response Plan. Details required for this compliance are included in the Appendix including the allowable duration of the shutdown or bypass (low risk holding time), the location of the isolation facilities, required facility information to determine residual wastewater volume disposal requirements and disposal locations, anticipated continuous flow the Contractor may expect and other pertinent information.

The Contractor is also responsible for all costs associated with the Emergency Operation Measures should these be implemented due to negligence on the Contractor's part or failure of the Contractor to perform the work within the allowed time frame.

## 9.33 Permits

Unless otherwise identified in Section 01000 of the Technical Specifications, Contractor shall be responsible for obtaining any and all permits (i.e. building permits) necessary for the Work under this Contract and pay the costs thereof, said permits may be included as part of the Contract Documents. If differences between the specifications and conditions of the permits exist, the permits shall govern.

## 9.34 Coordination of Construction

#### A. General

Contractor shall be responsible for the maintenance of utility operations during construction as specified in the Section 01500 of the Technical Specifications.

B. Temporary Facilities

District personnel must have ready access at all times to all existing structures. Temporary facilities shall include any equipment, materials, controls, services and accessories temporarily needed for access to, and for protection of all existing structures and equipment, and to maintain an operating system, in accordance with the provisions of these Specifications.

The size or capacity of the temporary facility shall generally be equal to the size or capacity of the facility replaced, unless otherwise indicated on the Contract Plans and Specifications or otherwise directed and approved by the District. All temporary facilities shall be removed when they are no longer required unless otherwise agreed upon in writing. To substitute an unscheduled temporary facility for an existing or new facility, Contractor shall prepare and submit a plan and description of the proposed temporary facility to the District. Upon receipt of the written approval of the District, Contractor shall then submit the notification of intent to commence Work.

#### C. Coordination with District Personnel

Before commencing Work involving removing or placing in operation existing or new facilities, Contractor shall notify the District in writing at least thirty (30) calendar days in advance in writing. The District shall be responsible for removing facilities from operation. Only the District can authorize the shutdown of any portions of the sanitary system. Contractor shall, under no circumstances, interfere with any existing lift station or collection system.

#### 9.35 Field Layout Work

All Work under this Contract shall be constructed in accordance with the lines and grades shown on the Contract Plans and Specifications or as directed by Engineer. Elevation of existing ground, structures and appurtenances are believed to be reasonably correct but are not guaranteed to be absolute and therefore are presented only as an approximation. Any error or apparent discrepancy in the date shown or omissions of data required for accurately accomplishing the stake-out survey shall be referred immediately to Engineer for interpretation or correction.

All survey Work for construction control purposes shall be made by Contractor at its expense as set forth in General Conditions Section 10.11.

Contractor shall establish all base lines for the location of the principal component parts of the Work together with benchmarks and batter boards adjacent to the Work. Based upon the information provided by the Contract Plans and Specifications, Contractor shall have the responsibility to carefully preserve the benchmarks, reference points and stakes. In case of destruction thereof by

Contractor or resulting from its negligence, Contractor shall be held liable for any expense and damage resulting therefrom and shall be responsible for any mistakes that may be caused by the unnecessary loss or disturbance of such marks, reference points, and stakes.

Existing or new control points, property markers, and monuments that will be established or are destroyed during the normal causes of construction shall be reestablished by Contractor; and all reference ties recorded therefore shall be furnished to Engineer. All computations necessary to establish the exact position of the Work shall be made and preserved by Contractor.

#### 9.36 Submittals

#### A. Progress Schedule

Prior to executing the Contract, but after the award of the Contract to the Successful Bidder, the Successful Bidder shall prepare and submit the proposed progress schedule to Engineer for review and comments. The schedule shall be prepared using Oracle - Primavera P6. The contractor shall supply the electronic Primavera P6 schedule and a PDF copy of the Primavera P6 gantt chart.

The schedule shall be prepared using the Critical Path Method ("CPM") and shall depict in detail the proposed sequence of the Work and identifying construction activities for each structure, collection, transmission, or treatment facility. The schedule shall be time scaled, identifying the first day of each week, with the estimated date of starting and completion of each stage of the Work in order to complete the Project within the Contract time.

Contractor shall revise the progress schedule to reflect Engineer's comments prior to approval.

An updated schedule shall be submitted monthly with each Progress Payment Application depicting progress to the last day of the month. Subsequent changes to the schedule shall be accompanied by a letter of explanation with appropriate references and revision dates on the schedule.

- B. Operation and Maintenance Instruction for all Valves and Mechanical Devices
  - 1. Individual Instructions

When required by Engineer, Contractor, through manufacturer's representatives, shall provide instruction to the District's designated employees regarding the operation and care of all equipment furnished by Contractor and installed hereunder.

2. Written Instructions

When required by Engineer, Contractor shall furnish and deliver to Engineer, prior to final payment, six (6) complete sets of instructions, technical bulletins, and any other printed matter such as diagrams, prints or drawings, containing full information required for the proper operation, maintenance, and repair of all Contractor furnished equipment. Included in this submission shall be a spare parts diagram and complete spare parts list. The information provided shall include a source of replacement parts and names of service representatives,

including addresses and telephone numbers. Extensive pictorial cuts of equipment are required for operator reference in servicing. These requirements are a prerequisite to the operation and acceptance of equipment. Each set of instructions shall be bound together in appropriate three-ring binders. A detailed table of contents shall be provided for each set. Written operation and maintenance instructions shall be required for all equipment items supplied for this Project. The amount of detail required shall be commensurate with the complexity of the equipment item.

Information not applicable to the specific piece of equipment installed on this Project shall be removed from the submission.

When written instructions include shop drawings and other information previously reviewed by Engineer, only those editions thereof which were accepted by Engineer, and which accurately depict the equipment installed, shall be incorporated in the instructions.

#### C. Maintenance and Lubrication Schedules

When required by Engineer, Contractor shall furnish complete Equipment Maintenance and Lubrication Schedules for each piece of mechanical equipment such as valves, gates, etc. The complete forms (six copies), as provided in Section 01300 entitled "Submittals" of the Technical Specifications shall be submitted along with the shop drawings and included with the furnished O&M Manuals.

#### D. Schedule of Values

Contractor shall submit as a shop drawing a Schedule of Values for Engineer's review at the Pre-Construction Meeting. The Schedule of values shall contain the installed value of the component parts of the Work for the purpose of making progress payments during the construction period. The Schedule shall provide sufficient detail for the proper identification of Work accomplished. Each item shall include its proportional share of all costs, including Contractor's overhead contingencies and profit. The sum of all scheduled items shall equal the total value of the Contract. For payments on acceptable stored material items, Contractor shall also submit a separate list covering the cost of materials, delivered, and unloaded at the project site along with delivery invoices with taxes paid. Stored materials will be paid for items to be used within thirty (30) days of delivery. In addition, the listing shall also include the installed value of the item with coded reference to the Work items in the Schedule of Values.

Contractor shall expand or modify the above schedule and materials listing as required by Engineer's initial and subsequent reviews.

#### E. Schedule of Payments

Contractor shall submit a Schedule of Payments at the Pre-Construction meeting to be approved by the District. The Schedule of Payments shall contain Contractor's expected Progress Payment values throughout the construction period, for the purpose of assuring that the District will have sufficient monies available to make payments in the expected amounts for each payment period. Contractor shall provide an updated Schedule of Payments with each Progress Payment Application.

F. Contractor's Shop and Working Drawings

Contractor shall submit shop and Work drawings in accordance with General Conditions Section 10.07.

### 9.37 Inspection and Testing

The Contractor shall employ and pay for the services of an independent test laboratory for specified testing.

The Work or actions of the testing laboratory shall in no way relieve Contractor of its obligations under the Contract. The laboratory testing Work shall include such inspections and testing required by the Contract Document, existing laws, codes, ordinances, etc. The testing laboratory will have no authority to change the requirements of the Contract Documents, nor perform or approve any of Contractor's Work.

Contractor shall allow Engineer ample time and opportunity for testing materials and equipment to be used in the Work. Contractor shall advise Engineer promptly upon placing orders for materials and equipment so that arrangements may be made, if desired, for inspection before shipment from place of manufacture. Contractor shall at all times furnish Engineer and Engineer's representatives, facilities including labor, and allow proper time for inspecting and testing materials, equipment, and workmanship. Contractor must anticipate that possible delays may be caused in the execution of the Work due to the necessity of materials and equipment being inspected and accepted for use. Contractor shall furnish, at Contractor's own expense, all samples of materials required by Engineer for testing. Contractor shall make its own arrangements for providing water, electric power, or fuel for the various inspections and tests of structures and equipment.

Contractor shall furnish the services of representatives of the manufacturers of certain equipment, as prescribed in other sections of the Specifications. Contractor shall also place orders for such equipment on the basis that, after the equipment has been tested prior to Final Completion of the Work; the manufacturer will furnish the District with certified statements that the equipment has been installed properly and is ready to be placed in functional operation. Tests and analyses required of equipment shall be paid for by Contractor, unless otherwise specified in writing.

The Contractor will pay the cost of all tests, inspections, or investigations undertaken by the order of Engineer for the purpose of determining conformance with the Contract Documents if such tests, inspections, or investigations are not specifically required by the Contract Documents, and if conformance is ascertained thereby. Whenever nonconformance is determined by Engineer as a result of such tests, inspections, or investigations, Contractor shall bear the full cost thereof or shall reimburse the District for said cost. The cost of any additional tests and investigations, which are ordered by Engineer to ascertain subsequent conformance with the Contract Documents, shall be borne by Contractor.

#### 9.38 Utilities and Services

#### A. General

Contractor shall provide for utilities and services for its own operations, as well as field offices. These shall include electrical power, water, ventilation, sanitary facilities and telephone service. Contractor shall furnish, install and maintain all temporary utilities during the Contract period including removal upon completion of the Work. Such facilities shall comply with regulations and requirements of the National Electrical Code, OSHA, Florida Power and Light, and applicable Federal, State, and local codes, etc.

B. Temporary Power

Contractor shall arrange with Florida Power and Light for construction period service and pay all costs for the work and power. In addition to providing for a safe construction period distribution system, Contractor shall provide a safe and adequate artificial lighting system for work areas which do not have sufficient natural light. Temporary lighting shall be maintained during non-working periods if the area is subject to access by the public or plant personnel. Contractor shall furnish all electrical or other power required for construction, testing and trial operation prior to final acceptance by the District or at the time of Beneficial Occupancy.

C. Permanent Power

Utility charges for power consumed by permanent electrical facilities used for normal operations and maintenance of the treatment plant will be paid by the District.

D. Temporary Water

Contractor shall pay for all water used for construction, flushing, testing and temporary sanitary facilities. Contractor shall provide and maintain all piping, fittings, adapters, and valves required.

E. Temporary Ventilation

Contractor shall provide and maintain adequate ventilation for a safe working environment. In addition, forced air ventilation shall be provided for the curing of installed materials, humidity control and the prevention of hazardous accumulations of dust, gases or vapors.

F. Temporary Sanitary Facilities

Contractor shall provide and maintain adequate and clean sanitary facilities for the construction work force and visitors. The facilities shall comply with local codes and regulations and be situated at approved locations.

#### 9.39 Security

Contractor shall employ watchmen and security guards in its sole discretion, as it deems necessary to protect the job site against vandalism, burglary, theft, trespassing, etc. Contractor shall care for and

protect against loss or damage all material to be incorporated in the construction, including but not limited to, the existing plant structures, equipment and materials for the duration of the Contract, shall repair or replace damaged or lost materials and damaged structures at no additional cost to the District.

Contractor shall be responsible for providing, maintaining and securing gates used for construction purposes for the duration of the Project.

### 9.40 Special Controls

#### A. Chemicals

All chemicals used during Project construction or furnished for testing or Project operation, whether herbicide, pesticide, disinfectant, polymer, reactant of other classification, must be approved by either EPA or HUD. The handling, use, storage and disposal of such materials, containers or residues shall be in strict conformance to the manufacturer and/or supplier's instructions. Unless otherwise authorized, such materials shall be kept in secured storage. Copies of antidote literature shall be kept at the storage site and at Contractor's job site office. A supply of antidotes shall be kept at Contractor's office.

#### B. Dust

During construction Contractor shall, by the application of water and/or calcium chloride or other means, approved by Engineer, eliminate dust annoyance to adjacent property owners, business establishments, and all vehicular traffic. Contractor shall take all protective measures, to the satisfaction of Engineer, necessary to ensure that dust and debris do not enter any adjacent property or roadway. Contractor shall be responsible for the cleanup of existing property and roadways which have become soiled due to lack of proper dust control as determined by Engineer.

## C. Noise

Noise resulting from Contractor's Work shall not exceed the noise levels and other requirements stated in local ordinances. Contractor shall be responsible for curtailing noise resulting from its operation. Contractor, upon written notification from Engineer or the noise control officers, shall make any repairs, replacements, adjustments, additions to and/or furnish mufflers when necessary to fulfill noise level requirements.

#### D. Erosion Abatement and Water Pollution

It is imperative that any Contractor dewatering operation does not contaminate or disturb the environment of the properties adjacent to the plant. Contractor shall, therefore, schedule and control its operations to confine all runoff water from disturbed surfaces, and water from dewatering operations that becomes contaminated with lime, silt, muck, and other deleterious matter, fuels, oils, bitumens, calcium chloride, chemicals and other polluting materials.

Contractor shall construct temporary stilling basin(s) of adequate size and provide all necessary temporary materials, operations, and controls including, but not limited to, filters,

coagulants, screens, and other means necessary to attain the required discharge water quality.

Contractor shall be responsible for providing, operating, and maintaining materials and equipment used for conveying clear water to the point of discharge. All pollution prevention procedures, materials, equipment and related items shall be operated and maintained until such time as the dewatering operation is discontinued. Upon the removal of the materials, equipment and related items, Contractor shall restore the area to the existing condition prior to commencing the Work.

E. Pests and Rodents

Contractor shall be responsible for maintaining the job site free from litter, rubbish and garbage. Contractor shall provide containers for the disposal of garbage and other materials that attract and are breeding places for pests and rodents. Contractor shall, at its expense, provide the services of an exterminator on a periodic basis to inspect the job site and to provide services as required to control pests and rodents.

F. Periodic Clean-Up; Basic Site Restoration

During construction, Contractor shall regularly remove from the site all accumulated debris and surplus materials of any kind which result from the construction. Unused equipment and tools shall be stored at Contractor's yard or base of operations for the Project.

Contractor shall perform the clean-up Work on a regular basis and/or as frequently as ordered by Engineer. Basic site restoration in a particular area shall be accomplished immediately following the installation or completion of the required facilities in that area. Furthermore, such site restoration shall also be accomplished, when ordered by Engineer, if partially completed facilities must remain incomplete for some time period due to unforeseen circumstances.

Upon failure of Contractor to perform periodic clean-up and basic restoration of the site to Engineer's satisfaction, Engineer may, upon five (5) calendar days prior written notice to Contractor, employ such labor and equipment as he deems necessary for the purpose, and all costs resulting therefrom shall be charged to Contractor and deducted from any amounts of money that may be due it.

#### 9.41 Storage and Construction Areas

#### A. Storage and Construction Areas

Contractor shall confine its construction operations within the Contract limits shown on the Plans and Specifications and/or property lines and/or fence lines. All on-site Contractor Staging Areas shall be confined to designated areas as shown on the Plans and Specifications. Any additional staging and storage areas required by Contractor shall be provided by Contractor.

Contractor shall be solely responsible for the protection and safekeeping of equipment and materials at or near the sites. No claim shall be made against the District for any act of an

employee or trespasser. Should an occasion arise necessitating access to an area occupied by stored equipment and/or materials, Contractor shall immediately move such equipment or materials. No equipment or materials shall be placed upon the District's property until written approval has been received from the District.

Upon completion of the Contract, Contractor shall remove from the staging areas all equipment, fencing, surplus materials, rubbish, etc., from the construction, storage, and staging areas, and restore the areas to their original condition.

#### 9.42 Equipment and Materials

#### A. General

All equipment, materials, instruments or devices incorporated in this Project shall be new and unused, unless indicated otherwise in the Contract Documents or in writing signed by the District and Contractor. All equipment, materials, instruments or devices shall be the products of reliable manufacturers who, unless otherwise specified, have been regularly engaged in the manufacture of such material and equipment for the use as identified for this Project for, at least five (5) years.

Equipment and materials to be incorporated in the Work shall be delivered sufficiently in advance of their installation and use to prevent delay in the execution of the Work, and they shall be delivered as nearly as feasible in the order required for executing the Work.

Contractor shall protect all equipment and materials from deterioration and damage. The equipment and materials shall be handled and stored by the manufacturer, fabricator supplier and Contractor before, during, and after shipment in a manner to prevent warping, twisting, bending, breaking, chipping, rusting, and any injury, damage or theft of any kind whatsoever. Any equipment exhibiting any of the above, shall be removed and replaced at Contractor's expense; such expense shall include both labor and materials.

#### B. Storage

Contractor shall store its equipment and materials in accordance with Special Conditions Section 9.18, Storage of Materials, at the job site in accordance with the manufacturer's recommendations and as directed by Engineer. Contractor shall not store unnecessary materials or equipment on the job site and shall prevent any structure from being overloaded or kept in a condition that would endanger the safety of others. Contractor shall enforce the instructions of the District and Engineer regarding the posting of regulatory signs for loading structures, fire safety, and smoking areas.

#### C. Handling and Maintenance

The manufacturer's storage instructions shall be carefully followed and any deviations shall be approved by the manufacturer in writing with a copy to Engineer. Equipment with moving parts, such as gears, electric motors, etc., and/or instruments, control panels, and switch gears, shall be stored in a temperature and humidity controlled building until the equipment is to be installed, and such equipment shall be rotated per the manufacturer's recommendations while

in storage and during the period between installation and acceptance of the Work.

The equipment shall be stored fully lubricated unless otherwise instructed by the manufacturer. Lubricants shall be changed upon completion of installation and as frequently as required thereafter during the period between installation and acceptance of the Work. New lubricants shall be put into the equipment at the time of acceptance of the Work.

Equipment with electric motors having space heaters shall have the space heaters energized unless stored in a temperature and humidity controlled building. Space heaters shall be energized at the time of installation and maintained until acceptance of the equipment.

#### 9.43 **Project Closeout**

A. General

As construction of the Project enters the final stages of completion, Contractor shall, in accordance with the requirements set forth in the Contract Documents, attend to or have already completed the following items:

- 1. Schedule equipment manufacturer's visits to site.
- 2. Calibrate instruments and controls.
- 3. Required testing of Project components.
- 4. Schedule facilities start-up and initial operation.
- 5. Schedule and furnish skilled personnel during initial facilities operation.
- 6. Correct and/or replace Defective Work, including completion of items previously overlooked or Work which remains incomplete, all as evidenced by Engineer's "Punch List".
- 7. Attend to any other items listed herein or brought to Contractor's attention by Engineer.
- B. Substantial Completion

Items to be completed and provided prior to issuance of Substantial Completion shall include but not be limited to the following:

- 1. All equipment mfg. visits to the site
- 2. Startup tests completed and documentation provided to the Engineer
- 3. All instruments and controls calibrated and tested
- 4. All components of the Project successfully tested
- 5. Instruction provided to personnel on operation of equipment as required by the Technical Specification.
- 6. Project and its constituent pieces must be fully operational in accordance with Contract requirements and permits.
- 7. Restore areas disturbed by construction activities.

#### C. Cleaning and Restoration

Before the Final Completion of the Project, Contractor shall accomplish the cleaning and final adjustments of the various facility components as specified in the Specifications, including:

- 1. Clean and lubricate all finish hardware after adjustment for proper operation.
- 2. Touch up marks or defects in painted surfaces and touch up any similar defects in factory finished surfaces.
- 3. Remove all stains, marks, fingerprints, soil, spots, and blemishes from all finish surfaces.
- 4. Restore all areas disturbed by construction operations to conditions equal to or better than that which existed prior to the Work.
- D. Project Record Drawings and Documents

Contractor shall keep a set of drawings at the jobsite. As-built plans shall be submitted for Work completed at the end of each pay period. The payment application will not be processed until the as-built plans are approved by Engineer. Contractor shall be held responsible for the accuracy of such data, and shall bear any costs incurred in finding utilities as a result of incorrect data furnished by Contractor.

Before the Final Completion of the Project, Contractor shall submit to Engineer (or to the District if indicated) certain records, certifications, etc., which are specified elsewhere in the Contract Documents. Missing, incomplete, or unacceptable items, as determined by Engineer or the District, shall constitute grounds for withholding Final Payment to Contractor. A partial list of such items appears below, but it shall be Contractor's responsibility to submit any other items which are required in the Contract Documents:

- 1. Test results of Project components.
- 2. Performance affidavits for equipment.
- 3. Operation and maintenance instructions or manuals for equipment.
- 4. Month-to-month records containing all deviations from the Plans and Specifications, Addenda, and Modifications of Shop drawings. Such records shall be prepared from record drawings showing correct and accurate changes and deviations from the Work made during construction so as to reflect the Work as it was actually constructed. These drawings shall conform to recognized standards of drafting, be neat, legible and be on Mylar or other approved reproducible material. Contractor shall secure and pay for the services of a registered land surveyor for a final survey at every 100 feet of the location of the pipeline upon completion of construction. Signed and sealed "As Built" record drawings showing pipe location, slopes, depths of cover, offsets, and location of all fittings, valves, manholes, and all related appurtenances shall be submitted to Engineer. Missing, incomplete or inaccurate drawings as specified herein and as determined by Engineer, shall constitute grounds for withholding final payment to Contractor.
- 5. In addition to items specified under Article 4 Section 6 of the Contract, all technical documentation as specified elsewhere in the Contract Documents and particularly in the Technical Specifications.

#### E. Grease, Oil and Fuel

All grease, oil, and fuel required for testing of equipment shall be furnished by Contractor. Contractor shall also furnish a one (1) year's supply of lubricants including grease and oil in the type recommended by the manufacturer for each item of equipment supplied.

#### F. Touch-Up and Repair

Contractor shall touch-up and repair damage to all field painted and factory finished equipment. Touch-up of equipment, panels, etc. shall match as nearly as possible to the original finish. If in the opinion of Engineer the touch-up Work is not satisfactory, Contractor shall repaint the item.

### G. Chemicals

All chemicals required for testing of equipment or the process shall be furnished by Contractor. Contractor shall also furnish chemicals for the District's use where specified.

#### H. Closeout and Punch Lists

Contractor shall notify Engineer and the District in writing when the Work has reached Substantial Completion. Engineer will make an inspection of the Project for the purposes of determining the Work has reached Substantial Completion and for discovering and developing a list of Work not found acceptable and requiring cleaning, repair or replacement ("Punch List"). If Engineer determines the Project to be substantially complete, Engineer shall issue the Certificate of Substantial Completion. If the Project has an estimated cost of less than \$10 million, the Punch List shall be developed within thirty (30) days following actual Substantial Completion of the Project. If the Project has an estimated cost of more than \$10 million, the Punch List shall be developed within sixty (60) days following actual Substantial Completion of the Project. The Punch list shall be delivered to Contractor within five (5) days of the development of the Punch List. The Final Completion date shall not be less than thirty (30) days following delivery of the Punch List.

Upon receipt of the Punch List, Contractor shall perform all work necessary to complete the Punch List. Work that has been inspected and accepted by Engineer shall be maintained by Contractor, until Final Completion of the entire Project. Upon completion of the items on the Punch List, Contractor shall notify Engineer in writing that the Project is ready for inspection. This procedure will continue until the entire Project is accepted by Engineer. "Final Payment" will not be processed until the entire Project has been accepted by Engineer in writing by issuance of the Certificate of Final Completion and all of the requirements in Special Conditions Section 9.43 D. - Project Record Drawings and Documents have been satisfied. Contractor's acceptance of final payment from the District shall constitute a full waiver and release by Contractor of all claims against the District arising out of or relating to the Project or Work.

Final cleaning and repairing shall be scheduled upon completion of the Project.

## I. Partial Utilization

Prior to the completion of the Project, it may be necessary to place into service various facilities, structures, equipment and processes in accordance with the Sequence of Operation and Construction. Whenever a structure, equipment, or process has been completed and tested, Contractor shall notify Engineer that it is ready for inspection. Any Work not found acceptable will be noted on the "Punch List." Whenever Contractor has completed the Work and it has been accepted by Engineer, the District shall take possession, operate and maintain the facility, and equipment warranties begin ("Partial Utilization"). Partial Utilization shall not constitute Substantial Completion.

#### J. Tools and Spare Parts

1. Tools

Any special tools (including grease guns or other lubricating devices) which may be necessary for the adjustment, operation, and maintenance of any equipment shall be furnished with the respective equipment. Contractor shall furnish a complete list of tools and instructions for their use, recommended by the manufacturer or supplier with the Shop Drawing Submittal.

2. Spare Parts

Spare parts for equipment shall be furnished where indicated in the equipment specifications and/or as recommended by the equipment manufacturer. Spare parts shall be identical and interchangeable with original parts. Parts shall be supplied, prepared for storage, in clearly identified containers, except large or bulky items which may be wrapped in polyethylene.

The parts shall be stored separately in a locked area, maintained by Contractor, and shall be delivered to the District at a location designated by the District. Contractor shall furnish an inventory listing all spare parts in the form included herein for each piece of equipment.

#### K. Start-Up and Field Instructions

The bid prices for the equipment furnished by Contractor shall include the cost of competent manufacture representatives of all equipment to supervise the installation, adjustment and testing of the equipment and to instruct the District's operating personnel in their operation and maintenance of all equipment. The supervision may be divided into two or more time periods as required by the installation program or as directed by Engineer.

The manufacturer's representatives shall certify in writing that the installation and testing of the equipment has satisfactorily been completed and that the equipment is ready for operation and the District's operating personnel have been instructed in the operation, maintenance, and lubrication of the equipment.

Contractor shall provide the services of the manufacturer's representative(s) for additional time as required should difficulties arise in the operation of the equipment due to the

manufacturer's design or fabrication of the equipment or faulty installation by Contractor. This additional service shall be provided at no cost to the District for the duration of the Contract and one (1) year maintenance period.

L. Final Clean-Up and Site Restoration

Before finally leaving the site, Contractor shall wash and clean all exposed surfaces which have become soiled or marked. Contractor shall remove from the site of the Work all accumulated debris and surplus materials of any kind which result from its operation, including construction equipment, tools, sheds, sanitary enclosures, etc. Contractor shall leave all equipment, fixtures, and Work, which he had installed, in a clean condition. The completed Project shall be turned over to the District in a neat and orderly condition.

All damage, as a result of Work under this Contract, to existing structures, pavement, driveways, curb and gutters, sidewalks, utility poles, utility pipelines, conduits, drains, catch basins, fences, and other obstructions not specifically mentioned herein shall be repaired.

## 9.44 Open Specifications

Where materials or equipment are specified by a trade or brand name, it shall not be the intention of the District to discriminate against an equal product of another manufacturer but rather to set a definite standard of quality or performance and to establish an equal basis for the evaluation of bids. Unless otherwise specified, all materials shall be the best of their respective kinds and shall be in all cases, fully equal to approved samples. Where a trade or brand name is specified with the words "or equal" or "equivalent," this is understood to mean that other trade or brand names may be substituted that are, in the opinion and judgment of Engineer, equal in quality and performance. Even though the words "or equal" or "equivalent" are used in the Specifications, unless a substitute is approved in writing by Engineer, Engineer shall have the right to require the use of the material or equipment specified by trade or brand name.

## 9.45 Spare Parts List

The equipment supplier shall prepare a recommended spare parts list. Six (6) copies of the recommended spare parts list shall be submitted with the shop drawings.

## 9.46 Applicable Standards and Codes

Whenever reference is made to any published standards, codes, or standard specifications, such reference shall mean the latest issue of that standard, code, specifications, or tentative specification of the technical society, organization, or body referred to which is in effect at the date of invitation for bids.

## 9.47 Copies of Plans and Specifications

Contractor shall be provided with three (3) complete sets of Plans and Specifications for its use at no charge. Signed and sealed drawings which are necessary to obtain Building Permits will also be provided to Contractor by Engineer at no charge.

#### 9.48 Restoration – Special

Existing areas of special landscaping materials, irrigation systems, ground cover and any other improvements that are damaged shall be restored with new materials to equal or better than existing conditions. Technical Specifications may contain additional requirements.

#### 9.49 Contractor Performance Reviews and Ratings

The District shall develop a Contractor performance evaluation report. This report shall be used to periodically review and rate the Contractor's performance under the contract with performance rating as follows:

Satisfactory	Performance meets contractual requirements. The contractual performance of the element being assessed may contain some minor problems for which corrective actions taken by the Contractor were satisfactory
Unsatisfactory	Performance does not meet most contractual requirements and recovery is not likely in a timely manner. The contractual performance contains a serious problem(s) for which the contractor's corrective

The report shall also list discrepancies found during the review period. The Contractor shall be provided with a copy of the report and may respond in writing if he takes exception to the report or wishes to comment on the report. Contractor performance reviews and subsequent reports will be used in determining the Contractor's satisfactory performance record on future Contracts.

actions appear or were ineffective.

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# **GENERAL CONDITIONS**

# **ARTICLE 10**

#### TITLE

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### 10.01 General

Contractor shall furnish all labor, materials, tools and equipment necessary to do all Work required for the completion of each item of this Contract as specified herein. The Work to be done and paid for under any item shall not be limited to the exact extent mentioned or described, but shall include all incidental Work necessary or customarily done for the completion of that item.

#### 10.02 Definitions

Wherever the words or terms defined in this Section or pronouns used in their stead occur in the Specifications or other Contract Documents, they shall have the meanings herein given.

- a. "AASHTO" shall mean the American Association of State Highway and Transportation Officials.
- b. "ACI" shall mean the American Concrete Institute.
- c. "Addendum" shall mean modification of the Contract Documents issued in writing by Engineer prior to opening the bids.
- d. "ANS" shall mean American National Standard, as approved by the American National Standards Institute, Inc.
- e. "ASTM" shall mean the American Society for Testing and Materials.
- f. "AWWA" shall mean the American Water Works Association.
- g. "Bid" shall mean the documents that comprise the submission for the Work of this Project.
- h. "Bid Period" shall mean the time period from when the Bid Documents will be available to the deadline for submitting Bids.
- i. "Bidder" shall mean one who submits a Bid directly to District, as distinct from a sub-bidder, who submits a Bid to the Bidder.
- j. "Bid Documents" include the Advertisement for Bids, Instructions to Bidders, Proposal, Questionnaire, the Bid Form, and the proposed Contract Documents (including all Addenda issued prior to receipts of Bids).
- k. "Change Order" shall mean a written change, addition, or deletion to the Contract Documents signed by both Contractor and the District.
- 1. "Contract" shall mean the agreement between the Successful Bidder and the District for performance of the Work.
- m. "Contract Documents" shall mean all documents that comprise the agreement of the parties related to this Project. The Contract Documents include the Notice to Contractors, Instructions to Bidders, Proposal, Questionnaire, Bid Security, Contract, Public Construction

Bond, Sworn Statement of Public Entity Crimes, Opinion of District's Attorney, Final Release of Lien, Special Conditions, General Conditions, Technical Specifications, Standard Details and Plans, including all modifications, addenda, and Change Orders contained in any documents before or after execution of the Contract

- n. "Contract Sum" shall mean the total amount due to Contractor as a result of Work on the Project, including any amounts as a result of Change Orders.
- o. "Contract Time" shall mean the time to the complete the Project as set forth in the Contract Documents. Reference to "days" shall mean calendar days unless otherwise noted.
- p. "Contractor" shall mean the Successful Bidder with whom the District signs the Contract for the Work or its duly authorized agents.
- q. "County" shall mean Palm Beach County, as may be applicable.
- r. "Defective" shall mean the Work does not conform to the Contract Documents or does not meet the requirements of any applicable inspection, reference standard, test, or approval.
- s. "District" shall mean the Loxahatchee River Environmental Control District, acting through its properly authorized representatives.
- t. "Engineer" shall mean the engineer designated by the District as its engineering representative during the course of construction to make appropriate inspection and computation of payments, whether acting directly or through properly authorized agents, inspectors or representatives of Engineer, acting within the scope of duties entrusted to them.
- u. "Final Completion" shall mean the time when Engineer determines that all Contract Document requirements have been completed.
- v. "IEEE" shall mean the Institute of Electrical and Electronic Engineers, Inc.
- w. "Notice of Award" shall mean the District's notification of the Contract to the Successful Bidder.
- x. "Notice to Proceed" shall mean the written notice from the District to the Contractor to proceed with the Work.
- y. "Plans" shall mean any and all drawings, plans, sketches, diagrams, designs, lists, exhibits, or other graphic and pictorial portions of the Contract Documents showing the design, location, and dimensions of the Work for the Project.
- z. "Pricing Schedule" shall be based upon the Bid item(s) and shall establish the value of the Contract Award. .
- aa. "Project" shall mean the entire construction to be performed as provided in the Contract Documents.

- bb. "Schedule of Values" is established between Contractor and Engineer to determine the appropriate cost of component items that were used to establish the "Pricing Schedule," and the value to be paid as Work is completed. The Schedule of Values shall be determined during the Pre-Construction Meeting.
- cc. "Specifications" shall mean the written requirements for materials, equipment, systems, standards, and workmanship for the Work, and performance of related services.
- dd. "Substantial Completion" shall mean the date as certified by Engineer when the construction of the Project or a specified part thereof is completed, in accordance with the Contract Documents and applicable permits, so that the Project or specified part can be utilized for the purposes for which it was intended; or if there be no such certification, the date when final payment is due in accordance with the Contract.
- ee. "Successful Bidder" shall mean the lowest cost, qualified, responsive, responsible Bidder to whom the District, based on the District's evaluation hereinafter provided, makes an award.
- ff. "Work" shall mean any and all obligations, duties and responsibilities necessary to the successful completion of the Project assigned to or undertaken by Contractor under the Contract Documents, including all labor, materials, equipment, services, and other incidentals and the furnishing, installation, and delivery thereof and all Work reasonably inferable therefrom.

## 10.03 Plans and Specifications are Supplementary

The Plans and Specifications are intended to supplement each other, and together constitute one complete set of Contract Documents, so that any Work exhibited in the one and not the other shall be executed just as if it has been set forth in both, in order that the Work shall be completed in every respect according to the complete design or designs as decided and determined by Engineer. In the event of a conflict in the Plans and Specifications, the Specifications shall be considered prevailing. Should Contractor find that anything is omitted from the Plans and Specifications which is necessary for a clear understanding of the Work, or that there is an error in either Plans or Specifications, Contractor shall promptly notify Engineer. From time to time during the progress of the Work, Engineer may furnish supplementary or working drawings necessary to show changes or define the Work in more detail, and these also shall be part of the Contract Documents.

#### **10.04 Handling and Distribution**

Contractor shall, at its own expense, handle, haul, deliver, and distribute all materials and all surplus materials on the different portions of the Work, as necessary. Contractor shall provide suitable and adequate storage room for materials and equipment, until the Final Completion of the Work.

Storage charges and demurrage charges by transportation companies and vendors, which result from delays in handling, shall be borne by Contractor.

#### 10.05 Materials, Samples, Inspection, Approval

Unless otherwise indicated on the Plans and Specifications or specified, only new materials and equipment shall be incorporated in the Work. All materials and equipment furnished by Contractor to be incorporated in the Work shall be subject to the inspection and approval of Engineer.

No material shall be processed for, fabricated for, or delivered to the Work without prior approval of Engineer.

Within thirty (30) calendar days after the award of the Contract, Contractor shall submit to Engineer the names and addresses of the manufacturers and suppliers of all materials and equipment proposed to be incorporated into the Work. When shop and working drawings are required as specified below, such information shall be submitted prior to the submission of the drawings so that Engineer may consider and approve or disapprove the manufacturer and/or the supplier as to the its ability to furnish a product meeting the Specifications, subject to final approval of the particular material or equipment. As requested, Contractor shall also submit data relating to the material and equipment proposed to be incorporated into the Work, in sufficient detail to enable Engineer to identify the particular product in question and to form an opinion as to its conformity to the Contract requirements.

Such data shall be submitted in a manner similar to that specified for shop and working drawings.

Facilities and labor for the handling and inspection of all materials and equipment shall be furnished by Contractor. Defective materials and equipment shall be removed immediately from the site of the Work. The Contractor will make arrangements for, and pay for soil density tests wherever and whenever the District desires, but at no less than every 1 foot lift and 400 LF of trench backfill, 1 foot lift and 100 SF of roadway subgrade and base and 1 foot lift and 100SF of fill beneath concrete on grade. If the results of a soil density test indicate that compaction is less than that specified, Contractor shall recompact and retest soil density with no additional cost to the District.

If Engineer so requires, either prior to beginning or during the progress of the Work, Contractor shall submit samples of materials for such special tests as may be necessary to demonstrate that they conform to the Specifications. Such samples, including concrete test cylinders, shall be furnished, taken, stored, packed and shipped as directed, at the expense of Contractor. Contractor shall, at its expense, furnish approved molds for making concrete test cylinders. Except as otherwise specified, the District shall make arrangements for, and pay for, the tests. All samples shall be packed so as to reach their destination in good condition, and shall be labeled to indicate the material represented, the name of the building or Work and location of which the material is intended, and the name of Contractor submitting the sample. To ensure consideration of samples, Contractor shall notify Engineer by letter that the samples have been shipped and shall properly describe the samples in the letter. In no case shall the letter of notification be enclosed with the samples.

Contractor shall submit data and samples to Engineer, or place its orders, sufficiently early to permit Engineer to consider, inspect, test, and approve the materials and equipment before they are incorporated in the Work. Delay resulting from Contractor's failure to do so shall not be used as a basis of a claim against the District or Engineer. When required, Contractor shall furnish to Engineer three (3) sworn copies of manufacturer's shop or mill tests (or reports from independent testing laboratories) relative to materials, concrete and equipment data.

After Engineer approval of the samples, data, etc., the materials and equipment used in the course of the Work shall correspond therewith.

### 10.06 Inspection of Work Away from the Site

If Work done off the construction site is to be inspected on behalf of the District during its fabrication, manufacture, or testing, or before shipment, Contractor shall give notice to Engineer of the place and time where such fabrication, manufacture, testing or shipping is to be done. Such notice shall be in writing and delivered to Engineer in ample time so that the necessary arrangements for the inspection can be made.

#### 10.07 Contractor's Shop and Working Drawings

Contractor shall submit for approval six (6) copies (unless otherwise specified in writing) of shop and working drawings of concrete reinforcement, structural details, piping layout, wiring, materials fabricated especially for this Contract, and materials and equipment for which such drawings are specifically requested. All shop and working drawing submittals shall be prepared and submitted in accordance with Section 01300 of the Technical Specifications.

## 10.08 Health, Safety and Environmental Program

The Contractor shall adhere to all applicable federal and state occupational safety and health laws as they apply to this Contract.

The Contractor will enforce the Loxahatchee River Environmental Control District's safety rules and practices as they apply to the Contractor's employee's, in addition to the Contractor's own safety rules and procedures.

The Contractor shall provide all of its subcontractors with copies of all safe working procedures and shall ensure their enforcement.

#### **10.09** Insufficiency of Safety Precautions

Failure of Contractor to provide these required conditions shall be a material breach of this Contract and the District shall be entitled to stop the Work until such time as Contractor corrects these conditions, without payment to Contractor of extension of time to complete the Work.

#### **10.10** Sanitary Regulations

Contractor shall provide adequate sanitary conveniences for the use of those employed on the worksite. Such conveniences shall be made available when the first employees arrive on the worksite, shall be properly secluded from public observation, and shall be constructed and maintained in suitable numbers and at such points and in such manner as may be required or approved.

Contractor shall maintain the sanitary facilities in a satisfactory and sanitary condition at all times and shall enforce their use. Contractor shall rigorously prohibit the committing of nuisances on the
worksite, on the lands of the District, or any adjacent property. Contractor is solely responsible for the use and maintenance of the sanitary facilities.

The District and Engineer shall have the right to inspect any building or other facility erected, maintained, or used by Contractor, to determine whether or not the sanitary regulations have been complied with.

### 10.11 Lines, Grades and Measurements

Contractor shall employ, at its own expense, a land surveyor who shall be registered in the State of Florida and who shall be thoroughly experienced in field layout work. Said surveyor shall establish all lines, elevations, reference marks, etc., needed by Contractor during the progress of the Work, and from time to time Contractor shall verify such marks by instrument or by other appropriate means.

Alignment and grade of all pipe, tunnels and borings shall be controlled by use of lasers, levels or other equipment as required to assure proper alignment and grade. Contractor shall furnish all lasers and accessories as required and approved by Engineer. Contractor's engineer will set and check each laser each day that Work is in progress or more often as required to assure continuous accurate control. Contractor's engineer responsible for lines and grades shall certify to the District in writing that the Work has been constructed to lines and grades as shown on the Plans and Specifications. This certification shall accompany each request for payment.

Engineer shall be permitted at any time to review the lines, elevations, reference marks, lasers, etc., set by Engineer employed by Contractor, and Contractor shall correct any errors in lines, elevations, reference marks, lasers, etc., disclosed by engineer. Such a review shall not be construed to be an approval of Contractor's Work and shall not relieve Contractor of the responsibility for the accurate construction of the entire Work.

Contractor shall make all measurements and review all dimensions necessary for the proper construction of the Work called for by the Plans and Specifications. During the prosecution of the Work, Contractor shall make all necessary measurements to prevent misfitting in said Work, for the accurate construction of the entire Work.

### **10.12** Dimensions of Existing Structures

Where the dimensions and locations of existing structures are of critical importance in the installation or connection of new Work, Contractor shall verify such dimensions and locations in the field before the fabrication of any materials or equipment which is dependent on the correctness of such information.

### **10.13** Work to Conform

During its progress and on its completion, all Work shall conform to the lines, levels, and grades indicated on the Plans and Specifications or given by Engineer and shall be built in a thoroughly substantial and workmanlike manner, in accordance with the Plans and Specifications and the directions given from time to time by Engineer. In no case shall any Work in excess of the requirements of the Plans and Specifications be paid for unless ordered in writing by Engineer.

All Work done without instructions having been given therefore by Engineer, done without proper lines or levels, or done during the absence of Engineer, or its agent, will not be estimated or paid for except when such Work is authorized by Engineer in writing. Work so done may be ordered uncovered or taken down, removed, and replaced at Contractor's expense.

### 10.14 Pipe Location

Pipelines will be located substantially as indicated on the Plans and Specifications, but the right is reserved by the District, acting through Engineer, to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons. Where fittings, etc., are noted on the Plans and Specifications, such notation is for Contractor's convenience and does not relieve Contractor from laying and joining different or additional items where required without additional compensation.

### 10.15 Planning and Progress Schedules

Contractor shall prepare and submit all schedule submittals in accordance with Section 01300 of the Technical Specifications.

### 10.16 Precautions During Adverse Weather

In the event of, or the possibility thereof, adverse weather, including high tides, and against the possibility thereof, Contractor shall take all necessary precautions so that the Work may be properly done and satisfactory in all respects. When required, protection shall be provided by use of tarpaulins, wood, building paper shelters, and other approved means. Contractor shall be responsible for all changes caused by adverse weather, including tidal fluctuations and Contractor shall take such precautions and procure insurance as Contractor deems prudent.

Engineer may suspend construction operations at any time when, in its sole discretion, the conditions are unsuitable or the proper precautions are not being taken, whatever the weather or tidal conditions may be, in any season.

Contractor shall provide a written tropical storm/hurricane plan consistent with District requirements to Engineer prior to commencement of construction.

### **10.17** Electrical Energy

Contractor shall make all necessary applications and arrangements and pay all fees and charges for power and light and other electrical energy as necessary for the proper completion of this Contract during its entire progress. Contractor shall provide and pay for all temporary wiring, switches, connections, and meters.

There shall be sufficient electrical lighting so that all Work may be done in a workmanlike manner when there is not sufficient daylight.

### 10.18 Bolts, Anchor Bolts and Nuts

All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by Contractor in accordance herewith.

### **10.19** Concrete Inserts

Concrete inserts shall be designed to safely support, in the concrete that is used, the maximum load that can be imposed by the bolts used in the inserts. Inserts shall be of a type which will permit locking of the bolt head or nut. All inserts shall be 316 stainless steel.

### **10.20** Operating Instructions and Parts Lists

Operations and Maintenance (O&M) Manuals for each item of equipment shall be submitted in accordance with Section 01300 of the Technical Specifications entitled "Submittals."

### 10.21 Lubricants

During testing and prior to acceptance, Contractor shall furnish all lubricants necessary for the proper lubrication of all equipment furnished under this Contract and as specified in the Contract Documents.

### 10.22 Special Tools

For each type of equipment furnished by Contractor, Contractor shall provide a complete set of all special tools (including calibration and test equipment) which may be necessary for the adjustment, operation, maintenance, and disassembly of such equipment.

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

Special tools shall be delivered at the same time as the equipment to which they pertain. Contractor shall properly store and safeguard such special tools to ensure they are in a proper functioning condition, as determined by Engineer. At the completion of the Work the special tools shall be delivered to the District.

### **10.23** Protection Against Electrolysis

Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact and any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other materials approved by Engineer.

### 10.24 Indemnification and Confidentiality

For specific consideration received by Contractor, included in the Contract sum beyond the cost of the Work, Contractor shall indemnify and hold harmless the District, its officers and employees, from liabilities, damages, losses and costs, including, but not limited to, reasonable attorney's fees, to the extent caused by the negligence, recklessness, or intentional wrongful misconduct of Contractor and persons employed or utilized by Contractor in the performance of the Contract. The monetary limitation on the extent of the indemnification that bears a reasonable commercial relationship to the

Contract and is part of the Project specifications or Bid Documents, is up to three (3) times the monetary value of the Contract. Notwithstanding the foregoing, the monetary limitation on the extent of the indemnification provided shall not be less than one million dollars (\$1,000,000.00) per occurrence. The District and the insurance carrier shall have the right to "mutually approve" the choice of attorney(s) to provide the defense, with such approval not to be unreasonably withheld. If no agreement on the choice of attorney(s) can be reached in a reasonable length of time, the final authority to choose an attorney will rest with the claims manager in the office where the claim originated.

In any and all claims against the District or any of their officers or employees by an employee of Contractor, any subcontractor, anyone directly or indirectly employed by any of them or anyone else for whose acts any of them may be liable, the indemnification obligation under this General Conditions Section 10.24 shall not be limited in any way on the amount or type of damages, compensation or benefits payable by or for Contractor or any subcontractor under worker's compensation acts, disability benefits or other employee benefit acts. The intention of these two clauses above is to provide for the legal indemnification allowed for under Section 725.06, Florida Statutes, no more and no less, so as to be completely legal and not void as against public policy. If any provision of this indemnification is determined by a court of law to be void, it shall be severed from this provision and the remainder of this provision shall be given full force and effect under Section 725.06, Florida Statutes.

In the performance of the Work, Contractor may be exposed to the confidential information of the District and other. Contractor shall not disclose to anyone not employed by the District nor use, except on behalf of the District, any such confidential information acquired in the performance of the Work except as authorized by the District in writing and, regardless of the term of this Contract, Contractor shall be bound by this obligation until such time as said confidential information shall become part of the public domain. Information regarding all aspects of the District's business and information concerning the Work (either directly or indirectly disclosed to it or developed by it in the performance of the Work) shall be presumed to be confidential except to the extent that same shall have been published or otherwise made freely available to the general public without restriction. Contractor also agrees that it will not disclose to the District any information it holds subject to any obligation or confidence to any third persons.

### 10.25 Work by Others

The District may perform additional Work related to the Project itself, or the District may engage others to perform Work on the Project which such engagement shall be governed by similar General Conditions. Contractor shall afford the other contractors who are parties to such direct contracts (or the District, if it is performing the additional Work), reasonable opportunity for the introduction and storage of materials and equipment and the execution of the Work, and shall properly connect and coordinate Contractor's Work with the Work of others. If any part of Contractor's Work depends for proper execution or results upon the Work of any such other contractor (or the District), Contractor shall inspect and promptly report to Engineer, in writing, any defects or deficiencies in such Work that render it unsuitable for such proper execution and results. Contractor's failure so to report shall constitute an acceptance of the other Work as fit and proper for the relationship of its Work except as to defects and deficiencies which may appear in the other Work after the execution of Contractor's Work.

Contractor shall do all cutting, fitting and patching of its Work that may be required to make its several parts come together properly and fit it to receive or be received by such other Work. Contractor shall not endanger any Work of others by cutting, excavating or otherwise altering their Work and will only cut or alter their Work with the written consent of Engineer and of the other contractors whose Work will be affected.

If the performance of additional Work by other contractors or the District is not noted in the Contract Documents prior to the execution of the Contract, written notice thereof shall be given to Contractor prior to the state of any such additional Work.

### 10.26 Record Drawings

Contractor shall keep and maintain one record copy of all Specifications, Plans and Specifications, Addenda, Change Orders, Modifications and Shop drawings at the site in good order and annotated to show all changes made during the construction process as specified in the Contract Documents. All record drawings shall be kept maintained and updated by Contractor in accordance with Section 01720 of the Technical Specifications entitled "Project Record Drawings."

### 10.27 Non-Waiver

Progress or final payments shall not be acceptance of improper, faulty, or defective work or material, and shall not release Contractor of any of its obligations under the Contract Documents, and shall not constitute a waiver of any rights or provisions of the Contract Documents by the District.

### 10.28 Mutuality of Provisions

If any provision of the Contract Documents shall for any reason be held to be invalid, illegal, or unenforceable in any respect under the laws of the State of Florida, any such invalidity, illegality or unenforceability shall not affect any other provision of the Contract Documents and the Contract Documents shall be construed as if such invalid, illegal, or unenforceable provision had never been incorporated herein and the rights of the parties hereto shall be construed and enforced accordingly.

### **10.29** Restoration of Property

Existing structures and facilities, including but not limited to buildings, utilities, topography, streets, curbs, walks landscape materials and other improvements that are damaged or removed due to the Work, shall be patched, repaired, or replaced by Contractor to the satisfaction of the owner of such structure and facility, and authorities having jurisdiction. In the event that authorities having jurisdiction require that such repairing and patching be done with their own labor and materials, Contractor shall abide by such regulations and pay for such work.

### 10.30 Notice

Any notice or writing given hereunder shall be delivered by depositing the notice contained in a sealed envelope, postage prepaid in the United States Postal System as registered or certified mail, with return receipt requested, or by overnight express carrier. Any such notice so deposited shall be conclusively deemed delivered to and received by the addressee forty-eight (48) hours after the deposit if all of the foregoing conditions of notice have been satisfied and addressed as follows:

DISTRICT:

CONTRACTOR:

### 10.31 Legally Binding

Contractor agrees that the Contract Documents are legally binding documents and has had the opportunity to permit its attorney to review them. The Contract Documents are the joint work product of the Parties hereto and, accordingly, no term or provision shall be more strictly construed against any party.

### (Remainder of this page left blank intentionally)

# **DIVISION 1**

# **GENERAL REQUIREMENTS**

# SECTION 01010 SUMMARY OF WORK

### PART 1 - GENERAL

### 1.01 WORK COVERED BY CONTRACT DOCUMENTS

- A. The location of the work is on-site at the Loxahatchee River District Wastewater Water Treatment Plant (WWTP) property as shown on Drawing C-1. The work is located on the District's private property. The existing water system is under the jurisdiction of Town of Jupiter.
- B. The construction drawings for the proposed reclaimed water system have been prepared by Baxter & Woodman, Inc. entitled "Irrigation Quality 511 (IQ-511) Pump Station Piping Improvements."
- C. The total work for the Irrigation Quality 511 (IQ-511) Pump Station Piping Improvements consists of furnishing all labor, materials, equipment and all incidentals and appurtenances for the installation of approximately 75 LF of 36-inch DIP reclaimed water main, bypass influent bay structure, connection to the existing wet well at the IQ-511 pump station and improvements at Diversion Structure "B" including replacement of a sluice gate, pedestal, stem cover, lighting and the addition of an electric actuator with associated power and controls. The affected roadway shall be milled and overlaid. Construction also includes dewatering, testing and <u>all</u> <u>restoration</u> work for a complete and operating system. The work will be on private property owned by the District.
- D. Except as specifically noted, the Contractor shall provide and pay for:
  - 1. Labor, materials, tools, construction equipment, and machinery.
  - 2. Other facilities and services necessary for proper execution and completion of the work.
- E. The Contractor shall comply with all codes, ordinances, rules, regulations, orders, and other legal requirements of the Loxahatchee River District, Palm Beach County, FDOT, FDEP, SFWMD, and the Army Corps of Engineers.

#### 1.02 LOCATIONS OF UTILITIES

A. Information shown on the drawings as to the location of existing utilities has been prepared from the most reliable data <u>available</u> to Baxter & Woodman; 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. Extreme caution shall be exercised to eliminate any possibility of any damage to utilities resulting from his activities.

The Contractor shall be fully responsible for any damage to utilities resulting from his operation.

The Contractor is required to subcontract with a Professional Utility Locator, to locate existing service utilities such as telephone lines, CATV, electric lines, fiber optic lines, gas lines, and any other existing facility.

The Contactor shall be responsible for the <u>immediate repair</u> of damage to existing utilities such as telephone line, CATV, underground electric lines, gas lines, stormwater facilities, septic tanks and any facility that has been marked in the field and/or on the drawings.

The Contactor shall be responsible for damages to existing landscaping, landscape lighting and electrical lines, irrigation system piping and appurtenances (irrigation heads, spray nozzles), and control wiring. Contractor shall complete the repair and restoration of damaged facilities within <u>two (2) calendar days of the damage</u>.

B. The Contractor shall determine any conflicts between existing utilities, or other structures or facilities, with the alignment or gradient of the proposed work, and report such conflicts to the District, sufficiently in advance of his construction operations so that proper adjustments in the alignment or gradient of the proposed work may be planned by the District to avoid such conflicts. The District shall not be liable for any cost or added expenses to the Contractor for delays, or for the necessary adjustment of previously installed work to avoid such conflicts, due to the Contractor's failure to advise the District of such conflicts adequately in advance of his construction operations.

### 1.03 SILTATION AND BANK EROSION

A. The Contractor shall take adequate precautions as directed by Engineer and/or regulatory agencies to minimize siltation and bank erosion in the vicinity of wetlands or coastline, in discharging well point systems, or during other construction activities (including flushing of mains).

### 1.04 STORAGE OF MATERIALS

A. Coordinate with the District and private property owners to identify and utilize

storage area(s), and agree to terms and conditions for use of the area to mobilize, and to store materials and equipment.

- B. All materials, supplies and equipment intended for use in the work shall be suitably stored by the Contractor to prevent damage from exposure, admixture with foreign substances, or vandalism or other cause. The District will refuse to accept, or sample for testing, materials, supplies or equipment that have been improperly stored, as determined by the Engineer. <u>Materials found unfit for use shall not be incorporated in the work and shall immediately be removed from the construction or storage site.</u>
  - 1. Delivered materials shall be stored in a manner acceptable to the Engineer before any payment for same will be made.
- C. When storing materials on private property, the Contractor shall submit in writing the property owner's authorization to do so and provide any and all permits that may be required at no expense to the District.

# 1.05 PRESERVATION OF PROPERTY

A. The Contractor shall preserve from damage all property along the line of the work, or which is in the vicinity of or is in any way affected by the work, the removal or destruction of which is not called for by the Drawings. Wherever such property is damaged due to the activities of the Contractor, it shall be immediately restored to its original condition by the Contractor at no cost to the District.

# 1.06 <u>CLEAN UP</u>

A. The Contractor shall keep the construction site free of rubbish and other materials and restore to their original conditions those portions of the site not designated for the alternation by the Contract Documents. Clean up and restoration shall be accomplished daily throughout the contract period and in such a manner as to maintain a minimum of nuisance and interference to the general public and residents in the vicinity of the work. The Contractor shall also remove, when no longer needed, all temporary structures and equipment used in his operation. It is the intent of this Specification that the construction areas and those other areas not designated for alteration by the Contract Documents shall be immediately restored to original condition. All clean up is subject to approval by the District.

# 1.07 <u>PUBLIC SAFETY AND CONVENIENCE</u>

A. The Contractor shall at all times so conduct his work as to ensure the least possible obstruction to traffic, or inconvenience to the general public and residents in the vicinity of the work. No road or street shall be closed to the public, except with the permission of the District and appropriate Police and Fire Department. Fire hydrants

on or adjacent to the work shall be kept accessible. Provisions shall be made by the Contractor to ensure public access to sidewalks, public telephones, and the proper functioning of all gutters, sewer inlets, drainage ditches, and irrigation ditches. No open excavation shall be left overnight. All open excavation within the roadway shall be protected with steel plating.

### 1.08 SAFETY AND OSHA COMPLIANCE

- A. The Contractor shall comply in all respects with all Federal, State and Local safety and health regulations. Copies of the Federal regulations may be obtained from the U.S. Department of Labor, Occupation Safety and Health Administration (OSHA), Washington, DC 20210 or their regional offices.
- B. The Contractor shall comply in all respects with the applicable Workman's Compensation Law.

### 1.09 <u>CONTRACTOR'S USE OF PREMISES</u>

- A. Coordinate use of premises under direction of the District. Submit in writing authorization to use the premises and provide any and all permits that may be required at no expense to the District.
- B. Assume full responsibility for the protection and safekeeping of equipment and materials stored on the site.

#### 1.10 SALVABLE MATERIALS

- A. All salvable pipe fittings, valve boxes, or other miscellaneous materials removed during construction and not used in the work shall be cleaned and delivered to the District maintenance facility office, at the Contractor's expense, and shall remain the property of the District. All other materials shall be disposed of by the Contractor at his own expense. No separate payment for this work shall be allowed.
- B. Clean fill generated from the construction shall be delivered to a site as designated by the District, or disposed of by the Contractor at his own expense. No separate payment for this work shall be allowed.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

END OF SECTION

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# SECTION 01015 MISCELLANEOUS REQUIREMENTS

### PART 1 - GENERAL

### 1.01 LINES, GRADES AND MEASUREMENTS

A. Alignment and grade of all pipe, tunnels and borings shall be continuously controlled by use of lasers or other acceptable method. Laser alignment and grade through the pipeline is the preferred method. The District Engineer shall be permitted at any time to check the lines, elevations, reference marks, laser, etc., set by the Contractor or the Design Engineer.

#### 1.02 WORK TO CONFORM

A. The maximum allowed vertical deviation of any single gravity pipe, tunnel or boring from plan grade shall be three percent (3%) of inside diameter. No single gravity pipe shall vary in horizontal alignment right or left, from the pipe centerline by more than five percent (5%) of inside diameter. Force main joint deflections shall be limited by AWWA Standards and manufacturers recommendation.

#### 1.03 <u>PIPELINE LOCATION</u>

- A. Pipelines shall not be located closer to an existing or proposed structure than the horizontal distance obtained when drawing a 45-degree angle from the proposed invert of the pipeline to bottom outside face of the footing. In no case shall this distance be less than ten (10) feet.
- B. Pipelines shall be located as indicated on the drawings, but the right is reserved to the Design Engineer to make such modifications in location as may be found desirable to avoid interference with existing structures or for other reasons, which are not material to the interest of the District and which do not otherwise conflict with any other statement or criteria set forth in this manual. The District should be notified of such changes in a timely fashion and such changes shall be recorded on as-built drawings.

#### 1.04 <u>PIPE ADAPTERS</u>

A. When joining pipes of different types, District approved transition sleeves, adapters, and couplings shall be used.

#### 1.05 <u>FITTINGS AND STOPPERS</u>

A. Branches, stubouts and fittings shall be laid as indicated in the Standard Details and shown on the approved drawings. Open ends of pipe and branches shall be closed with nonmetallic "wing nut" expansion stoppers secured in place in an acceptable manner. Stoppers shall be designed to remain in place and watertight during infiltration tests. The location of all service lines shall be marked with a District approved electronic marker sensor at the cleanout location.

### 1.06 BOLTS, ANCHOR BOLTS, AND NUTS

- A. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal. All anchor bolts, nuts, washers, plates, and bolt sleeves shall be 316 SS unless otherwise indicated or specified.
- B. Expansion bolts shall have malleable iron and lead composition elements or the required number of units and sizes.
- C. Bolts, anchor bolts, nuts and washers, specified to be galvanized shall be zinc coated, after being threaded, by the hot dip process in conformity with the ASTM Standard Specification for Zinc (Hot Galvanized) Coatings on Products Fabricated from Rolled, Pressed and Forged Steel Shapes, Plates, Bars, and Strip, Designation A123, Latest Revision, or the ASTM Standard Specifications for Zinc Coating (Hot Dip) on Iron and Steel Hardware, Designation A153, Latest Revision, as is appropriate.
- D. Bolts, anchor bolts, nuts and washers specified to be stainless steel shall be Type 316 stainless steel.
- E. Anchor bolts and expansion bolts shall be set accurately. If anchor bolts are set before the concrete has been placed, they shall be carefully held in suitable templates of approved design. If anchor or expansion bolts are set after the concrete has been placed, all necessary drilling and grouting or caulking shall be done and care shall be taken not to damage the structure or finish by cracking, chipping, spalling, or otherwise during the drilling and caulking.

### 1.07 <u>CONCRETE INSERTS</u>

A. Concrete inserts shall be designed to safely support the maximum load that can be imposed by the bolts used in the inserts. Inserts shall be of a type which will permit locking of the bolt head or nut. All inserts shall be 316 SS.

### 1.08 PROTECTION AGAINST ELECTROLYSIS

A. Where dissimilar metals are used in conjunction with each other, suitable insulation shall be provided between adjoining surfaces so as to eliminate direct contact with any resultant electrolysis. The insulation shall be bituminous impregnated felt, heavy bituminous coatings, nonmetallic separators or washers, or other approved materials.

# PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

END OF SECTION

# SECTION 01025 MEASUREMENT AND PAYMENT

### PART 1 - GENERAL

### 1.01 <u>GENERAL</u>

- A. The Contractor shall receive and accept the compensation provided in the Proposal and the Contract as full payment for performing all operations necessary to complete the work under the Contract, and also in full payment for all loss or damages between the actual quantities of work and quantities herein estimated by the Engineer, or from the action of the elements or from any unforeseen difficulties which may be encountered during the prosecution of the work until the final acceptance by the District. The Contractor shall be responsible for conforming to all permit conditions as required by all governing agencies including, but not limited to, the Palm Beach County Health Department, Florida Department of Environmental Protection, and South Florida Water Management District.
- B. Each of the prices for the individual items stated in the Proposal include all costs and expenses for taxes, labor, supervision, administration, equipment, materials, commissions, transportation charges and expenses, patent fees and royalties, labor for handling materials during inspection, together with any and all other costs and expenses for performing and completing the work as shown on the Plans and specified herein. The basis of payment for an item at the unit price shown in the Proposal shall be in accordance with the description of that item in this Section.
- C. The Contractor's attention is again called to the fact that the quotations for the various items of work are intended to establish a total price for completing the work in its entirety. Should the Contractor feel that the cost for any item of work has not been established by the Bid Form or Payment Items, he shall include the cost for that work in some other applicable bid item, so that his proposal for the project does reflect his total price for completing the work in its entirety.
- D. The District reserves the right to increase or decrease the quantities of work to be paid for at the stated unit price, whichever it deems to be in the best interest of the District.
- E. All required manufacturer testing and certification shall be included in the unit prices shown in the proposal and Contract. Density testing required for compacted backfilling, and concrete strength and materials testing required at the time of construction shall be arranged for by Contractor and paid for by the District. Water quality monitoring testing required for the dewatering permit shall be arranged for by the Contractor and paid for by the District.

- F. Any items not shown or omitted that are required for a complete installation shall be furnished and installed by the Contractor at no additional cost to the District.
- G. Payment for repair and/or replacement of existing utilities will be included in the unit price bid or the lump sum bid amount for the related new construction bid item.
- H. Existing storm sewers affected by construction shall be replaced to the line and grade of the existing storm sewer with equal of better materials. No separate payment for storm sewer restoration shall be made.
- I. The bids for the work are intended to establish a total cost for the work in its entirety. Should the Contractor feel that the cost for the work has not been established by specific items in the Bid Forms, include the cost for that work in some related bid item so that the Proposal for the project reflects the total cost for completing the work in its entirety.

# PART 2 - MATERIAL (NOT USED)

### PART 3 - EXECUTION

### 3.01 MEASUREMENT AND PAYMENT

- A. The quantities for payment under this Contract shall be determined by actual measurement of the completed items, in place, ready for service and accepted by the District, in accordance with the applicable method of measurement therefore contained herein unless otherwise stated. A representative of the Contractor shall witness all field measurements.
- B. Payment for all work completed under this Contract shall be in accordance with the provisions of the Contract and upon the basis of specific provisions of this Section of the Contract Documents. The bid items for furnishing and installing work under the Contract shall include full compensation for completing all activities not limited to selling, delivery, construction, testing and restoration, within the limits of right-of-way to right-of-way, and work areas outside of the right-of-way.

### 3.02 PAYMENT ITEMS

### **GENERAL CONDITIONS**

### A. Mobilization, Insurance and Bonds – Bid Item No. 1

1. Payment for mobilization/demobilization, bonds, insurance, scheduling, temporary facilities, permits and all other activities necessary will be made at the Contract Lump Sum (LS) bid price for this item, which price shall be full compensation for all materials, labor, equipment, tools and all other

incidentals necessary to complete this item.

- 2. For mobilization/demobilization the lump sum cost shall include, but not limited to, those operations necessary for the movement of personnel, equipment, permit fees, school site access badge fees, pay requisitions, meetings, coordination with contractors, and sub-contractors which may or may not be on this site, meetings with residents and/or government agencies, supplies and incidentals to the project site and to maintain services (mail, trash, etc.). The cost of bonds, insurance, survey layout, and clean up of site, shall also be included in this item. The cost of supervision and/or administration of the project shall be deemed to be included in each of the respective items of work bid herein.
- 3. Payment item for mobilization, insurance and bonds shall not exceed eight percent (8%) of the contract price. Should the bid price for mobilization, insurance and bonds exceed 8% of the Contract amount, any amount over the 8% will be paid with the Contractor's final payment application.

### B. <u>As-Built Record Drawings– Bid Item No. 2</u>

- 1. Payment for this item will be made at the Contract Lump Sum (LS) bid price for this item. One set of full size design drawings and an electronic AutoCAD 2018 file of the design drawings on CD will be furnished to the Contractor by the Engineer. The Contractor shall maintain full size (22" x 34") field drawings to reflect the "as-built" items of work as the work progresses.
- 2. The signed and sealed As-Built drawings prepared by professional surveyor are required to be submitted with <u>each</u> pay request. Partial payment will be made for this item based upon the percentage of work completed. All survey work shall be performed by an independent third party surveyor, licensed to practice in the State of Florida. The surveyor shall be retained by the Contractor and approved by the Engineer.
- 3. The Contractor shall provide complete record drawing information to the Engineer. This information shall include horizontal and vertical dimensions on all structures, <u>north & east coordinates</u>, lateral stationing, slopes, lines, cleanouts, and materials. Discovered utilities or utilities to be found in different locations shall also be shown on record drawings. The AutoCAD files shall be established in State Plane Coordinate System, NAD 83, Florida East Zone. The vertical datum referenced shall be NGVD 29. All EMS marker locations shall be shown on record drawings and in accordance with Engineer's directions. No payment will be made for final "as-built" drawings until both the reproducible and electronic files are received and accepted by the District.
- 4. This item does not include surveying work required for layout and alignment of utility and paving improvements.

5. Refer to Specification Section 01720.

# C. <u>Professional Audio/Video of Construction Site – Bid Item No. 3</u>

- 1. Payment for this item will be made at the Contract Lump Sum (LS) bid price for this item.
- 2. The Contractor shall provide, prior to start of construction, a video record of the entire project by a <u>professional</u> audio-video taping service acceptable to the District. The video shall document the existing site conditions prior to the Contractor mobilizing to the project and shall include all roadways, Contractor's staging area, driveways, walls, fences, landscaping area, wetland areas, etc. The entire pump station site(s) including existing wetlands shall also be videoed. Two (2) copies of the video (DVD format) shall be provided to the District for their use prior to construction activities.
- 3. Refer to Specifications Section 01360 for detailed description of suggested taping requirements.
- 4. A Professional Video Taping Company must be used for this work.

# D. <u>NPDES Permit / Erosion Protection Measures – Bid Item No. 4</u>

- 1. Payment for Contractor required NPDES Permit application (Notice of Intent and Notice of Termination), reporting by a person holding a certification as an FDEP NPDES Construction Site Inspector, and associated erosion protection measures including turbidity abatement for short-term dewatering procedures will be made at the Contract Lump Sum Price (LS) Bid for this item. The percent completion of the project shall be based on the percent of the total project actually constructed and not on the percent of the Contract price completed.
- 2. This item includes all silt fencing.

# CIVIL

# E. Excavation (Bypass Influent Bay excavation and backfill) – Bid Item No. 5

- 1. Payment for excavation and backfill furnished and installed for installation of the proposed bypass influent bay will be made at the Contract Lump Sum (LS) bid price for this item.
- 2. The Contractor's contract unit price shall include full compensation for labor, material, equipment, and cleanup necessary for excavation and backfill as required for installation of the proposed bypass influent bay as shown on the Drawings.

# F. <u>36" Ductile Iron Reclaimed Water Main Pipe, Epoxy-Lined – Bid Item No. 6</u>

1. Payment for this epoxy lined ductile iron water main pipe (CL 50) push-on

and restrained joint as indicated and shall be determined by the number of Linear Feet (LF) of each size of pipe installed, in place, completed and approved. The footage shall be the horizontal distance measured along the surface of the trench between the centerlines of connecting or branch mains. The length of all fittings, sleeves, bends and valves in the main shall not be included in the footage as typical sections of the pipeline being measured.

2. The unit price bid per foot under this item shall be full compensation for the following: unloading, stringing, excavation of any type including rock and/or muck, sheeting, shoring, dewatering, temporary plugs, backfilling, complying with the State of Florida Trench Safety Act, restraining devices, pipe location tape, all restoration (sod, irrigation repair, maintenance of balance of irrigation zones, etc.), fees for potable water required for testing, flushing, pigging, existing utility protection and other appurtenances required to complete construction of the water main and not included in other bid items. Also included is painting a 4" wide continuous purple line on the pipe.

# G. <u>Connection to Existing Reclaimed Water Main (36" Tee) – Bid Item No. 7</u>

- 1. The unit price Each (EA) for this item shall be full compensation for the furnishing and installation of reclaimed water main connections as shown on the Drawings including all adapter fittings, glands, bolts, gaskets and restraining devices, removing existing plug, all restoration work and all appurtenances and miscellaneous items of work required.
- 2. The number of connections to be paid for will be determined by the actual number of units installed and accepted but excluding all other separate bid items. Refer to Drawing C-2 for location of reclaimed water main connection.

# H. DIP Compact Fittings (Epoxy-Lined) - Bid Item No. 8

- 1. The unit price bid for this item shall be full compensation for furnishing, installing and testing compact weight fittings (epoxy coated), including restraint glands, bolts, nuts, gaskets, restraining devices and all other appurtenances for fittings. Only fittings actually installed will be measured for payment by the ton, based on certified shipping weight slips supplied by the Contractor. Provide electronic ball markers at all fittings.
- 2. This item does not include restraining devices for piping (Bid Item No. 5) or any fittings included in other bid items.

# I. Asphalt Driveway Restoration – Bid Item No. 9

- 1. Payment for this item shall be on a Square Foot (SF) basis.
- 2. Measurement of this item shall be a count of the square footage of pavement removed for installation of the proposed reclaimed water main piping. The contract unit price shall include all labor, materials, and equipment necessary

to construct the trench repair in accordance with the plans and specifications. This pay item also includes providing a temporary asphalt concrete patch until replaced with permanent overlay. Permanent overlay is also included in this bid item. Also included in this item is <u>all</u> restoration work (sod, re-establishing swales, curb replacement, <u>driveways</u>, etc.) that is required due to removing the pavement trench section.

3. The contract unit price shall include all labor, materials, and equipment necessary to prepare the sub-base, install the baserock and asphalt concrete in accordance with the plans and specifications.

# J. Furnish & Install Bahia Sod – Bid Item No. 10

- 1. Payment for this item shall be made on a square yard (SY) basis. The Contractor's unit price shall include full compensation for furnishing and installing the bahia sod including site preparation, grading, installation, watering, maintenance, etc. as indicated on the plans and details.
- 2. Sod that is diseased or in poor condition or is damaged incidental to the construction shall be replaced by the Contractor at no additional cost to the District.

# K. <u>Dewatering – Bid Item No. 11</u>

- 1. Payment for this item shall be made on a Lump Sum (LS) Basis and shall be based on the percentage of completion of the associated construction.
- 2. The Contractor's contract unit price shall include full compensation for labor, material, equipment, and cleanup necessary for providing dewatering and disposal operation for the construction of the Bypass Influent Bay. This item includes, well points, stilling basin, piping, Silent Knight pumps, pump noise mitigation and all other required dewatering appurtenances. Dewatering pumps shall have mitigation measures to reduce the noise level to less than 60 dBA measured at the base of residential structures.
- 3. Water discharge activities shall be adjusted accordingly and corrective actions taken if the water exiting the dewatering system exceeds these requirements to be complaint with all applicable regulations. Contractor shall implement best management practices (BMPs) and install pollution control devises including but not limited to settling tanks, silt barriers, and hay bales as needed to comply with discharge water quality requirements.

# MECHANICAL

# L. <u>36" Plug Valve, MJ w/ Valve Box – Bid Item No. 11</u>

1. Payment for furnishing and installing 36-inch plug valve shall be made at the Contractor's unit price Each (EA) per valve and shall include all necessary

labor and materials for furnishing and installing the valves, boxes, and appurtenances as called for on the plans.

# M. <u>36" Aluminum Sluice Gate and Stem Cover – Bid Item No. 13</u>

- 1. Payment for this item shall be on a Unit Price (EA) basis and shall include all labor, material and equipment to furnish and install the 36" aluminum sluice gate and stem cover in accordance with the plans and specifications.
- 2. This item includes full compensation for the furnishing & installation of the 36" aluminum sluice gate and stem cover and all mounting hardware and associated testing, coatings, etc. for a complete and operating installation.
- 3. Dewatering is not included in this Bid Item. Refer to Bid Item No. 11.

# N. <u>Sluice Gate Electric Actuator and Pedestal – Bid Item No. 14</u>

- 1. Payment for this item shall be on a Unit Price (EA) basis and shall include all labor, material and equipment to furnish and install the sluice gate electric actuator and pedestal in accordance with the plans and specifications.
- 2. This item includes full compensation for the furnishing & installation of the sluice gate electric actuator and pedestal and all mounting hardware and associated testing, coatings, etc. for a complete and operating installation.

# O. <u>4' x 3' Aluminum Access Hatch – Bid Item No. 15</u>

1. Payment for this item shall be on a Unit Price (EA) basis and shall include all labor, material and equipment, and all mounting hardware and associated testing, coatings, etc. to furnish and install the 4' x 3' aluminum access hatch in accordance with the plans and specifications. Payment shall be made per each (EA) access hatch installed and accepted.

# STRUCTURAL

# P. <u>Bypass Influent Bay – Bid Item No. 16</u>

- 1. Payment for this item shall be on a Lump Sum (LS) basis and shall include all labor, material and equipment, all associated hardware and testing, coatings, etc. to furnish and install the bypass influent bay in accordance with the plans and specifications. Payment shall be made based on a complete and operating system installed and accepted.
- 2. Dewatering is not included in this Bid Item. Refer to Bid Item No. 11.

# Q. <u>Sawcut Existing Wet Well Wall – Bid Item No. 17</u>

1. This item shall be paid on a Lump Sum Basis (LS) for saw-cutting the existing wet well wall to allow for the proposed bypass influent bay connection. The Contractor's lump sum price shall include full compensation for labor,

materials and equipment for saw-cutting the existing wet well to provide sufficient room for the proposed bypass influent bay connection. Contractor is responsible for disposal of all wet well material removed.

# ELECTRICAL

### R. <u>Electrical Service to Sluice Gate – Bid Item No. 18</u>

1. The Lump Sum (LS) price for this item shall be full compensation for furnishing and installing electrical service to the proposed sluice gate. The work shall include compensation for labor, materials, and equipment required to furnish and install the conduit, wire, pull boxes, grounding and related equipment. All electrical demolition, trenching, backfilling, pavement repair, sodding, and all restoration is to be included. Installation shall be in accordance with the NEC and District standards.

### S. <u>Electrical Controls and Instrumentation – Bid Item No. 19</u>

- 1. Payment for this item shall be on a Lump Sum (LS) basis.
- 2. This item includes full compensation for the furnishing & installation of the meter can, fused disconnect switch, equipment rack and all mounting hardware and associated conduit, wire and grounding, breaker panel, RIO panel modification, PLC and SCADA programming and testing for a complete and operating installation.
- 3. Refer to Electrical Drawings and Division 13 in Specifications for all required instrumentation and controls work.

# T. Lighting Including Concrete Poles and Fixtures – Bid Item No. 20

- 1. Payment for this item shall be on a Lump Sum (LS) basis.
- 2. This item includes full compensation for the furnishing & installation of the proposed lighting and all mounting hardware and associated conduit, wire and grounding, and testing for a complete and operating installation.
- 3. Refer to Electrical Drawings and Division 16 in Specifications for all required electrical work.

### END OF SECTION

# SECTION 01041 PROJECT COORDINATION

### PART 1 - GENERAL

### 1.01 <u>REQUIREMENTS INCLUDED</u>

- A. Engineer will coordinate the work between Prime Contractors as required.
- B. The Contractor shall:
  - 1. Coordinate work of his [own] employees and subcontractors.
  - 2. Expedite his work to assure compliance with schedules.
  - 3. Comply with orders and instructions of Engineer.

### 1.02 <u>RELATED REQUIREMENTS</u>

- A. Section 01152 entitled: Applications for Payment.
- B. Section 01300 entitled: Submittals.
- C. Section 01310 entitled: CPM Construction Schedule Requirements.
- D. Section 01500 entitled: Construction Facilities and Temporary Controls.
- E. Section 01700 entitled: Contract Closeout.

#### 1.03 CONSTRUCTION ORGANIZATION AND START-UP

- A. Engineer shall establish on-site lines of authority and communications:
  - 1. Schedule and conduct pre-construction meeting and progress meetings as specified in Section.
  - 2. Establish procedures for [intra-project communications]:
    - a. Submittals
    - b. Reports and records
    - c. Recommendations
    - d. Coordination of drawings
    - e. Schedules
    - f. Resolution of conflicts

- 3. Interpret Contract Documents:
  - a. Transmit written interpretations to [Prime] Contractors, and to other concerned parties.
- 4. Assist in obtaining permits and approvals:
  - a. Verify that contractor[s] and subcontractors have obtained inspections for Work and for temporary facilities.
- 5. Control the use of Site:
  - a. Allocate space for [each Prime] Contractor's use for field offices, sheds, and work and storage areas.
- 6. Inspection and Testing:
  - a. Inspect work to assure performance in accord with requirements of Contract Documents.
  - b. Administer special testing and inspections of suspect Work.
  - c. Reject Work which does not comply with requirements of Contract Documents.

### 1.04 <u>CONTRACTOR'S DUTIES</u>

- A. Construction Schedules:
  - 1. Prepare a detailed schedule of basic operations.
  - 2. Monitor schedules as work progresses:
    - a. Identify potential variances between scheduled and probable completion dates or each phase.
    - b. Recommend to Owner adjustments in schedule to meet required completion dates.
    - c. Document changes in schedule; submit to Owner, Engineer and to involved subcontractors.
  - 3. Observe work of each subcontractor to monitor compliance with schedule.
    - a. Verify that labor and equipment are adequate for the work and the schedule.
    - b. Verify that product procurement schedules are adequate.
    - c. Verify that product deliveries are adequate to maintain schedule.
    - d. Report noncompliance to Engineer, with recommendation for changes.

- B. Process Shop Drawings, Product Data and Samples:
  - 1. Prior to submittal to Engineer, review for compliance with Contract Documents:
    - a. Field dimensions and clearance dimensions.
    - b. Relation to available space.
    - c. Effect of any changes on the work of any subcontractor.
- C. Prepare Coordination Drawings as required to resolve conflicts and to assure coordination of the work of, or affected by, mechanical and electrical trades, or by special equipment requirements.
  - 1. Submit to Engineer.
  - 2. Reproduce and distribute copies to concerned parties after Engineer review.
- D. Maintain Reports and Records at Job Site, available to Engineer and Owner.
  - 1. Daily log of progress of work.
  - 2. Records
    - a. Contracts
    - b. Purchase orders
    - c. Materials and equipment records
    - d. Applicable handbooks, codes and standards
  - 3. Maintain file of record documents

#### 1.05 <u>CONTRACTOR'S CLOSE-OUT DUTIES</u>

- A. At completion of Work, conduct an inspection to assure that:
  - 1. Specified cleaning has been accomplished.
  - 2. Temporary facilities have been removed from site.
- B. Substantial Completion:
  - 1. Conduct an inspection to develop a list of Work to be completed or corrected.
  - 2. Assist Engineer in inspection.
  - 3. Supervise correction and completion of work of subcontractors.

### 1.06 ENGINEER'S CLOSE-OUT DUTIES

- A. Final Completion:
  - 1. When Contractor determines that Work is finally complete, conduct an inspection to verify completion of Work.
- B. Administration of Contract closeout:
  - 1. Receive and review contractor's final submittals.
  - 2. Transmit to Owner with recommendations for action.

### PART 2 - PRODUCTS (NOT USED)

### PART 3 - EXECUTION (NOT USED)

### END OF SECTION

# SECTION 01042 PROJECT MEETINGS

### PART 1 - GENERAL

#### 1.01 ENGINEER RESPONSIBILITIES

- A. Engineer shall schedule and administer a pre-construction meeting, periodic progress meetings, and specially called meetings throughout progress of the work. Engineer will conduct the following:
  - 1. Prepare agenda for meetings.
  - 2. Distribute written notice of each meeting four days in advance of meeting date.
  - 3. Make physical arrangements for meetings.
  - 4. Preside at meetings.
  - 5. Record the minutes; include significant proceedings and decisions.
  - 6. Reproduce and distribute copies of minutes within three days after each meeting.
    - a. To participants in the meeting.
    - b. To parties affected by decisions made at the meeting.
- B. Representatives of contractors, subcontractors and suppliers attending meetings shall be qualified and authorized to act on behalf of the entity each represents.

#### 1.02 <u>RELATED REQUIREMENTS</u>

- A. Section 01300 entitled: Submittals
- B. Section 01700 entitled: Contract Closeout

#### 1.03 <u>PRE-CONSTRUCTION MEETING</u>

- A. The preconstruction meeting shall be scheduled within 10 days after effective date of the Contract.
- B. A central site for the meeting, convenient for all parties, shall be designated by the Owner.
- C. The following shall attend:

- 1. Owner's representatives.
- 2. Contractor's superintendent.
- 3. Contractor's safety officer.
- 4. Major subcontractors.
- 5. Representatives from various utilities.
- 6. Others as appropriate and approved by the District.
- D. The suggested agenda shall be as follows:
  - 1. Distribution and discussion of:
    - a. List of major subcontractors and suppliers.
    - b. Projected construction schedules.
  - 2. Critical work sequencing.
  - 3. Major equipment deliveries and priorities.
  - 4. Project coordination and designation of responsible personnel.
  - 5. Procedures and processing of:
    - a. Field decisions.
    - b. Proposal requests.
    - c. Submittals.
    - d. Change orders.
    - e. Applications for payment.
  - 6. Adequacy for distribution of Contract Documents.
  - 7. Procedures for maintaining Record Documents.
  - 8. Use of premises.
    - a. Office, work, and storage areas.
    - b. Owner's requirements.
  - 9. Construction facilities, controls, and construction aids.
  - 10. Temporary utilities.
  - 11. Safety and first-aid procedures.
  - 12. Security procedures.
  - 13. Housekeeping procedures.

- 14. Emergency phone numbers.
- 15. Miscellaneous.

### 1.04 PROGRESS MEETINGS

- A. Engineer shall schedule regular periodic (monthly) meetings.
- B. Progress meetings shall be held a location as directed by the Owner.
- C. The following shall attend:
  - 1. Owner representatives
  - 2. Other representatives
  - 3. Contractor's superintendent
  - 4. Subcontractors as appropriate to the agenda
  - 5. Suppliers as appropriate to the agenda
  - 6. Others
- D. The suggested agenda shall be as follows:
  - 1. Review, approval, of minutes of previous meeting.
  - 2. Review of work progress since previous meeting.
  - 3. Field observations, problems, conflicts.
  - 4. Problems which impede construction schedule.
  - 5. Review of off-site fabrication delivery schedules.
  - 6. Corrective measures and procedures to regain projected schedule.
  - 7. Revisions to construction schedule.
  - 8. Progress, schedule, during succeeding work period.
  - 9. Coordination of schedules.
  - 10. Review of submittal schedules; expedite as required.
  - 11. Maintenance of quality standards.
  - 12. Pending changes and substitutions.
  - 13. Review proposed changes for:
    - a. Effect on construction schedule and on completion date.

- b. Effect on other contracts relating to the project.
- 14. Review of record drawings.
- 15. Other business.

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

END OF SECTION

# SECTION 01050 MOBILIZATION

### PART 1 - GENERAL

#### 1.01 WORK INCLUDED

A. This section covers the work necessary for the movement of personnel, equipment, supplies and incidentals, the establishment and removal of temporary offices and the maintaining of services (mail, trash, & etc.), bonds, insurance, traffic control, survey layout, and site clean up.

#### **PART 2 - PRODUCTS**

#### 2.01 <u>GENERAL</u>

A. Provide all materials and equipment required to accomplish the work as specified.

#### **PART 3 - EXECUTION**

#### 3.01 MAINTAIN SERVICES

- A. Maintain postal services facilities in accordance with the requirements of the U.S. Postal Service. Move mailboxes to temporary locations designated by the Postal Service, and upon completion of work in each area, replace them in their original location in accordance with Postal Service Regulations.
- B. Maintain trash pickup facilities in accordance with the requirements of the Palm Beach County Solid Waste Authority. Move trash pickup to temporary locations designated by the Solid Waste Authority, and upon completion of work in each area, notify the Solid Waste Authority that normal pickups may resume.

#### 3.02 TRAFFIC CONTROL

- A. Traffic Routing:
  - 1. Prior to starting work at project site, Contractor shall submit traffic routing plans in accordance with Florida Department of Transportation Standards, to the Owner, and to the Engineer, for review showing:
    - a. Sequences of construction affecting the use of roadways.

- b. Time required for each phase of work.
- c. Provisions for decking over excavations or phasing of operations, or a combination of both methods, to provide necessary access.
- d. Signing, barricading, and striping to provide:
  - 1) Passages for pedestrians.
  - 2) Number and width of vehicular lanes over and adjacent to trenches and other excavations.
- 2. Contractor shall comply with the requirements of Palm Beach County and the FDOT for traffic regulations and road constructions.
- B. Signs and Equipment:
  - 1. Furnish at the site, or convenient to and immediately available to the site, the following signs and equipment:
    - a. Barricades, as required by FDOT, in sufficient quantity to safeguard the public and the work.
    - b. Portable "TOW-AWAY NO STOPPING" signs, placed where approved by police department and OWNER.
    - c. Traffic cones, to delineate traffic lanes to guide and separate traffic movements.
  - 2. Signs and equipment shall conform to requirements of the FDOT.
- C. Traffic Safety and Access:
  - 1. Comply with rules and regulations of the city, county, and state authorities regarding closing or restricting the use of public streets or highways. No public or private road shall be closed, except by written permission of the proper authority. Assure the least possible obstruction to traffic.
  - 2. Provide temporary access driveways where required.
  - 3. Provide signs, signals, cones, barricades and trained flagmen to direct traffic in and around the construction site in accordance with Florida Department of Transportation Work Zone Traffic Control Standards.
  - 4. Notify the fire department and police department before closing any street or portion thereof. Notify said departments when the streets are again passible for emergency vehicles. Conduct operations with the least interference to fire equipment access, and at no time prevent such access.

### 3.03 <u>SURVEY LAYOUT</u>

A. Employ a Land Surveyor registered in the State of Florida and acceptable to the

Engineer to perform all field surveys.

- B. Contractor shall locate and protect survey control and reference points.
- C. Control datum for survey is NGVD 1929.
- D. Provide field engineering services. Utilize land surveyor to establish elevations, lines, and levels, utilizing recognized survey practices.
- E. Submit signed and sealed certification prepared by the Land Surveyor that the elevations and locations of the Work are in conformance with the Contract Documents.
- F. Surveyor's Responsibilities
  - 1. Engineer will furnish Autocad file of all applicable Drawings for surveyor's use in plotting Record Drawing information.
  - 2. Record information is to be plotted on mylars. Signed and sealed prints are to be submitted at appropriate stages of construction as designated by the Engineer. One complete set will be required for Health Department approval.
  - 3. Mark information on the Drawing in a manner that indicates which elevations and dimensions have been checked. This is to be done by crossing through the design elevation or dimension and placing the Record information next to it. If an elevation or dimension has not changed, the same procedure should be followed to confirm that it has been checked. Add new information in a manner to indicate that it is Record information and not design information.
  - 4. Each Record Drawing sheet must include the surveyor's name, company, address, and registration number.
  - 5. At the conclusion of the Project, return the Record Drawing mylars and one final set of signed and sealed prints to the Engineer for permanent record keeping.

### 3.04 <u>CLEANUP</u>

- A. Progress Cleaning
  - 1. Maintain all construction areas free of waste materials, debris, and rubbish. Maintain all sites in a clean and orderly condition.
  - 2. To prevent dust periodically water bare soil, unpaved streets, roads, detours, and haul roads.
  - 3. Broom and vacuum clean areas prior to start of surface finishing, and continue cleaning to eliminate dust.

- 4. Remove waste materials, debris, and rubbish from site weekly and dispose of at approved location.
- 5. Always keep roadways, sidewalks and bicycle paths clear of construction debris and trash.
- B. Upon completion and acceptance of work, remove from the site all equipment and all debris, unused materials, temporary facilities, and other miscellaneous items resulting from or used in the operations. Replace or repair any facility which has been damaged during construction work. Restore the site to the original condition or better.

# END OF SECTION

# SECTION 01090 REFERENCE STANDARDS

### PART 1 - GENERAL

#### 1.01 <u>REQUIREMENTS INCLUDED</u>

A. Abbreviation and acronyms used in Contract Documents to identify reference standards.

#### 1.02 **QUALITY ASSURANCE**

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

#### 1.03 ABBREVIATIONS, NAMES, AND ADDRESSES OR ORGANIZATIONS

- A. Obtain copies of referenced standards direct from publication source, when needed for proper performance of Work, or when required for submittal by Contract Documents.
  - AA Aluminum Association 818 Connecticut Avenue, N.W. Washington, DC 20006
  - AABC Associated Air Balance Council 1000 Vermont Avenue, N.W. Washington, DC 20005
  - AASHTO American Association of State Highway & Transportation Officials 444 North Capitol Street, N.W. Washington, DC 20001

ACI	American Concrete Institute Box 19150 Redford Station Detroit, MI 48219
ADC	Air Diffusion Council 435 North Michigan Avenue Chicago, IL 60611
AI	Asphalt Institute Asphalt Institute Building College Park, MD 20740
AISC	American Institute of Steel Construction 1221 Avenue of the Americas New York, NY 10020
AISI	American Iron and Steel Institute 1000 16th Street, N.W. Washington, DC 20036
AMCA	Air Movement and Control Association 30 West University Drive Arlington Heights, Il 60004
ANSI	American National Standards Institute 1430 Broadway New York, NY 10018
ARI	Air-Conditioning and Refrigeration Institute 1815 North Fort Myer Drive Arlington, VA 22209
ASHRAE	American Society of Heating, Refrigerating & Conditioning Engineers 345 East 47th Street New York, NY 10017
ASME	American Society of Mechanical Engineers 345 East 47th Street New York, NY 10017
ASPA	American Sod Producers Association Association Building Ninth and Minnesota Hastings, NE 68901
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ASTM	American Society of Testing & Materials 1916 Race Street Philadelphia, PA 19103
AWWA	American Water Works Association 6666 W. Quincy Avenue Denver, CO 80235
AWI	Architectural Woodwork Institute 2310 South Walter Reed Drive Arlington, VA 22206
AWPA	American Wood-Preserver's Association 7735 Old Georgetown Road Bethesda, MD 20014
AWS	American Welding Society 2501 NW 7th Street Miami, FL 33125
CDA	Cooper Development Association 57th Floor, Chrysler Building 405 Lexington Avenue New York, NY 10017
CLFMI	Chain Link Fence Manufacturers Institute 1101 Connecticut Avenue Washington, DC 20036
CRSI	Concrete Reinforcing Steel Institute 180 North LaSalle Street, Suite 2110 Chicago, IL 60601
MF	Factory Mutual System 1151 Boston Providence Turnpike Norwood, MA 02062

FS	Federal Specification General Services Administration Specifications and Consumer Information Distribution Section (WFSIS) Washington Navy Yard, Bldg. 197 Washington, DC 20407
GA	Gypsum Association 1603 Orrington Avenue Evanston, IL 60201
MIL	Military Specification Naval Publications and Forms Center 5801 Tabor Avenue Philadelphia, PA 19120
MLSFA	Metal Lath/Steel Framing Association 221 North LaSalle Street Chicago, IL 60601
NAAMM	National Association of Architectural Metal Manufacturers 221 North LaSalle Street Chicago, IL 60601
NEBB	National Environmental Balancing Bureau 8224 Old Courthouse Road Vienna, VA 22180
NEMA	National Electrical Manufacturer's Association 2101 L Street, N.W. Washington, DC 20037
NFPA	National Fire Protection Association 470 Atlantic Avenue Boston, MA 02210
NFPA	National Forest Products Association 1619 Massachusetts Avenue, N.W. Washington, DC 20036
NTMA	National Terrazzo and Mosaic Association 3166 Des Plains Avenue Des Plains, Il 60018

PCA	Portland Cement Association 5420 Old Orchard Road Skokie, IL 20076
PCI	Prestressed Concrete Institute 20 North Wacker Drive Chicago, IL 60606
PS	Product Standard U.S. Department of Commerce Washington, DC 20203
RCSHSB	Red Cedar Shingle & Handsplit Shake Bureau 515 116th Avenue Bellevue, WA 98004
SDI	Steel Deck Institute Box 3812 St. Louis, MO 63122
SDI	Steel Door Institute 712 Lakewood Center North Cleveland, OH 44107
SIGMA	Sealed Insulating Glass Manufacturers Association 111 East Wacker Drive Chicago, IL 60601
SJI	Steel Joist Institute 1703 Parham Road, Suite 204 Richmond, VA 23229
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association 8224 Old Court House Road Vienna, VA 22180
TAS	Technical Aid Series Construction Specifications Institute 1150 Seventeenth Street, N.W. Washington, DC 20036

TCA	Tile Council of America, Inc.
	Box 326
	Princeton, NJ 08540

UL Underwriter's Laboratories, Inc. 333 Pfingston Road Northbrook, Il 60062

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

# SECTION 01152 APPLICATION FOR PAYMENT

# PART 1 - GENERAL

### 1.01 <u>REQUIREMENTS INCLUDED</u>

A. Submit Applications for Payment to Engineer in accordance with the schedule established by Conditions of the Contract and herein.

# 1.02 <u>RELATED REQUIREMENTS</u>

- A. Agreement Between Owner and Contractor: Lump Sum and Unit Price.
- B. Conditions of the Contract: Progress Payments, Retainage and Final Payment.
- C. Section 01153 entitled: Change Order Procedures.
- D. Section 01370 entitled: Schedule of Values.
- E. Section 01700 entitled: Contract Closeout.

#### 1.03 FORMAT AND DATA REQUIRED

- A. Submit applications in the form required by Owner, with itemized data typed on  $8\frac{1}{2} \times 11$ -inch white paper continuation sheets.
- B. Provide itemized data on continuation sheet:
  - 1. Format, schedules, line items and values: Those of the Schedule of Values accepted by Engineer.

#### 1.04 PREPARATION OF APPLICATION FOR EACH PROGRESS PAYMENT

- A. Application Form:
  - 1. Fill in required information, including that for Change Orders executed prior to date of submittal of application.
  - 2. Fill in summary of dollar values to agree with respective totals indicated on continuation sheets.
  - 3. Execute certification with signature of a responsible officer of Contract firm.

4. Include updated project schedule and progressive record drawings.

# B. Continuation Sheets:

- 1. Fill in total list of all scheduled component items of work, with item number and scheduled dollar value for each item.
- 2. Fill in dollar value in each column for each scheduled line item when work has been preformed or products stored.
  - a. Round off values to nearest dollar, or as specified for Schedule of Values.
- 3. List each Change Order executed prior to date of submission at the end of the continuation sheets.
  - a. List by Change Order Number, and description, as for an original component item of work.

# 1.05 <u>SUBSTANTIATING DATA FOR PROGRESS PAYMENTS</u>

- A. When the Owner or the Engineer requires substantiating data, Contractor shall submit suitable information, with a cover letter identifying:
  - 1. Project
  - 2. Application number and date.
  - 3. Detailed list of enclosures.
  - 4. For stored products:
    - a. Item number and identification as shown on application.
    - b. Description of specific material.
- B. Submit one copy of data and cover letter for each copy of application.

# 1.06 PREPARATION OF APPLICATION FOR FINAL PAYMENT

- A. Fill in Application form as specified for progress payments.
- B. Use continuation sheet for presenting the final statement of accounting as specified in Section 01700 Contract Closeout.

# 1.07 <u>SUBMITTAL PROCEDURE</u>

A. Submit Applications for Payment to Engineer at the times stipulated.

- B. Number: Four (4) copies of Application.
- C. When Engineer finds Application properly completed and correct, he will transmit certificate for payment to Owner, with copy to Contractor.

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

# SECTION 01153 CHANGE ORDER PROCEDURES

# PART 1 - GENERAL

### 1.01 <u>REQUIREMENTS INCLUDED</u>

- A. Promptly implement change order procedures.
  - 1. Provide full written data required to evaluate changes.
  - 2. Maintain detailed records of work done on time and material/force account basis.
  - 3. Provide full documentation to Engineer on request.
- B. Designate in writing the member of Contractor's organization:
  - 1. Who is authorized to accept changes in the work.
  - 2. Who is responsible for informing others in the Contractor's employ of the authorization of changes in the work.
- C. District will designate in writing the person who is authorized to execute Change Orders.

#### 1.02 <u>RELATED REQUIREMENTS</u>

- A. Agreement: The amounts of established unit prices.
- B. Special Conditions and General Conditions.
- C. Conditions of the Contract:
  - 1. Methods of determining cost or credit to District resulting from changes in Work made on a time and material basis.
  - 2. Contractor's claims for the additional cost.
- D. Section 01152 entitled: Application for Payment.
- E. Section 01310 entitled: CPM Construction Schedule Requirements.
- F. Section 01370 entitled: Schedule of Values.
- G. Section 01700 entitled: Contract Closeout.

### 1.03 **DEFINITIONS**

- A. Change Order: See Special Conditions and General Conditions.
- B. Construction Change Authorization: A written order to the Contractor, signed by District and Engineer, which amends the Contract Documents as described, and authorizes Contractor to proceed with a change which affects the Contract Sum or the Contract Time, for inclusion in a subsequent Change Order.
- C. Field Order: A written order, instructions, or interpretations, signed by Engineer making minor changes in the Work not involving a change in Contract Sum or Contract Time.

# 1.04 PRELIMINARY PROCEDURES

- A. District or Engineer may initiate changes by submitting a Proposal Request to Contractor. Request will include:
  - 1. Detailed description of the Change, products, and location of the change in the Project.
  - 2. Supplementary or revised Drawings and Specifications.
  - 3. The projected time span for making the change, and a specific statement as to whether overtime work is, or is not, authorized.
  - 4. A specific period of time during which the requested price will be considered valid.
  - 5. Such request is for information only, and is not an instruction to execute the changes, nor to stop Work in progress.
- B. Contractor may initiate changes by submitting a written notice to Engineer, containing:
  - 1. Description of the proposed changes.
  - 2. Statement of the reason for making the changes.
  - 3. Statement of the effect on the Contract Sum and the Contract Time.
  - 4. Statement of the effect on the work of separate contractors.
  - 5. Documentation supporting any change in Contract Sum or Contract Time, as appropriate.

### 1.05 <u>CONSTRUCTION-CHANGE AUTHORIZATION</u>

- A. In lieu of Proposal Request, Engineer may issue a construction change authorization for Contractor to proceed with a change for subsequent inclusion in a Change Order.
- B. Authorization will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change, and will designate the method of determining any change in the Contract Sum and any change in Contract Time.
- C. District and Engineer will sign and date the Construction Change Authorization as authorization for the Contractor to proceed with the changes.
- D. Contractor shall sign and date the Construction Change Authorization to indicate agreement with the terms therein.

# 1.06 DOCUMENTATION OF PROPOSALS AND CLAIMS

- A. Support each quotation for a lump-sum proposal, and for each unit price which has not previously been established, with sufficient substantiating data to allow Engineer to evaluate the quotation.
- B. On request provide additional data to support time and cost computations:
  - 1. Labor required.
  - 2. Equipment required.
  - 3. Products required.
    - a. Recommended sources of purchase and unit cost.
    - b. Quantities required.
  - 4. Taxes, insurance and bonds.
  - 5. Credit for work deleted from Contract, similarly documented.
  - 6. Overhead and profit.
  - 7. Justification for any change in Contract Time.
- C. Support each claim for additional costs, and for work done on a time-andmaterial/force account basis, with documentation as required for a lump-sum proposal, plus additional information:
  - 1. Name of District's authorized agent who ordered the work, and date of the order.

- 2. Dates and times work was performed, and by whom.
- 3. Time record, summary of hours worked, and hourly rates paid.
- 4. Receipts and invoices for:
  - a. Equipment used, listing dates and times of use.
  - b. Products used, listing of quantities.
  - c. Subcontractors.
- D. Document requests for substitutions for Products as specified in Section 01630.

# 1.07 <u>PREPARATION OF CHANGE ORDERS</u>

- A. Engineer will prepare each Change Order.
- B. District's Form, per example provided by the Engineer.
- C. Change Order will describe changes in the Work, both additions and deletions, with attachments of revised Contract Documents to define details of the change.
- D. Change Order will provide an accounting of the adjustment in the Contract Sum and in the Contact Time.

# 1.08 <u>LUMP-SUM/FIXED PRICE CHANGE ORDER</u>

- A. Content of Change Orders will be based on, either;
  - 1. Engineer's Proposal Request and Contractor's responsive Proposal as mutually agreed between District and Contractor.
  - 2. Contractor's Proposal for a change, as recommended by Engineer.
- B. District and Engineer will sign and date the Change Order as authorization for the Contractor to proceed with the changes.
- C. Contractor shall sign and date the Change Order to indicate agreement with the terms therein.

# 1.09 <u>UNIT PRICE CHANGE ORDER</u>

- A. Content of Change Orders will be based on, either:
  - 1. Engineer's definition of the scope of the required changes.
  - 2. Contractor's Proposal for a change, as recommended by Engineer.

- 3. Survey of completed work.
- B. The amounts of the unit prices to be:
  - 1. Those stated in the Agreement.
  - 2. Those mutually agreed upon between District and Contractor.
- C. When quantities of each of the items affected by the Change Order can be determined prior to start of the work:
  - 1. District and Engineer will sign and date the Change Order as authorization for Contractor to proceed with the changes.
  - 2. Contractor shall sign and date the Change Order to indicate agreement with the terms herein.
- D. When quantities of the items cannot be determined prior to start of the work:
  - 1. Engineer or District will issue a construction change authorization directing Contractor to proceed with the change on the basis of unit prices, and will cite the applicable unit prices.
  - 2. At completion of the change, Engineer will determine the cost of such work based on the unit process and quantities used.
    - a. Contractor shall submit documentation to establish the number of units of each item and any claims for a change in Contract Time.
  - 3. Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
  - 4. District and Contractor will sign and date the Change Order to indicate their agreement with the terms therein.

# 1.10 <u>TIME AND MATERIAL/FORCE ACCOUNT CHANGE ORDER/ CONSTRUCTION</u> <u>CHANGE AUTHORIZATION</u>

- A. Engineer and District will issue a Construction Change Authorization directing Contractor to proceed with the changes.
- B. At completion of the change, Contractor shall submit itemized accounting and supporting data as provided in the Article "Documentation of Proposals and Claims" of this Section.
- C. Engineer will determine the allowable cost for such work, as provided in General Conditions and Supplementary Conditions.

- D. Engineer will sign and date the Change Order to establish the change in Contract Sum and in Contract Time.
- E. District and Contractor will sign and date the Change Order to indicate their agreement therewith.

# 1.11 CORRELATION WITH CONTRACTOR'S SUBMITTALS

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

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

# SECTION 01300 SUBMITTALS

# PART 1 - GENERAL

#### 1.01 <u>REQUIREMENTS</u>

A. Submittals include the preconstruction audio-video recording, traffic control plan, project schedule, shop drawings, product data and samples, and record documents including as-built drawings.

#### 1.02 <u>RELATED REQUIREMENTS</u>

- A. Definitions and additional responsibilities of parties: General Conditions of the Contract.
- B. Section 01360 entitled: Pre-Construction Audio-Video Documentation
- C. Section 01700 entitled: Contract Closeout

#### 1.03 PROJECT SCHEDULE

- A. Prior to the preconstruction meeting, the Contractor shall submit to the Engineer for review and approval, a project schedule (Refer to Section 01310) showing the approximate dates on which each part or division of the work is expected to start and finish.
- B. The schedule shall be updated and submitted to the Engineer at the end of each month, whenever the work deviates substantially from the schedule, or any time the Engineer requests an updated schedule.

#### 1.04 <u>SHOP DRAWINGS</u>

- A. Shop drawings shall be presented in a clear and thorough manner. Details shall be identified by reference to sheet and detail and schedule.
- B. Minimum sheet size shall be  $8 \frac{1}{2} \times 11$  inches.

#### 1.05 PRODUCT DATA AND SAMPLES

- A. Preparation
  - 1. Clearly mark each copy to identify pertinent products or models.

- 2. Show performance characteristics and capacities.
- 3. Show dimensions and clearances required.
- 4. Show wiring or piping diagrams and controls.
- B. Manufacturer's standard schematic drawings and diagrams:
  - 1. Modify drawings and diagrams by deleting information which is not applicable to the work.
  - 2. Supplement standard information to provide information specifically applicable to the work.

# 1.06 ADDITIONAL SUBMITTALS

1. Submittal of the preconstruction audio-video recording, traffic control plan, and record documents are described in Sections 01360 and 01720, respectively.

# 1.07 <u>CONTRACTOR'S RESPONSIBILITIES</u>

- A. Review shop drawings, product data, and samples prior to submission.
- B. Determine and verify:
  - 1. Field measurements
  - 2. Field construction criteria
  - 3. Catalog numbers and similar data
  - 4. Conformance with specifications
- C. Coordinate each submittal with requirements of the work and of the Contract Documents.
- D. Notify the Engineer in writing, at the time of submission, of any deviations in the submittals from requirements of the Contract Documents.
- E. Begin no fabrication or work which requires approved submittals until return of submittals by the Engineer.
- F. Provide a submittal register listing all anticipated submittals.

# 1.08 SUBMISSION REQUIREMENTS

A. Make submittals in such sequence as to cause no delay in the work.

- B. Number of submittals required:
  - 1. Shop drawings and product date: Submit electronic version of each shop drawing submittal in .pdf format.
  - 2. Samples: Submit the quantity stated in each specification section.
- C. Submittals shall contain:
  - 1. The date of submission and the dates of any previous submissions.
  - 2. The project title and number.
  - 3. Contract identification.
  - 4. The names of:
    - a. Contractor
    - b. Supplier
    - c. Manufacturer
  - 5. Identification of the product, with the specification section number
  - 6. Field dimensions, clearly identified as such.
  - 7. Relation to adjacent or critical features of the work or materials.
  - 8. Applicable standards, such as ASTM or federal specification numbers.
  - 9. Identifications of deviations from Contract Documents.
  - 10. Identification of revisions on resubmittals.
  - 11. Contractor's stamp initialed or signed, certifying review of submittal, verification of products, field measurements and field construction criteria, and coordination of the information within the submittal with requirements of the work and of Contract Documents.

# 1.09 <u>RESUBMISSON REQUIREMENTS</u>

- A. Make any corrections or changes in the submittals noted by the Engineer and resubmit unless otherwise noted.
- B. Shop drawings and product data:
  - 1. Revise initial drawings or data, and resubmit as specified for the initial submittal.
  - 2. Indicate any changes which have been made other than those suggested by the Engineer.

C. Samples: Submit new samples as required for initial submittal.

# 1.10 ENGINEER'S DUTIES

- A. Review submittals within 14 working days or in accord with schedule.
- B. Affix stamp and initials or signature, and indicate status of submittal.
- C. Return submittals to Contractor for distribution, or resubmission.
- D. <u>Review initial submittals and one resubmittal.</u> Resubmittals that cannot be approved will be returned. Additional resubmittals will be reviewed by the Engineer, and costs for time and materials for reviewing resubmittals will be back charged by the District to the Contractor.

# 1.11 <u>SUPPLEMENTS</u>

- A. The supplements listed below, following "END OF SECTION" are part of this specification.
  - 1. Forms: Transmittal of Contractor's Submittal

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

TRANSMITTAL OF CONTRACTOR'S SUBMITTAL

(Attach to Each Submittal)

-						
то:			ıbmittal No.: _			
		_ 🗆 New Submittal 🛛 Resubmittal				
		Previous Submittal No.: Project: Project No.				
		Specification Section No.:				
FROM: Contractor		(Cover only one section with each transmittal) Schedule Date of Submittal:				
SUBMITTAL 1	TYPE:  Shop Drawing Quality Control	- - C - S	Contract Clos Sample	seout 🗆 "C	)r-Equal"/Sเ	ubstitute
Number of         Description of Item Submitted		、 、	Spec.	Drawing or	Contains Variation	
Copies	(Type, Size, Model Number, Etc	5.)	Para. No.	Brochure Number	No	Yes

CONTRACTOR hereby certifies that (i) CONTRACTOR has complied with the requirements of Contract Documents in preparation, review, and submission of designated Submittal and (ii) the Submittal is complete and in accordance with the Contract Documents and requirements of laws and regulations and governing agencies.

By: \_

CONTRACTOR (Authorized Signature)

DATE: \_\_\_\_\_

# SECTION 01310 CPM CONSTRUCTION SCHEDULE REQUIREMENTS

# PART 1 - GENERAL

### 1.01 <u>GENERAL</u>

- A. This section covers the requirements for submittal of a critical path method (CPM) construction schedule and an associated schedule of values.
- B. Development of the schedule, the cost loading of the schedule, monthly payment requisitions, and project status reporting requirements of the contract shall employ computerized CPM scheduling. The CPM schedule shall be cost loaded based on the schedule of values or unit bid prices or combination thereof.

### 1.02 INITIAL SCHEDULE SUBMITTALS

- A. Submit two short-term schedule documents at the preconstruction conference and as described in the subsection on "Submittals" which shall serve as the Contractor's plan of operation for the initial 60-day period of the contract time and to identify the manner in which the Contractor intends to complete all work within the contract time. Submit (1) a 60-day narrative plan of operation, describing in detail narrative how contract operations will be conducted, and (2) a project overview bar-chart type plan for all work as indicated below.
  - 1. 60-Day Narrative Plan of Operation: During the initial 60 days of the contract time, conduct contract operations in accordance with the 60-day detail narrative and bar chart plan of operation. The bar chart shall show the accomplishment of the Contractor's early activities (mobilization items, permits, submittals necessary for early material and equipment procurement, submittals necessary for long lead equipment procurement, CPM submittals, initial site work, and other submittals and activities required in the first 60 days).
  - 2. Comprehensive Project Overview Bar Chart: The comprehensive overview bar chart shall indicate the major components of the project work and the sequence relations between major components and subdivisions of major components. The overview bar chart shall indicate the relationships and time frames in which the various components of the work will be substantially complete and placed into service in order to meet the project milestones. Sufficient detail shall be included for the identification of subdivisions of major components into such activities as potholing, excavation, bedding and pipe installation, backfilling, surface restoration, tunneling, structures, relocations, improvements, and other important work for each major facility within the overall project scope. Indicate planned durations and start dates for each work item subdivision.

Plot each major component and subdivision component on time scale sheets not to exceed 24 inches by 36 inches in size. Do not use more than four sheets to represent this overview information.

- B. The District's Representative and the Contractor shall meet to review and discuss the narrative 60-day plan of operations and project overview bar chart within 5 days after they have been submitted to the District's Representative. The District's Representative's review and comment on the schedules shall be limited to contract conformance (with the sequencing and interim duration requirements). Make corrections to the schedules necessary to comply with the contract requirements, and adjust the schedules to incorporate any missing information requested by the District's Representative.
- C. Satisfactory incorporation of the District's Representative's comments shall be a condition for progress payments.

# 1.03 <u>CPM PROGRAM</u>

A. Use PRIMAVERA (R) P-6 software for the CPM schedule, as approved by the District's Representative. If software other than one of the programs named above is used, provide licensed copy and training to District's Representative.

# 1.04 <u>SUBMITTALS</u>

- A. Within three calendar days of the Notice to Proceed, submit a written statement of CPM capability, verifying that the Contractor has qualified in-house personnel capable of using the CPM technique or that the Contractor employs a qualified CPM consultant. The statement shall identify the individuals who will perform the CPM scheduling and provide those individuals' detailed resumes. Capability shall be verified by detailed description of construction projects and references on which the individuals have successfully applied computerized CPM and shall include at least three projects of similar nature, scope, and value not less than one-half the total bid price of this project. The statement shall also provide the contact persons for the referenced projects with current telephone and address information.
- B. Submit an initial schedule within ten days of the date of Notice to Proceed. If revisions are required to this initially submitted schedule, resubmit a revised schedule within five calendar days after the Contractor receives the returned copy.
- C. Submit graphic network diagram and tabulated schedules within 30 days of the Notice to Proceed.
- D. Within 10 days after the conclusion of District's Representative's review, revise the network diagram and resubmit the network diagram and a tabulated schedule produced therefrom. The revised network diagram and tabulated schedule will be reviewed and accepted or rejected by District's Representative within 15 days

after receipt. The network diagram and tabulated schedule when accepted by District's Representative shall constitute the project work schedule unless a revised schedule is required due to substantial changes in the work or a change in contract time, delinquency by Contractor requiring a recovery schedule, or as otherwise provided herein below. Activities not occurring as scheduled are delinquent if they begin after early start or they finish after early finish.

- E. Submit a copy of the schedule, clearly showing progress made and actual "S" curves, on a monthly basis along with the Application for Payment.
- F. Schedule submittals to the District's Representative shall include eight hard copies and one electronic copy of a CPM-type construction schedule, generally as outlined in the Associated General Contractors Publication the Use of CPM in Construction.
- G. Submit a preliminary schedule of values for the major components of the work within three days of the Notice to Proceed.
- H. Prepare and submit a detailed schedule of values to the District's Representative within 30 days from the date of Notice to Proceed.

### 1.05 **PROJECT INFORMATION**

- A. Each network diagram and report tabulation shall be prefaced with the following summary data:
  - 1. Project name.
  - 2. Contractor.
  - 3. Type of tabulation (initial or updated).
  - 4. Project duration.
  - 5. Project contract completion date.
  - 6. Projected completion date.
  - 7. Variance analysis per activity.

# 1.06 GRAPHIC NETWORK DIAGRAM AND TABULATED SCHEDULES

A. The completed schedule shall include a graphic network and tabulated schedules with the graphic network displayed on a sheet with a minimum size of 11 inches by 17 inches and a maximum size of 24 inches by 36 inches. The graphic network shall be the precedence diagram method (PDM). It may be divided into two or more sheets, if necessary, provided that all sheets are properly referenced. Notation on each activity arrow shall include a brief work description and an estimate of the time duration of the work. Show a calendar along the full length of each sheet. Plot each activity so that the beginning and completion dates can be readily determined by comparison to the calendar scale. Show activities using symbols and/or color that clearly designate whether it is a critical path or noncritical activity. Noncritical path activities shall show estimated work time and free float time.

- B. Float Time:
  - 1. Definition: Unless otherwise provided herein, float as referenced in these documents is total float. Total float is the period of time measured by the number of working days each noncritical path activity may be delayed before it and its succeeding activities become part of the critical path. If a noncritical path activity is delayed beyond its float period, that activity then becomes part of the critical path and controls the end date of the project. Thus, the delay of the noncritical path activity beyond its float period will cause delay to the project itself.
  - 2. Float Ownership: Neither the District nor the Contractor owns the float time. The project owns the float time. As such, liability for delay of the project completion date rests with the party actually causing delay to the project completion date. For example, if Party A uses some but not all of the float time and Party B later uses the remainder of the float time as well as additional time beyond the float time, Party B shall be liable for the costs associated with the time that represents a delay to the project's completion date. Party A would not be responsible for any costs since it did not consume all of the float time and additional float time remained; therefore, the project's completion date was unaffected.
- C. Display time at the top of the schedule, reading left to right, with no greater than weekly divisions.
- D. The schedule shall indicate dates for important activities including:
  - 1. A logical succession of work from start to finish. This logical succession, when accepted, is the Contractor's work plan and is only designated as early start to accommodate standard computerized systems.
  - 2. Detailed definition of each activity.
  - 3. A logical flow of work crews/equipment (crews are to be defined by labor category and labor hours; equipment by type and hours).
  - 4. Shop drawing submittals and reviews.
  - 5. Decisions.
  - 6. Product procurement and delivery.
  - 7. Beginning and completion of each element of construction.
  - 8. Critical coordination dates.
  - 9. Submittal of record drawings and equipment manuals.

- 10. Cleanup, final inspection, etc.
- 11. Any project milestones or phases of work that affect important dates, such as other parallel contracts.
- E. Submit:
  - 1. Activity sort by early start, organized by related elements.
  - 2. Activity sort by float, organized by related elements.
  - 3. Activity sort by predecessor/successor.
  - 4. Narrative description of the logic and reasoning of the schedule.
  - 5. Resource allocation by activity.
  - 6. List of cost-loaded activities that identifies specific cost amount for each activity in the CPM schedule.
- F. Show constraints between interrelated activities.
- G. The initial schedule shall include the following minimum data for each activity:
  - 1. Activity numbers.
  - 2. Estimated duration.
  - 3. Activity description.
  - 4. Early start date (calendar dated).
  - 5. Early finish date (calendar dated).
  - 6. Status (whether critical).
  - 7. Float.
  - 8. Cost of activity.
  - 9. Other resources including equipment hours by type, labor by craft or crew, and materials by units.
- H. Where float time exists in activities, show the activities with early start/early finish times.
- I. The schedule shall include a title block with the project title, the Contractor's business name, the date of submittal or revision, and the signature of the Contractor's authorized representative attesting to his review and accuracy of the submittal.
- J. The duration indicated for each activity shall be in calendar days and shall represent the single best time considering the scope of the work and resources planned for the activity including time for inclement weather. Except for certain non-labor activities, such as curing concrete or delivering materials, activity durations shall not exceed 14 days, be less than one day, or exceed \$50,000 in

value unless otherwise accepted by the District's Representative.

# 1.07 CONSTRUCTION SCHEDULE PROGRESS

A. If the Contractor's progress has fallen behind the accepted construction schedule, the Contractor shall take such steps as may be required, including increasing the number of personnel, shifts, overtime operations, days of work, and amount of construction equipment until such time as the work is back on schedule. Increased costs of any accelerated work program shall be paid for by the Contractor. Submit such recovery schedule within 10 days upon written request by District's Representative.

# 1.08 <u>ACCEPTANCE</u>

- A. The finalized schedule will be acceptable to the District's Representative when it provides an orderly progression of the Work to completion in accordance with the contract requirements, adequately defines the Contractor's work plan, provides a workable arrangement for processing the submittals in accordance with the project specification requirements, and properly allocates resources (labor, equipment, and costs) to each activity (free of unbalances in resources). When the network diagram and tabulated schedule have been accepted, submit to District's Representative eight copies of the timescaled network diagram; eight copies of a computerized, tabulated schedule in which the activities have been sequenced by activity numbers; and eight copies of all reports required by this specification.
- B. Also submit a 700MB CD that contains all of the schedule submittal information. The disk shall contain data compatible with the specified CPM program to generate network diagrams and schedule reports identical to the hard copies submitted.
- C. Review of the Contractor's project schedule is for conformance to the requirements of the contract documents only. Review by the District's Representative of the Contractor's project schedule does not relieve the Contractor of any of its responsibility whatsoever for the accuracy or feasibility of the project schedule, or of the Contractor's ability to meet the interim milestone date(s) and the contract completion date, nor does such review and acceptance imply or expressly warrant, acknowledge, or admit the reasonableness of the logic, durations, labor, or equipment loading of the Contractor's project schedule.

# 1.09 <u>REVISIONS OR UPDATES TO CONSTRUCTION SCHEDULE</u>

- A. Submit a revised or updated construction schedule by the third working day of each month. The data date shall be the 25<sup>th</sup> of the preceding month. Revise or update the schedule upon the occurrence of any of the following:
  - 1. When delay in completion of any activity or group of activities indicates an overrun of the contract time or control point requirement by 10 working

days or 10% of the remaining duration, whichever is less.

- 2. Delays in submittals, deliveries, or work stoppage are encountered which make re-planning or rescheduling of the work necessary.
- 3. The schedule does not represent the actual prosecution and progress of the project as being performed in the field and progress for any activity is five working days behind the current schedule.
- 4. The Contractor will be performing work at an earlier date than is shown on the schedule and the work will require additional inspection and/or testing personnel.
- B. In the event of any change to the contract, submit a time analysis of the effect on the critical path. If the Contractor maintains there is no impact, submit a statement to that effect.
- C. The cost of revisions to the construction schedule resulting from District-initiated contract changes shall be included in the cost for the change in the work and shall be paid as part of the total cost of the change through the contract allowable percentages for changed work.
- D. The cost of revisions to the construction schedule not resulting from authorized changes in the work shall be the responsibility of the Contractor.

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

# SECTION 01360 PRE-CONSTRUCTION AUDIO-VIDEO DOCUMENTATION

# PART 1 - GENERAL

# 1.01 <u>REQUIREMENTS</u>

- A. The Contractor shall provide a color audio-video recording showing the entire preconstruction site. All audio/video recordings shall be taken by a <u>professional</u> <u>commercial video photographer</u>. The video photographer shall be an established enterprise that routinely provides these services. The videos shall be in standard electronic compact disc/DVD format, indicating the date, project name, and a brief description of the location where the video was taken. The Contractor shall submit two (2) copies of the preconstruction audio-video to the Engineer.
- B. Include the names and addresses of two references that the professional video photographer has performed color audio-visual recording on projects of a similar nature, including one within the last six months.
- C. No construction shall begin prior to the review and approval of the preconstruction audio-video DVD by the Engineer.

#### 1.02 <u>RELATED REQUIREMENTS</u>

A. Submit qualifications and references of the professional commercial video photographer.

#### 1.03 QUALITY ASSURANCE

A. Completed documentation shall reproduce bright, sharp pictures with accurate colors and shall be free from distortion, tearing, rolling, or any other significant picture imperfection. The audio portion of the recording shall reproduce the commentary of the camera operator with proper volume, clarity, and be free of distortion.

# PART 2 - PRODUCTS

# 2.01 <u>GENERAL</u>

A. The total audio-video recording system and the procedures employed in its use shall be such as to produce a finished product that will fulfill the technical requirements of the project. The video portion of the recording shall produce bright sharp, and clear pictures with accurate colors and shall be free from distortion, and any other form of picture imperfection. All video recordings shall, by electronic means, display on the screen the time of day, the month, day, and year of the recording.

# PART 3 - EXECUTION

# 3.01 <u>COVERAGE</u>

- A. Record coverage of all surface features located in the construction's zone of influence including, but not limited to:
  - 1. Roadways, driveways, sidewalks, bicycle paths, railroads.
  - 2. Buildings, walls, retaining walls, seawalls.
  - 3. Ponds, culvert ends, drainage structures.
  - 4. Landscaping, trees, shrubbery, fences, irrigation heads.
- B. Record the individual features of each item with particular attention being focused upon the existence of any faults, fractures, or defects.
- C. Control pan rate, rate of travel, camera height and zoom rate to maintain a steady clear view at all times.
- D. Limit recorded coverage to one side of any street at any one time.
- E. Create a single, continuous, unedited recording which begins and ends within each portion of a particular construction area. The recording shall proceed in the direction of ascending baseline stationing.

#### 3.02 AUDIO CONTENT

- A. Simultaneously record audio content during video taping.
- B. Audio recording shall assist in viewer orientation and in any needed identification, clarification, or description of features being recorded.
- C. Audio recording will only consist of camera operator commentary.

#### 3.03 <u>INDEXING</u>

- A. Permanently label each DVD with a sequential DVD number and the project name.
- B. Index each DVD with a digital record of the time and date of the recording which is continuously displayed as the tape is played.

- C. Prepare a written log which describes the contents of each tape including:
  - 1. Names of streets or easements.
  - 2. Coverage begin/end, station and location.
  - 3. Recording date.

### 3.04 <u>CONDITIONS</u>

- A. Record coverage during dry, clear weather and during daylight hours only.
- B. Record coverage when the area to be video recorded is free of debris or obstructions.
- C. Record coverage no more than 45 days prior to the start of construction.

# SECTION 01370 SCHEDULE OF VALUES

# PART 1 - GENERAL

### 1.01 <u>REQUIREMENTS INCLUDED</u>

- A. Submit to the Engineer a Schedule of Values allocated to the various portions of the Work, within ten days after award of contract.
- B. Upon the request of the Engineer, support the values with data which will substantiate their correctness.
- C. The Schedule of Values, unless objected to by the Engineer, shall be used only as the basis for the Contractor's Applications for Payment.
- D. Related Requirements in Other Parts of the Contract Documents.
  - 1. Agreement
  - 2. General Conditions
  - 3. Supplementary Conditions

# 1.02 <u>RELATED REQUIREMENTS</u>

- A. Section 01152 entitled: Application for Payment
- B. Section 01600 entitled: Material and Equipment.

# 1.03 FORM AND CONTENT OF SCHEDULE OF VALUES

- A. Type schedule on 8<sup>1</sup>/<sub>2</sub> x 11-inch white paper; Contractor's standard forms and automated printout will be considered for approval by Engineer upon Contractors request. Identify schedule with:
  - 1. Title of Project, location and (City, County, Owner) Project Number.
  - 2. Engineer and Engineer's Project number.
  - 3. Name and Address of Contractor.
  - 4. Date of Submission.

- B. Schedule shall list the installed value of the component parts of the Work, in sufficient detail to serve as a basis for computing values for progress payments during construction.
- C. Follow the table of contents of these Specifications as the format for listing component items.
  - 1. Identify each line item with the number and title of the respective major section of the specifications.
- D. For each major line item list sub-values of:
  - 1. Major products or operations under the item.
  - 2. Contract conditions, such as: bonds, insurance premiums, job mobilization, construction facilities and temporary controls.
- E. For the various portions of the Work:
  - 1. Each item shall include a directly proportional amount of the Contractor's overhead and profit.
  - 2. For items on which progress payments will be requested for stored materials, break down the value into:
    - a. The cost of the materials, delivered and unloaded, with taxes paid.
    - b. The total installed value.
- F. The sum of all values listed in the schedule shall equal the total Contract Sum.

# 1.04 <u>SUBSCHEDULE OF UNIT MATERIAL VALUES</u>

- A. Submit a sub-schedule of unit costs and quantities for:
  - 1. Products specified under a unit cost allowance in Section 01020.
  - 2. Products on which progress payments will be requested for stored products.
- B. The form of submittal shall parallel that of the Schedule of Values, with each item identified the same as the line item it the Schedule of Values.
- C. The unit quantity for bulk materials shall include an allowance for normal waste.
- D. The unit values for the materials shall be broken down into:
  - 1. Cost of the material, delivered and unloaded at the site, with taxes paid.
  - 2. Installation costs, including Contractor's overhead and profit.

E. The installed unit value multiplied by the quantity listed shall equal the cost of that item in the Schedule of Values.

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION (NOT USED)

# SECTION 01410 TESTING LABORATORY SERVICES

# PART 1 - GENERAL

### 1.01 <u>REQUIREMENTS INCLUDED</u>

- A. The Contractor will employ services of an Independent Testing Laboratory to perform specified testing.
  - 1. Contractor shall cooperate with laboratory to facilitate the execution of its required services.

### 1.02 <u>LIMITATIONS OF AUTHORITY OF TESTING LABORATORY</u>

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

### 1.03 <u>CONTRACTOR'S RESPONSIBILITIES</u>

- A. Cooperate with laboratory personnel and/or Engineer, provide access to Work or manufacturer's operations.
- B. Secure and deliver to the laboratory adequate quantities of representational samples of materials proposed to be used and which require testing.
- C. Provide to the laboratory the preliminary design mix proposed to be used for concrete, and other material mixes which require control by the testing laboratory.
- D. Furnish copies of Products test reports as required.
- E. Furnish incidental labor and facilities:
  - 1. To provide access to Work to be tested.
  - 2. To obtain and handle samples at the Project site or at the source of the product to be tested.
  - 3. To facilitate inspections and tests.
  - 4. For storage and curing of test samples.

F. Notify the Engineer sufficiently in advance of operations to allow for laboratory assignment of personnel and scheduling of tests:

When tests or inspections cannot be performed after such notice, reimburse District for laboratory personnel and travel expenses incurred due to Contractor's negligence.

G. Make arrangements with the Engineer and the laboratory and pay for additional samples and tests required for Contractor's convenience.

# PART 2 - PRODUCTS (NOT USED)

# PART 3 - EXECUTION

# 3.01 <u>PAYMENT</u>

- A. Testing of materials and products will be performed by an independent testing laboratory appointed and paid for by the Contractor. Testing will be performed so as to least encumber the performance of Work.
- B. The District will authorize the cost of one (1) series of tests only, on the area or item being evaluated. The Contractor shall pay for costs of additional testing as required due to improper performance of Work.
- C. When work of this contract or portions of work are completed, notify the Engineer so that arrangements can be made with the laboratory to perform or witness the tests. Do not proceed with additional portions of Work until results have been verified.

# SECTION 01500 CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

# PART 1 - GENERAL

### 1.01 <u>REQUIREMENTS INCLUDED</u>

A. Furnish, install and maintain temporary utilities required for construction, remove on completion of Work.

### 1.02 <u>RELATED REQUIREMENTS</u>

A. Section 01015 entitled: Miscellaneous Requirements.

#### 1.03 <u>REQUIREMENTS OF REGULATORY AGENCIES</u>

- A. Comply with National Electric Code.
- B. Comply with Federal, State and local codes and regulations and with utility company requirements.

# PART 2 - PRODUCTS

#### 2.01 <u>MATERIALS, GENERAL</u>

A. Materials may be new or used, but must be adequate in capacity for the required usage, must not create unsafe conditions, and must not violate requirements of applicable codes and standards.

#### 2.02 <u>CONSTRUCTION WATER</u>

- A. The Contractor shall make his own arrangements for developing water sources and supply all labor and equipment to collect, load, transport, and apply water as necessary for compaction of materials, concrete construction operations, testing, dust control, and other construction use.
- B. Develop sources of water supply or obtain water from private sources. Payment for all costs connected with utilization of the source shall be made by the Contractor. Water shall be clean and free from objectionable deleterious amounts of acids, alkalies, salts, or organic materials.

C. Include the cost of construction water in the appropriate bid item to which it is appurtenant. The cost shall include full compensation for furnishing all labor, materials, tools, and equipment and doing all the work necessary to develop a sufficient water supply and furnishing the necessary equipment for applying the water as described in these specifications.

# 2.03 <u>TEMPORARY ELECTRICITY AND LIGHTING</u>

- A. Arrange with utility company, provide service required for power and lighting, and pay all costs for service and for power used. The cost of power shall be included in the appropriate bid items to which it is appurtenant and shall include full compensation for furnishing all labor, materials, tools, and equipment required to obtain and distribute power for construction purposes.
- B. Install circuit and branch wiring, with area distribution boxes located so that power and lighting is available throughout the construction by the use of construction-type power cords.
- C. Provide adequate artificial lighting for all areas of work when natural light is not adequate for work, and for areas accessible to the public.

# 2.04 <u>TEMPORARY HEAT AND VENTILATION</u>

- A. Provide temporary heat and ventilation as required to maintain adequate environmental conditions to facilitate progress of the Work, to meet specified minimum conditions for the installation of materials, and to protect materials and finishes from damage due to temperature or humidity.
- B. Provide adequate forced ventilation of enclosed areas for curing of installed materials, to disperse humidity, and to prevent hazardous accumulations of dust, fumes, vapors or gases.
- C. Portable heaters shall be standard approved units complete with controls.
- D. Pay all costs of installation, maintenance, operation and removal, and for fuel consumed.

# 2.05 <u>TEMPORARY SANITARY FACILITIES</u>

- A. Provide sanitary facilities in compliance with laws and regulations.
- B. Service, clean and maintain facilities and enclosures.
- C. Existing plumbing facilities shall not be used by construction personnel.

# 2.06 <u>TEMPORARY ACCESS ROAD AND PARKING</u>

- A. Site Access Roads:
  - 1. Construct new temporary access roads over designated easements from public thorough- fare to site entrance.
- B. On-Site Roads and Parking Areas:
  - 1. Locate roads, drives, walks and parking facilities to provide uninterrupted access to construction offices, mobilization, work, storage areas, and other areas required for execution of the contract.
  - 2. Submit proposed location for Engineer's approval.
  - 3. Provide access for emergency vehicles.
    - a. Maintain driveways a minimum of 15 feet wide, between and around combustible materials in storage and mobilization areas.
  - 4. Maintain traffic areas free as possible of excavated materials, construction equipment, products and debris.
  - 5. Keep fire hydrants and water control valves free from obstruction and accessible for use.
  - 6. Provide traffic control devices as required by governing authorities along established public thoroughfares which will be used as haul routes to site access.
  - 7. Provide additional steel plates and dewatering appurtenances to bench down dewatering system as required to allow for unhindered traffic flow through work areas.

# 2.07 <u>TEMPORARY CONTROLS</u>

- A. Noise Control:
  - 1. Not used.
- B. Dust Control:
  - 1. Provide positive methods and apply dust control materials to minimize raising dust from construction operations, and provide positive means to prevent air-borne dust from dispersing into the atmosphere. Use water or dust preventative to control dust. Their supply and application shall be at the expense of the Contractor.
- C. Water Control:
- 1. Provide methods to control surface water to prevent damage to the Project, the site, or adjoining properties.
  - a. Control fill, grading and ditching to direct surface drainage away from excavations, pits, tunnels and other construction areas; and to direct drainage to proper runoff.
- 2. Provide, operate and maintain hydraulic equipment of adequate capacity to control surface water.
- 3. Dispose of drainage water in a manner to prevent flooding, erosion, or other damage to any portion of the site or to adjoining areas.
- D. Pest Control:
  - 1. Not used.
- E. Rodent Control:
  - 1. Provide rodent control as necessary to prevent infestation of construction or storage area.
    - a. Employ methods and use materials which will not adversely affect conditions at the site or on adjoining properties.
    - b. Should the use of rodenticides be considered necessary, submit an informational copy of the proposed program to District with a copy to Engineer. Clearly indicate:
      - (1) The area or areas to be treated.
      - (2) The rodenticides to be used, with a copy of the manufacturer's printed instructions.
      - (3) The pollution preventative measures to be employed.
  - 2. The use of any rodenticide shall be in full accordance with the manufacturer's printed instructions and recommendations.
- F. Debris Control:
  - 1. Maintain all areas under Contractor's control free of extraneous debris.
  - 2. Initiate and maintain a specific program to prevent accumulation of debris at construction site, storage and parking areas, or along access roads and haul routes.
    - a. Provide acceptable containers for deposit of debris.
    - b. Prohibit overloading of trucks to prevent spillages on access and haul routes.
      - (1) Provide periodic inspection of traffic areas to enforce requirements.

- 3. Schedule periodic collection and disposal of debris.
  - a. Provide additional collections and disposals of debris whenever the periodic schedule is inadequate to prevent accumulation.
- G. Pollution Control:
  - 1. Provide methods, means and facilities required to prevent contamination of soil, water or atmosphere by the discharge of noxious substances from construction operations.
  - 2. Provide equipment and personnel, perform emergency measures required to contain any spillages, and to remove contaminated soils or liquids.
    - a. Excavate and dispose of any contaminated earth off-site, and replace with suit- able compacted fill and topsoil.
  - 3. Take special measure to prevent harmful substances from entering public waters.
    - a. Prevent disposal of wastes, effluents, chemicals, or other such substances adjacent to streams, or in sanitary or storm sewers.
  - 4. Provide systems for control of atmospheric pollutants.
    - a. Prevent toxic concentrations of chemicals.
    - b. Prevent harmful dispersal of pollutants; into the atmosphere.

#### H. Erosion Control:

- 1. Plan and execute construction and earth work by methods to control surface drainage from cuts and fills, and from borrow and waste disposal areas, to prevent erosion and sedimentation.
  - a. Hold the areas of bare soil exposed at one time to a minimum.
  - b. Provide temporary control measures such as berms, dikes and drains.
- 2. Construct fills land waste areas by selective placement to eliminate surface silts or clays which will erode.
- 3. Periodically inspect earthwork to detect any evidence of the start of erosion, apply corrective measures as required to control erosion.

#### 2.08 <u>FIRE DANGER</u>

A. Minimize fire danger in the vicinity of and adjacent to the construction site. provide labor and equipment to protect the surrounding private property from fire damage resulting from construction operations. All costs arising from fire or the prevention of fire shall be at the expense of the Contractor.

#### 2.09 CONSTRUCTION STAKING

A. The Contractor will furnish all construction staking.

#### 2.10 STAGING AREA

A. The Contractor staging area shall be one mutually agreed upon by the District, Palm Beach County and property owner and the Contractor. Contractor is responsible for securing a staging area within (10) calendar days of NTP.

#### PART 3 - EXECUTION

#### 3.01 <u>GENERAL</u>

- A. Comply with applicable requirements specified in Division 16 Electrical.
- B. Maintain and operate systems to assure continuous service.
- C. Modify and extend systems as work progress requires.

#### 3.02 <u>REMOVAL</u>

- A. Completely remove temporary materials and equipment when their use is no longer required.
- B. Clean and repair damage caused by temporary installations or use of temporary facilities.
- C. Restore permanent facilities used for temporary services to specified condition.
  - 1. Prior to final inspection, remove temporary lamps and install new lamps.

#### 3.03 <u>UTILITY CLEARANCES</u>

- A. Contractor shall be responsible for obtaining all utility clearances. No work will be permitted on site until all utility clearances have been obtained and utility locations clearly identified on the ground, and provisions made to insure the safe conduct of work at the construction sites.
- B. The Contractor shall also check and ensure that any airport clearances are accounted for prior to starting construction.

#### 3.04 HURRICANE PRECAUTIONS

- A. During such periods of time as are designated by the United States Weather Service as being a hurricane warning or alert, the Contractor shall take all precautions necessary to respond to all threatened storm events, regardless of whether the District or Engineer has given notice of the same.
- B. Suspension of the work caused by a threatened or actual storm event, regardless of whether the District or Engineer has directed such suspension, will entitle the Contractor to additional Contract Time as an excusable delay, and shall not give rise to a claim for compensation.

## SECTION 01530 BARRIERS

#### PART 1 - GENERAL

#### 1.01 <u>REQUIREMENTS INCLUDED</u>

A. Furnish, install and maintain suitable barriers as required to prevent public entry, and to protect the Work, existing facilities, trees and plants from construction operations; remove when no longer needed, or at completion of Work.

#### 1.02 <u>RELATED REQUIREMENTS</u>

- A. Section 01015 entitled: Miscellaneous Requirements.
- B. Section 01500 entitled: Construction Facilities and Temporary Controls.

#### PART 2 - PRODUCTS

#### 2.01 MATERIALS, GENERAL

A. Materials may be new or used, suitable for the intended purpose, but must not violate requirements of applicable codes and standards.

#### 2.02 <u>FENCING</u>

- A. Minimum fence height six feet.
- B. Open-Mesh Fence:
  - 1. No. 11 gauge, 2-inch mesh, 72 inches high galvanized chain link fabric, with extension arms and three (3) strands of galvanized barbed wire.
  - 2. Galvanized steel posts;  $1\frac{1}{2}$  inch line posts and 2-inch corner posts.

#### 2.03 <u>BARRIERS</u>

A. Materials are Contractor's option, as appropriate to serve required purpose.

#### **PART 3 - EXECUTION**

#### 3.01 <u>GENERAL</u>

- A. Install facilities of a neat and reasonably uniform appearance, structurally adequate for the required purposes.
- B. Maintain barriers during entire construction period.
- C. Relocate barriers as required by the progress of construction.

#### 3.02 <u>FENCES</u>

- A. Provide and maintain fences necessary to assure security of the site during construction to keep unauthorized people and animals form the site when construction is not in progress.
- B. Gates shall have locks; and keys shall be furnished to the District.
- C. Provide additional security measures as deemed necessary and approved by the Engineer.

#### 3.03 TREE AND PLANT PROTECTION

- A. Preserve and protect existing trees and plants at site which are designated to remain, and those adjacent to site.
- B. Consult with the Engineer, and remove agreed-on roots and branches which interfere with construction.
  - 1. Employ qualified tree surgeon to remove branches and treat cuts.
- C. Provide temporary barriers to a height of six feet, around each, or around each group, of trees and plants.
- D. Protect root zones of trees and plants:
  - 1. Do not allow vehicular traffic or parking.
  - 2. Do not store materials or products.
  - 3. Prevent dumping of refuse or chemically injurious materials or liquids.
  - 4. Prevent puddling or continuous running water.
- E. Carefully supervise excavating, grading and filling, and other construction operations, to prevent damage.

F. Replace, or suitably repair, trees and plants designated to remain which are damaged or destroyed due to construction operations.

#### 3.04 <u>REMOVAL</u>

- A. Completely remove barricades, omit, when construction has progressed to the point that they are no longer needed and when approved by Engineer.
- B. Repair damage caused by construction. Fill and grade areas of the site to the required evaluations, and clean up the area.

## SECTION 01535 TEMPORARY EROSION AND SEDIMENTATION CONTROL

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. Provide erosion control measures on the project and in areas outside the right-ofway where work is accomplished in conjunction with the project, so as to prevent pollution of water, detrimental effects to public or private property adjacent to the project right-of-way and damage to work on the project. Construct and maintain temporary erosion control features or, where practical, construct and maintain permanent erosion control features as shown in the plans or as may be directed by the District.

#### 1.02 GENERAL

- A. Coordinate the installation of temporary erosion control features with the construction of the permanent erosion control features to the extent necessary to ensure economical, effective, and continuous control of erosion and water pollution throughout the life of the Contract.
- B. Contractor or his subcontractor must employ a person who holds a certification as a Florida Department of Environmental Protection NPDES Construction Site Inspector.
- C. Due to unanticipated conditions, the District may direct the use of control features or methods other than those included in the original Contract.

# 1.03 CONTROL OF CONTRACTOR'S OPERATIONS WHICH MAY RESULT IN WATER POLLUTION.

- A. Prevent pollution of streams, canals, lakes, reservoirs, and other water impoundments with fuels, oils, bitumens, calcium chloride, or other harmful materials. Also, conduct and schedule operations to avoid or otherwise minimize pollution or siltation of such water impoundments, and to avoid interference with movement of migratory fish. Do not dump any residue from dust collectors or washers into any live stream.
- B. Restrict construction operations in rivers, streams, lakes, tidal waters, reservoirs, canals, and other water impoundments to those areas where it is necessary to perform filling or excavation to accomplish the work shown in the plans and to those areas which must be entered to construct temporary or permanent structures.

As soon as conditions permit, promptly clear rivers, streams, and impoundments of all obstructions placed therein or caused by construction operations.

- C. Except as necessary for construction, do not deposit excavated material in rivers, streams, canals, or impoundments, or in a position close enough thereto, to be washed away by high water or runoff.
- D. Where pumps are used to remove highly turbid waters from enclosed construction areas such as cofferdams or forms, treat the water by one or more of the following methods prior to discharge into State waters: pumping into grassed swales or appropriate vegetated areas or sediment basins, or confined by an appropriate enclosure such as turbidity barriers when other methods are not considered appropriate.
- E. Do not disturb lands or waters outside the limits of construction as staked, except as authorized by the District.
- F. Obtain the District's approval for the location of, and method of operation in, borrow pits, material pits, and disposal areas furnished for waste material from the project (other than commercially operated sources) such that erosion during and after completion of the work will not result in probability of detrimental siltation or water pollution.

## PART 2 - PRODUCTS

#### 2.01 MATERIALS FOR TEMPORARY EROSION CONTROL.

- A. The District will not require testing of materials used in construction of temporary erosion control features other than as provided for geotextile fabric in 985-3 unless such material is to be incorporated into the completed project. When no testing is required, the District will base acceptance on visual inspection.
- B. The Contractor may use new or used materials for the construction of temporary silt fence, staked turbidity barriers, and floating turbidity barrier not to be incorporated into the completed project, subject to the approval of the District.

## 2.02 PRECONSTRUCTION REQUIREMENTS.

A. At the Preconstruction Conference, provide to the District an Erosion Control Plan meeting the requirements or special conditions of all permits authorizing project construction. If no permits are required or the approved permits do not contain special conditions or specifically address erosion and water pollution, the project Erosion Control Plan will be governed by Section 3.02 herein, and FDOT Section 104.

- B. Ensure the Erosion Control Plan includes procedures to control off-site tracking of soil by vehicles and construction equipment and a procedure for cleanup and reporting of non-storm water discharges, such as contaminated groundwater or accidental spills. Do not begin any soil disturbing activities until District's direction.
- C. Failure to sign any required documents or certification statements will be considered a default of the Contract. Any soil disturbing activities performed without the required signed documents or certification statements may be considered a violation of the DEP Generic Permit.
- D. When the SWPPP is required, prepare the Erosion Control Plan in accordance with the planned sequence of operations and present in a format acceptable to the District. The Erosion Control Plan shall describe, but not be limited to, the following items or activities:
  - 1. For each phase of construction operations or activities, supply the following information:
    - a. Locations of all erosion control devices
    - b. Types of all erosion control devices
    - c. Estimated time erosion control devices will be in operation
    - d. Monitoring schedules for maintenance of erosion control devices
    - e. Methods of maintaining erosion control devices
    - f. Containment or removal methods for pollutants or hazardous wastes
  - 2. The name and telephone number of the person responsible for monitoring and maintaining the erosion control devices.
  - 3. Do not begin construction activities until after the District has received the Erosion Control Plan.
- E. Comply with the approved Erosion Control Plan.

## PART 3 - EXECUTION

#### 3.01 CONSTRUCTION REQUIREMENTS

A. Limitation of Exposure of Erodible Earth: The District may limit the surface areas of unprotected erodible earth exposed by the construction operation and may direct the Contractor to provide erosion or pollution control measures to prevent contamination of any river, stream, lake, tidal waters, reservoir, canal, or other water impoundments or to prevent detrimental effects on property outside the project right-of-way or damage to the project. Limit the area in which excavation and filling operations are being performed so that it does not exceed the capacity to keep the finish grading, grassing, sodding, and other such permanent erosion control measures current in accordance with the accepted schedule.

Do not allow the surface area of erodible earth that clearing and grubbing operations or excavation and filling operations expose to exceed 750,000 sq ft without specific prior approval by the Engineer. This limitation applies separately to clearing and grubbing operations and excavation and filling operations.

The Engineer may increase or decrease the amount of surface area the Contractor may expose at any one time.

- B. **Incorporation of Erosion Control Features:** Incorporate permanent erosion control features into the project at the earliest practical time. Use approved temporary erosion control features to correct conditions that develop during construction which were not foreseen at the time of design, to control erosion prior to the time it is practical to construct permanent control features, or to provide immediate temporary control of erosion that develops during normal construction operations, which are not associated with permanent erosion control features when Topsoil is specified in the Contract and the limited availability of that material from the grading operations will prevent scheduled progress of the work or damage the permanent erosion control features.
- C. Scheduling of Successive Operations: Schedule operations such that the area of unprotected erodible earth exposed at any one time is not larger than the minimum area necessary for efficient construction operations, and the duration of exposure of uncompleted construction to the elements is as short as practicable.

Schedule and perform clearing and grubbing so that grading operations can follow immediately thereafter. Schedule and perform grading operations so that permanent erosion control features can follow immediately thereafter if conditions on the project permit.

#### D. Details for Temporary Erosion Control Features:

- 1. **General:** Use temporary erosion and water pollution control features that consist of, but are not limited to, temporary grassing, temporary sodding, temporary mulching, sandbagging, slope drains, sediment basins, sediment checks, berms, baled hay or straw, floating turbidity barrier, staked turbidity barrier and silt fence. For design details for some of these items, refer to the Water Quality Section of the FDOT Design Standards.
- 2. **Temporary Grassing:** The District may designate certain areas of grassing constructed in accordance with Section 570 as temporary erosion control features. The District may direct the Contractor to omit permanent type grass seed from grassing and reduce the specified rate of spread for

fertilizer used in conjunction with grassing operations when such work is designated as a temporary erosion control feature.

- 3. **Temporary Sod:** Furnish and place sod in accordance with Section 575 within areas designated by the District to temporarily control erosion. If the District determines that the sod will be of a temporary nature, he may not require fertilizer and lime. Keep the sod in a moist condition in order to ensure growth. The Contractor will pay for all required watering.
- 4. **Temporary Mulching:** Furnish and apply a 2 to 4-inch thick blanket of straw or hay mulch to designated areas, then mix or force the mulch into the top 2 inches of the soil in order to temporarily control erosion. Use only un-decayed straw or hay which can readily be cut into the soil and which otherwise complies with 981-3. The Contractor may substitute other measures for temporary erosion control, such as hydro-mulching, chemical adhesive soil stabilizers, etc., for mulching with straw or hay, if approved by the District. When beginning permanent grassing operations, plow under temporary mulch materials in conjunction with preparation of the ground.
- 5. **Sandbagging:** Furnish and place sandbags in configurations to control erosion and siltation.
- 6. **Slope Drains:** Construct slope drains in accordance with the details shown in the plans, the Design Standards, or as may be approved as suitable to adequately perform the intended function.
- 7. **Sediment Basins:** Construct sediment basins in accordance with the details shown in the plans, the Design Standards, or as may be approved as suitable to adequately perform the intended function. Clean out sediment basins as necessary in accordance with the plans or as directed.
- 8. **Berms:** Construct temporary earth berms to divert the flow of water from an erodible surface.
- 9. **Baled Hay or Straw:** Provide bales having minimum dimensions of 14 by 18 by 36 inches at the time of placement. Construct Baled Hay or Straw dams according to details shown in the plans, as directed by the District or as shown in the FDOT Design Standards to protect against downstream accumulations of sediment.

Use natural baled hay or straw meeting the requirements of 981-3 or synthetic hay bales may be used as an alternative to natural baled hay or straw. Synthetic hay bales should be interlocking, have pre-made stake holes, are made of synthetic fibers (polypropylene, nylon, polyester) that meet the Environmental Protection Agency's TCLP standards, and produced into a filter medium with needle-punched fibers. Use synthetic hay bales listed on the Qualified Products List. Wash out and remove sediment deposits when the deposits reach 1/2 the

height of the reusable synthetic hay bale or as directed by the District. Dispose of the washout in accordance with 104-3 or in an area approved by the District. Synthetic hay bales that have had sediment deposits removed may be reinstalled on the project as approved by the District.

- 10. Temporary Silt Fences:
  - a. **General:** Furnish, install, maintain, and remove temporary silt fences, in accordance with the manufacturer's directions, these Specifications, the details as shown on the plans, and the FDOT Design Standards.
  - b. **Materials and Installation:** Use a geotextile fabric made from woven or nonwoven fabric, meeting the physical requirements of Section 985 according to those applications for erosion control.

Choose the type and size of posts, wire mesh reinforcement (if required), and method of installation. Do not use products which have a separate layer of plastic mesh or netting. Provide a durable and effective temporary silt fence that controls sediment comparable to the Design Standards, Index No. 102.

Install all sediment control devices in a timely manner to ensure the control of sediment and the protection of lakes, streams, gulf or ocean waters, or any wetlands associated therewith and to any adjacent property outside the right-of-way as required.

At sites where exposure to such sensitive areas is prevalent, complete the installation of any sediment control device prior to the commencement of any earthwork.

After installation of sediment control devices, repair portions of any devices damaged at no expense to the District.

Erect temporary silt fence at upland locations across ditchlines and at temporary locations shown on the plans or approved by the Engineer where continuous construction activities change the natural contour and drainage runoff. Do not attach temporary silt fence to existing trees unless approved by the District.

c. **Inspection and Maintenance:** Inspect all temporary silt fences immediately after each rainfall and at least daily during prolonged rainfall. Immediately correct any deficiencies. In addition, make a daily review of the location of silt fences in areas where construction activities have changed the natural contour and drainage runoff to ensure that the silt fences are properly located for effectiveness. Where deficiencies exist, install additional silt fences as directed by the Engineer.

Remove sediment deposits when the deposit reaches approximately 1/2 of the volume capacity of the temporary silt fence or as directed by the Engineer. Dress any sediment deposits remaining in place after the temporary silt fence is no longer required to conform with the finished grade, and prepare and seed them in accordance with Section 570.

11. Floating Turbidity Barriers and Staked Turbidity Barriers: Install, maintain, and remove turbidity barriers to contain turbidity that may occur as the result of dredging, filling, or other construction activities which may cause turbidity to occur in the waters of the State. The Contractor may need to deploy turbidity barriers around isolated areas of concern such as seagrass beds, coral communities, etc. both within as well as outside the right-of-way limits. The District will identify such areas. Place the barriers prior to the commencement of any work that could impact the area of concern. Install the barriers in accordance with the details shown in the plans or as approved by the District. Ensure that the type barrier used and the deployment and maintenance of the barrier will minimize dispersion of turbid waters from the construction site. The District may approve alternate methods or materials.

Operate turbidity barriers in such a manner to avoid or minimize the degradation of the water quality of the surrounding waters.

- 12. **Rock Bags:** Furnish and place rock bags to control erosion and siltation. Place the bags as shown in the plans, the FDOT Design Standards or as directed by the District. Use a fabric material with openings that are clearly visible to minimize clogging yet small enough to prevent rock loss. Use material of sufficient strength to allow removing and relocating bags without breakage. The bag size when filled with rocks shall be approximately 12 by 12 by 4 inch. Use No. 4 or No. 5 coarse aggregate rock.
- 13. Artificial Coverings:
  - a. General: Install artificial coverings in locations where temporary protection from erosion is needed. Two situations occur that require artificial coverings. The two situations have differing material requirements, which are described below.
    - 1) Use artificial coverings composed of natural or synthetic fiber mats, plastic sheeting, or netting as protection against erosion, when directed by the District, during temporary pauses in construction caused by inclement weather or other

circumstances. Remove the material when construction resumes.

- 2) Use artificial coverings as erosion control blankets, at locations shown in the plans, to facilitate plant growth while permanent grassing is being established. For the purpose described, use non-toxic, biodegradable, natural or synthetic woven fiber mats. Install in accordance with 571-3 as for plastic erosion mat. Install erosion control blankets capable of sustaining a maximum design velocity of 6.5 ft/sec as determined from tests performed by Utah State University, Texas Transportation Institute or an independent testing laboratory approved by the District. Furnish to the District, two certified copies of manufacturers test reports showing that the erosion control blankets meet the requirements of this Specification. Certification must be attested, by a person having legal authority to bind the manufacturing company. Also, furnish two 4 by 8 inch samples for product identification. The manufacturers test records shall be made available to the District upon request. Leave the material in place, as installed, to biodegrade.
- E. **Removal of Temporary Erosion Control Features:** In general, remove or incorporate into the soil any temporary erosion control features existing at the time of construction of the permanent erosion control features in an area of the project in such a manner that no detrimental effect will result. The Engineer may direct that temporary features be left in place.

#### 3.02 INSPECTIONS AND REPORTING

A. The Contractor's certified NPDES Construction Site Inspector shall complete the required NPDES construction site inspection reports and provide them to the District. Reports shall be done on a weekly basis, at a minimum.

## 3.03 MAINTENANCE OF EROSION CONTROL FEATURES.

A. **General:** Provide routine maintenance of permanent and temporary erosion control features, at no expense to the District, until the project is complete and accepted. If reconstruction of such erosion control features is necessary due to the Contractor's negligence or carelessness or, in the case of temporary erosion control features, failure by the Contractor to install permanent erosion control features as scheduled, the Contractor shall replace such erosion control features at no expense to the District. If reconstruction of permanent or temporary erosion control features is necessary due to factors beyond the contractor,

the District will pay for replacement under the appropriate Contract pay item or items.

Inspect all erosion control features at least once every seven calendar days and within 24 hours of the end of a storm of 0.50 inch or greater. Maintain all erosion control features as required in the Stormwater Pollution Prevention Plan, Contractor's Erosion Control plan and as specified in the State of Florida Department of Environmental Protection Generic Permit for Stormwater Discharge from Large and Small Construction Activities.

B. **Mowing:** The District may direct mowing of areas within the limits of the project, in addition to and apart from those areas specified in Section 580. Mow these designated areas within seven days of receiving such order. Remove and properly dispose of all litter and debris prior to the mowing operation. Use conventional and specialized equipment along with hand labor to mow the entire area including slopes, wet areas, intersections, overpasses and around all appurtenances. Mow all areas to obtain a uniform height of 6 inches, unless directed otherwise by the District.

#### 3.04 PROTECTION DURING SUSPENSION OF CONTRACT TIME.

A. If it is necessary to suspend the construction operations for any appreciable length of time, shape the top of the earthwork in such a manner to permit runoff of rainwater, and construct earth berms along the top edges of embankments to intercept runoff water. Provide temporary slope drains to carry runoff from cuts and embankments that are in the vicinity of rivers, streams, canals, lakes, and impoundments. Locate slope drains at intervals of approximately 500 feet, and stabilize them by paving or by covering with waterproof materials. Should such preventive measures fail, immediately take such other action as necessary to effectively prevent erosion and siltation. The District may direct the Contractor to perform, during such suspensions of operations, any other erosion control work deemed necessary.

## SECTION 01600 MATERIAL AND EQUIPMENT

#### PART 1 - GENERAL

#### 1.01 <u>PERFORMANCE</u>

- A. Section generally defines Contractor's responsibilities, unless otherwise indicated, for the following:
  - 1. Products.
  - 2. Transportation and handling.
  - 3. Storage and protection.
  - 4. Product options.
  - 5. Substitutions.

#### 1.02 PRODUCTS

- A. Products: Means new material, machinery, components, equipment, fixtures, and systems forming the Work. Does not include machinery and equipment used for preparation, fabrication, conveying and erection of the Work. Products may also include existing materials or components required for reuse.
- B. Do not use materials and equipment removed from existing premises, except as specifically permitted by the Contract Documents.

#### 1.03 TRANSPORTATION AND HANDLING

- A. Transport and handle Products in accordance with manufacturer's instructions.
- B. Promptly inspect shipments to assure that Products comply with requirements, quantities are correct, and Products are undamaged.
- C. Provide equipment and personnel to handle Products by methods which prevent soiling, disfigurement, or damage.

#### 1.04 STORAGE AND PROTECTION

A. Store and protect Products in accordance with manufacturer's instructions, with seals and labels intact and legible. Store sensitive Products in weather-tight, climate controlled enclosures.

- B. For exterior storage of fabricated Products, place on secure supports, above ground.
- C. Provide off-site storage and protection when site does not permit on-site storage or protection.
- D. Cover Products subject to deterioration with impervious sheet covering. Provide ventilation to avoid condensation.
- E. Store loose granular materials on solid flat surfaces in a well-drained area. Prevent mixing with foreign matter.
- F. Arrange storage of Products to permit access for inspection. Periodically inspect to assure Products are undamaged and are maintained under specified conditions.

#### 1.05 PRODUCT OPTIONS

- A. Products Specified by Reference Standards or by Description Only: Any Product meeting those standards or description.
- B. Products Specified by Naming One or More Manufacturers: Products of manufacturers named and meeting specifications, no options or substitutions allowed.
- C. Products Specified by Naming One or More Manufacturers with a Provision for Substitutions: Submit a request for substitution for any manufacturer not named.

#### 1.06 <u>SUBSTITUTIONS</u>

- A. Instructions to Bidders specify time restrictions for submitting requests for Substitutions during the bidding period to requirements specified in this Section.
- B. Substitutions may be considered when a Product becomes unavailable through no fault of the Contractor.
- C. Document each request with complete data substantiating compliance of proposed Substitution with Contract Documents.
- D. A request constitutes a representation that the Bidder:
  - 1. Has investigated proposed Product and determined that it meets or exceeds the quality level of the specified Product.
  - 2. Will provide the same warranty for the Substitution as for the specified Product.
  - 3. Will coordinate installation and make changes to other Work which may be required for the Work to be complete with no additional cost to Owner.

- 4. Waives claims for additional costs or time extension which may subsequently become apparent.
- 5. Will reimburse Owner for review or redesign services associated with reapproval by the Engineer or governing authorities.
- E. Substitutions will not be considered when they are indicated or implied on shop drawing or product data submittals without separate written request, or when acceptance will require revision to the Contract Documents.
- F. Substitution Submittal Procedure:
  - 1. Submit three copies of request for Substitution for consideration. Limit each request to one proposed Substitution.
  - 2. Submit shop drawings, Product data, and certified test results attesting to the proposed Product equivalence.
  - 3. The Engineer will notify Contractor, in writing, of decision to accept or reject request.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION (NOT USED)

## SECTION 01630 SUBSTITUTIONS AND PRODUCT OPTIONS

#### PART 1 - GENERAL

#### 1.01 <u>REQUIREMENTS INCLUDED</u>

A. Furnish and install Products specified, under options and conditions for substitutions stated in this Section.

#### 1.02 <u>RELATED REQUIREMENTS</u>

- A. Information for Bidders and General Conditions.
- B. Section 01300 entitled: Submittals.
- C. Section 01700 entitled: Contract Closeout.

#### 1.03 <u>PRODUCTS LIST</u>

- A. Within 30 days after award of Contract, submit to Engineer five copies of complete list of major Products which are proposed for installation.
- B. Tabulate Products by specification section number and title.
- C. For products specified only by reference standards, list for each such Product:
  - 1. Name and address of manufacturer.
  - 2. Trade Name.
  - 3. Model or catalog designation.
  - 4. Manufacturer's data:
    - a. Reference standards.
    - b. Performance test data.

#### 1.04 CONTRACTOR'S OPTIONS

- A. For Products specified only by reference standard, select product meeting that standard, by any manufacturer.
- B. For products specified by naming several products or manufacturers, select any one or those products and manufacturers names which complies with

Specifications.

C. For products specified by naming only one or more products or manufacturers and stating "or equal", submit a request as for substitutions, for any product or manufacturer which is not specifically named.

## 1.05 <u>SUBSTITUTIONS</u>

- A. Within a period of 30 days after award of Contract, Engineer will consider formal requests from the Contractor for substitution of products in place of those specified:
- B. After the end of that period, the request will be considered only in case of product unavailability or other conditions beyond the control of the Contractor.
- C. Submit a separate request for each substitution. Support each request with:
  - 1. Complete data substantiating compliance of the proposed substitution with requirements stated in the Contract Documents:
    - a. Product identification, including manufacturer's name and address.
    - b. Manufacturer's literature; identify:
      - 1) Product description.
      - 2) Reference standards.
      - 3) Performance and test data.
    - c. Samples, as applicable.
    - d. Name and address of similar projects on which product has been used, and the date of each installation
  - 2. Itemized comparison of the proposed substitution with product specified; List significant variations.
  - 3. Data relating to changes in the construction schedule.
  - 4. Any effect of the substitution on separate contracts.
  - 5. List of changes required in other work or products.
  - 6. Accurate cost data comparing proposed substitution with product specified.
  - 7. Designation of required license fees or royalties.
  - 8. Designation of availability of maintenance services, and sources of replacement materials.
- D. Substitutions will not be considered for acceptance when:

- 1. They are indicated or implied on Shop Drawings or product data submittals without a formal request from Contractor.
- 2. They are requested directly by a subcontractor or supplier.
- 3. No Data relating to changes in construction schedule.
- 4. Any effect of substitution on separate contracts.
- 5. List of changes required in other work or products.
- 6. Accurate cost data comparing proposed substitution with product specified.
- 7. Designation of required license fees or royalties.
- 8. Designation of availability of maintenance services, sources of replacement materials.
- 9. Acceptance will require substantial revision of Contract Documents.
- E. Substitute products shall not be ordered or installed without written acceptance of Engineer.
- F. Engineer will determine the acceptability of proposed substitutions.

#### 1.06 <u>CONTRACTOR'S REPRESENTATION</u>

- A. In making formal request for substitution Contractor represents that:
  - 1. He has investigated proposed product and has determined that it is equal to or superior in all respects to that specified.
  - 2. He will provide the same warranties or bonds for substitution as for product specified.
  - 3. He will coordinate installation of accepted substitution into the Work, and will make such changes as may be required for the Work to be complete in all respects.
  - 4. He waives claims for additional costs caused by substitution which may subsequently become apparent.
  - 5. Cost data is complete and includes related costs under his Contract, but not:
    - a. Costs under separate contracts.
    - b. Engineer's costs of redesign or revision of Contract Documents.

#### 1.07 ENGINEER DUTIES

- A. Review Contractor's requests for substitutions with reasonable promptness.
- B. Notify Contractor, in writing, of decision to accept or reject requested substitution.

#### PART 2 - PRODUCTS (NOT USED)

#### PART 3 - EXECUTION (NOT USED)

## SECTION 01700 CONTRACT CLOSEOUT

#### PART 1 - GENERAL

#### 1.01 <u>REQUIREMENTS INCLUDED</u>

- A. Substantial Completion
- B. Final inspection after completion
- C. Final cleaning
- D. Contractor's closeout submittals
- E. Final adjustment of accounts

#### 1.02 SUBSTANTIAL COMPLETION

- A. When Contractor considers work has reached substantial completion, he shall submit to the Engineer the following:
  - 1. Written notice that the work is substantially complete in accordance with Contract Documents.
  - 2. A list of items yet to be completed or corrected and explanations thereof.
- B. Within a reasonable time upon receipt of such notice, the Engineer will make an inspection, if necessary, to determine the status of completion.
- C. Should the Engineer determine that the work is not substantially complete:
  - 1. The Engineer will promptly notify the Contractor in writing, giving the reasons thereof.
  - 2. Contractor shall remedy the deficiencies in the work and send a second written notice of Substantial Completion to the Engineer.
  - 3. Upon receipt of the second notice, the Engineer will re-inspect the Work.
- D. When the Engineer finds that the Work is substantially complete he will issue a Certificate of Substantial Completion with a tentative list of items to be completed or corrected before final inspection.
- E. Substantial completion shall be generally defined as when the sewer system is operational for intended use and restoration has been completed. This shall

include at a minimum: entire sewer system; lift station start-up; and restoration of driveways, roadways & swales. The permit certification from PBCHD must also be obtained prior to issuing substantial completion.

#### 1.03 FINAL INSPECTION AFTER COMPLETION

- A. When Contractor considers the Work is complete with all minor deficiencies completed or corrected, he shall submit written certification that:
  - 1. Contract Document requirements have been met.
  - 2. Work has been inspected for compliance with Contract Documents.
  - 3. Work has been completed in accordance with Contract Documents.
  - 4. All minor deficiencies have been corrected or completed and the Work is ready for final inspection.
  - 5. Project record documents are complete and submitted.
- B. Within a reasonable time upon receipt of such certification, the Engineer will make an inspection to verify the status of completion.
- C. Should the Engineer determine that the work is incomplete or defective:
  - 1. The Engineer will promptly notify the Contractor in writing, listing the incomplete or defective work.
  - 2. Contractor shall remedy the deficiencies in the work and send a second written certification to the Engineer that the Work is complete.
  - 3. Upon receipt of the second certification, the Engineer will re-inspect the Work.
- D. When the Engineer determines that the work is acceptable, under the Contract Documents, he shall request the Contractor to make closeout submittals.

#### 1.04 <u>FINAL CLEANING</u>

- A. Execute prior to final inspection.
- B. Clean site; sweep paved areas, rake clean other surfaces.
- C. Remove waste and surplus materials, rubbish, and construction facilities from the Project and from the site.

#### 1.05 <u>CONTRACTOR'S CLOSEOUT SUBMITTALS</u>

#### A. Project Record Documents

- 1. At Contract closeout, submit documents with transmittal letter containing date, Project title, Contractor's name and address, list of documents, and signature of Contractor.
- 2. Drawings; Legibly marked to record actual construction:
  - a. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - b. Drawings shall be signed and sealed by a surveyor registered in the State of Florida.
- 3. Specifications and Addenda; Legibly mark each Section to record.
- 4. Changes made by Field Order or by Change Order.
- B. Evidence of payment and Release of Liens.

#### 1.06 FINAL ADJUSTMENT OF ACCOUNTS

- A. Submit a final statement of accounting to the Engineer.
- B. Statement shall reflect all adjustments to the Contract Sum.
  - 1. The original Contract sum.
  - 2. Additions and deductions resulting from:
    - a. Previous change orders or written amendment.
    - b. Allowances
    - c. Unit prices
    - d. Deductions for uncorrected work.
    - e. Penalties and bonuses
    - f. Deductions for liquidated damages
    - g. Other adjustments
  - 3. Total Contract Sum as adjusted
  - 4. Previous payments
  - 5. Sum remaining due

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION (NOT USED)

## SECTION 01720 PROJECT RECORD DOCUMENTS

#### PART 1 - GENERAL

#### 1.01 <u>REQUIREMENTS INCLUDED</u>

- A. Maintain at the site of the District a record copy of:
  - 1. Drawings
  - 2. Specifications
  - 3. Addenda
  - 4. Change Orders and other modifications to the Contract.
  - 5. Approved Shop Drawings, Product Data and Samples.
  - 6. Field Test Records.

#### 1.02 <u>RELATED REQUIREMENTS</u>

- A. All applicable sections of the Specifications.
- B. Conditions of the Contract.
- C. District Record Drawing Submittal Guide (SD-29).

#### 1.03 MAINTENANCE OF DOCUMENTS AND SAMPLES

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

#### 1.04 MARKING DEVICES

A. Provide felt tip marking pens for recording information in the color code designated by District's Representative.

#### 1.05 <u>RECORDING</u>

- A. Label each document, "PROJECT RECORD" in neat large printed letters, or by rubber stamp.
- B. Record information concurrently with construction progress. Do not conceal any work until required information is recorded.
- C. Drawings: Legibly mark to record actual construction (hard copy):
  - 1. Horizontal and vertical locations of underground utilities and appurtenances, referenced to permanent surface improvements.
  - 2. Location of internal utilities and appurtenances concealed in the construction, referenced to visible and accessible features of the structures.
  - 3. Field changes of dimension and detail.
  - 4. Changes made by Field Order or by Change Order.
  - 5. Details not on original Contract Drawings.
- D. Specifications and Addenda; legibly mark each Section to record:
  - 1. Manufacturer, trade name, catalog number, and supplier of each produce and item of equipment actually installed.
  - 2. Changes made by Field Order or by Change Order.

#### 1.06 AS-BUILT PLANS (RECORD DRAWINGS)

A. The Contractor shall maintain full size (22"x34") field drawings to reflect the "asbuilt" items of work as the work progresses. Upon completion of the work, the Contractor shall prepare a record set of "as-built" drawings on full-size, reproducible material and an electronic file in ACAD 2018 Format or Latest Version. One set of full size design drawings on reproducible material will be furnished to the Contractor by the design Engineer at the current square foot price. An electronic file of the design drawings on a compact disk will be furnished to the Contractor by the design Engineer at no additional cost. No additional payment will be made for those "as-built" drawings.

- B. The cost of maintaining record changes, and preparation of the Record Drawings shall be included in the unit prices bid for the affected items. Upon completion of the work the Contractor shall furnish the Engineer the reproducible "as-built" Drawings and the electronic files. The completed Record drawings shall be delivered to the Engineer at least 5 working days prior to substantial inspection of the work. The Substantial inspection will not be conducted unless the Record Drawings are in the possession of the Engineer.
- C. The completed (or final) record drawings shall be certified by a Professional Land surveyor registered in the State of Florida. This certification shall consist of the surveyor's embossed seal bearing his registration number, the surveyor's signature and date on each sheet of the drawing set. In addition, the key sheet, cover sheet or first sheet of the plans set shall list the business address and telephone number of the surveyor.
- D. Representative items of work that should be shown on the record drawings as verified, changed or added are shown below:
  - 1. Plans:
    - a. Structure types, location with grade of rim and flow-line elevations.
    - b. Sewer type, length, size and elevations.
    - c. Utility type, length, size and elevation in conflict structures.
    - d. All maintenance access structures, valves and hydrants within right-of way.
    - e. Spot (critical) elevations at plateaued intersections, P.C., P.T., midpoint of all intersections.
    - f. Sewer laterals shall be stationed between maintenance access structures.
  - 2. <u>Reclaimed Water Plans</u>: Location (horizontal and vertical) of all pipe lines, structures, fittings, valves and appurtenances and pipe crossings.
  - 3. Any utility discovered to be in the wrong location during construction shall be shown on the record drawings.
  - 4. Record Drawings shall also show survey data (horizontal and vertical) for all surface feature items replaced during construction including roadways, driveways, sidewalks, swales, etc.
- E. The Contractor shall submit progress record drawings (in electronic .pdf format) and one Autocad file with each application for payment. These drawings shall accurately depict the work completed and for which payment is being requested.

- F. As-built drawings shall include the following criteria at a minimum. Also include GPS coordinates for all as-built data.
  - 1. As-builts of water lines shall include the following information:
    - a. Top of pipe elevations and horizontal location every 100 lf.
    - b. Locations and elevations of all fittings including bends, tees, gate valves, double detector check valves, fire hydrant, etc.
    - c. All tie-ins to existing lines shall be as-built.
    - d. The ends of all water services at the buildings or homes shall be asbuilt or where the water service terminates.
  - 2. As-builts of all gravity sanitary sewer lines include the following information:
    - a. Rims, inverts and length of piping between structures as well as slopes.
    - b. The stub ends of all sewer laterals shall be located and if there are any cleanouts installed on the sewer laterals then the invert elevation of these cleanouts need to be obtained.
    - c. Lift station as-builts shall consist of top of wet well elevation, invert elevation of the incoming line, bottom of the wet well and as-builts of the compound area.
  - 3. Reclaimed water main as-builts shall be prepared the same as the water line as-builts.
  - 4. As-builts of all drainage lines shall include the following information:
    - a. Rims, inverts and length of piping between structures and weir elevations if applicable.
    - b. The size of the piping shall be verified by the survey crew at the time of as-built.
  - 5. All rock as-builts for parking lot, roadways and swales areas shall consist of the following:
    - a. Rock elevations at all high and low points, and at enough intermediate point's to confirm slope consistency and every 50' for roadways.
    - b. Rock as-builts shall be taken at all locations where there is a finish grade elevation shown on the design plans.
    - c. All catch basin and manhole rim elevations shall be shown.
    - d. Elevations around island areas will also be required.

- e. As-builts shall be taken on all paved and unpaved swales prior to placement of asphalt and/or topsoil/sod, at enough intermediate points to confirm slope consistency and conformance to the plan details.
- f. Final driveway elevations shall be shown.
- 6. Lake and canal bank as-builts shall include a key sheet of the lake for the location of cross sections. Lake and canal bank cross sections shall be plotted at a minimum of every 100 lf, unless otherwise specified. As builts shall consist of the location and elevation of the top of bank, edge of water and the deep cut line, with the distance between each shown on the drawing.
- 7. Retention area as-built elevations shall be taken at the bottom of the retention area and at the top of bank. If there are contours indicated on the design plans, then they shall be as-built as well
- 8. If a change is made via field order or deviation to any structure, pipeline, etc., a new location shall be noted on the as-builts. The Engineer may request additional as-built information to verify horizontal or vertical locations.

#### 1.07 <u>SUBMITTAL – FINAL RECORD DRAWINGS</u>

- A. At Contract closeout, deliver Record Documents to District's Representative, or presentation to the District.
- B. After District Engineering staff has completed the final inspection and all work is to the satisfaction of the District Engineer, the final Record Drawings shall be submitted to the District, as follows:
  - 1. Two (2) final black line record drawings, signed and sealed by a Florida licensed Professional Surveyor & Mapper. This record drawing shall meet the technical standards for "Record Survey" set forth by the Florida Board of Professional surveyors and mappers, pursuant to Chapter 472 of the Florida Statutes and Chapter 61G17-6, Florida Administrative Code.
  - 2. One (1) compact disc with the record drawing in AutoCAD 2008 or later format. Only one (1) AutoCAD file shall be accepted containing the entire record drawing (additional files used for x-referencing are acceptable) and one Adobe Acrobat file with the entire record drawing as seen on the paper copy. The District will no longer accept separate AutoCAD and/or Adobe Acrobat files for separate record drawing pages. The AutoCAD files must be established in state plane coordinate system, NAD 83, Florida East Zone. The vertical datum referenced shall be NGVD 29.

- C. Accompany submittal with transmittal letter in duplicate, containing:
  - 1. Date
  - 2. Project title and number
  - 3. Contractor's name and address
  - 4. Title and number of each Record Document
  - 5. Signature of Contractor or his authorized representative

## PART 2 - PRODUCTS (NOT APPLICABLE)

## PART 3 - EXECUTION (NOT APPLICABLE)

## **DIVISION 2**

## SITE WORK

## SECTION 02012 PROTECTING EXISTING UNDERGROUND UTILITIES

#### PART 1 - GENERAL

#### 1.01 DESCRIPTION

A. This section includes materials and procedures for protecting existing underground utilities.

#### 1.02 <u>RELATED WORK SPECIFIED ELSEWHERE</u>

A. Section 02225 entitled: Trench Excavation and Backfill

#### PART 2 - MATERIALS

#### 2.01 <u>REPLACEMENT IN KIND</u>

A. Except as indicated below or as specifically authorized by the District's Representative, reconstruct utilities with new material of the same size, type, and quality as that removed.

#### PART 3 - EXECUTION

#### 3.01 <u>GENERAL</u>

- A. Replace in kind street improvements, such as curbs and gutters, barricades, traffic islands, signalization, fences, signs, etc., that are cut, removed, damaged, or otherwise disturbed by the construction.
- B. Where utilities are parallel to or cross the construction but do not conflict with the permanent work to be constructed, follow the procedures given below and as indicated in the drawings. Notify the utility owner 48 hours in advance of the crossing construction and coordinate the construction schedule with the utility owner's requirements. For utility crossings not shown in the drawings, refer to the General Conditions and the instructions of the District's Representative for guidance.
- C. Determine the true location and depth of utilities and service connections which may be affected by or affect the work. Determine the type, material, and condition of these utilities. In order to provide sufficient lead-time to resolve unforeseen conflicts, order materials and take appropriate measures to ensure that there is no delay in work.

#### 3.02 PROCEDURES

- A. Protect in Place: Protect utilities in place, unless abandoned, and maintain the utility in service, unless otherwise specified in the drawings or in the specifications.
- B. In the event an existing utility is damaged by the Contractor which was accurately marked in the field, shown on the drawings, or previously identified through potholing procedures, the Contractor shall be responsible to make the repair if directed by District or pay the Utility Company's current repair rate if Utility Company is required to make the repair.

#### 3.03 <u>COMPACTION</u>

- A. Utilities Protected in Place: Backfill and compact under and around the utility so that no voids are left.
- B. Utilities Reconstructed: Prior to replacement of the utility, backfill the trench and compact to an elevation 1 foot above the top of the ends of the utility. Excavate a cross trench of the proper width for the utility and lay, backfill, and compact.
# SECTION 02100 SITE PREPARATION

## PART 1 - GENERAL

#### 1.01 <u>SECTION INCLUDES:</u>

- A. This Section covers clearing, grubbing and stripping along the construction sites, complete as specified herein.
- B. The Contractor shall clear and grub all of the area within the limits of construction or as required. This shall be limited to the road rights-of-way and easements.

#### 1.02 PAYMENT

A. Unless noted otherwise on the Bid Form, no separate payment will be made for Work covered under this Section. All costs in connection therewith or incidental thereto are to be included in the respective Contract Price for the item or structure to which the Work pertains.

## PART 2 - PRODUCTS (NOT USED)

## PART 3 - EXECUTION

#### 3.01 <u>PROTECTION</u>

- A. Locate, identify and protect existing utilities.
- B. Protect trees, plant growth that are not required to be removed in the construction.

#### 3.02 <u>CLEARING</u>

A. The surface of the ground, for the area to be cleared and grubbed shall be completely cleared of all timber, brush, stumps, roots, grass, weeds, rubbish and all other objectionable obstructions resting on or protruding through the surface of the ground. However, those trees which are designated by the Engineer shall be preserved as hereinafter specified. Clearing operations shall be conducted so as to prevent damage to existing structures and installations, and to those under construction, and so as to provide for the safety of employees and others. Clearing for structures shall consist of topsoil and vegetation removal.

B. Unless otherwise shown on the plans, standard clearing and grubbing shall be performed over the limits of the construction, with the exception that, where so directed by the Owner, desirable trees shall be protected and left standing. No trees shall be removed beyond right-of-way limits or easements where construction will occur until the Contractor receives the Owner's direction and approval.

## 3.03 <u>GRUBBING</u>

A. Grubbing shall consist of the complete removal of all stumps, roots, matted roots, brush, timber, logs and any other organic or metallic debris not suitable for foundation purposed or subgrade, resting on, under or protruding through the surface of the ground to a depth of 12 inches below the subgrade. All depressions excavated below the original ground surface for or by the removal of such objects, shall be refilled with suitable materials and compacted to a density as required by these Specifications.

## 3.04 DEMUCKING, BACKFILLING AND COMPACTION REQUIREMENTS

A. All organic surface soils and muck shall be removed from backfill and under all structures and pipes.

## 3.05 DISPOSAL OF CLEARED, GRUBBED, AND DEMUCKED MATERIAL

A. The Contractor shall dispose of all material and debris from the clearing and grubbing operation by hauling such material and debris away to an approved disposal site. Disposal by burial will not be permitted. Disposal by burning may be allowed if permitted by local regulation and is subject to approval of the Owner. The Contractor shall be responsible for obtaining all required approvals and permits for any burning operation and shall include any costs for same in the various contract prices. Burning shall be allowed only at location where adjacent trees and shrubs will not be harmed. The cost of disposal (including hauling) of cleared and grubbed material and debris shall be included in the contract prices.

## 3.06 PRESERVATION OF TREES, SHRUBS, AND OTHER PLANT MATERIAL

A. All plant materials (trees, shrubbery, and plants) beyond the easement and rightof-way limits shall be saved and protected from damage resulting from the work. No filling, excavating, trenching, or stockpiling of materials will be permitted within the drip lines of these plant materials.

## 3.07 PRESERVATION OF DEVELOPED PRIVATE PROPERTY

- A. The Contractor shall exercise extreme care to avoid unnecessary disturbance of developed private property as applicable. Trees, shrubbery, gardens, lawn and other landscaping, which in the opinion of the Engineer must be removed, shall be replaced and replanted to restore the construction easement to the condition existing prior to construction.
- B. All soil preparation procedures and replanting operations shall be under the supervision of a nurseryman experienced in such operations.
- C. Improvements to the land such as fences, walls, outbuildings, etc., which of necessity must be removed shall be replaced with equal quality materials and workmanship. All costs to be included in the contract prices.
- D. The Contractor shall clean up the construction site across developed private property directly after construction is completed upon approval of the Engineer.

## 3.08 PRESERVATION OF PUBLIC PROPERTY

A. The appropriate paragraphs of Articles 3.05 and 3.06 of these specifications shall apply to the preservation and restoration of all damaged areas of public lands, parks, rights-of-way, easements, etc.

# SECTION 02140 DEWATERING

#### PART 1 - GENERAL

#### 1.01 <u>SECTION INCLUDES</u>

- A. The work covered by this Section consists of furnishing all permits, labor, equipment, appliances and materials, and performing all operations required for dewatering excavations as required to ensure that all <u>work is performed in the dry</u>.
- B. The Contractor shall not discharge water from dewatering operations in any manner that will:
  - 1. Adversely affect the water quality of adjoining water bodies.
  - 2. Violate federal, state or local laws and regulations.
  - 3. Allow discharge to flow onto private property.
  - 4. Hamper the movement of traffic.
  - 5. Damage portions of the work previously constructed.

#### 1.02 <u>RELATED SECTIONS</u>

A. Division 15 - Mechanical (As Applicable)

#### 1.03 <u>PAYMENT</u>

A. Dewatering is included in the Bid Form under Pay Item 12. Provide labor, equipment and materials to furnish, assemble and maintain pumps and transmission piping as required to transmit groundwater from the Contractor's dewatering system, settling tanks and transfer pump(s) to the discharge location; furnish and assemble pump(s) and transmission piping from the dewatering system to the approved discharge location.

#### 1.04 <u>SUBMITTALS</u>

A. Shop Drawings: Water Control Plan, including dewatering pumps, stilling basin, and means of sound attenuation. Dewatering operations shall not commence until Owner and Engineer have reviewed and approved this plan.

#### 1.05 WATER CONTROL PLAN

A. As a minimum, include descriptions of proposed groundwater and surface water control facilities including, but not limited to, equipment, methods, standby equipment and power supply, pollution control facilities, discharge locations to be utilized, and provisions for immediate temporary water supply as required by this Section.

#### **QUALITY ASSURANCE** 1.06

- A. Installer Qualifications: An experienced installer that has specialized in design of dewatering systems and dewatering work.
- B. Contractor's dewatering personnel must include key personnel with at least five (5) years of experience with dewatering methods in similar type and classifications of soils and groundwater conditions representative of this project. Experience must include dewatering excavations greater than 18-ft. depth. Refer to Geotechnical Report and SFWMD Dewatering Permit for existing soil conditions and groundwater level information and permitting requirements. The opinions expressed in the Geotechnical Report are those of a geotechnical engineer and represent interpretations of subsoil conditions, tests, and results of analyses conducted by geotechnical engineer. The District or Engineer will not be responsible for interpretations or conclusions drawn from this data.

## PART 2 - PRODUCTS (NOT USED)

#### 2.01 PUMP DRIVERS

A. Sound attenuated pumps as manufactured by Thompson Pumps with "Silent Knight" canopy, shall be used for all dewatering activities that require a pumping system. Contractor shall demonstrate, measure and record the dB levels at the time of initial set-up. The Contractor shall record the dB levels weekly.

## **PART 3 - EXECUTION**

#### 3.01 PUMPING AND DRAINAGE

- A. The Contractor shall be responsible for obtaining the necessary SFWMD Dewatering Permits for all dewatering activities for this project including but not limited to necessary pumping, methods of drainage, removal of water, etc.
- B. In areas of deep trench where dewatering and maintenance of vehicular traffic is required, the Contractor shall bench down the sides of the trench in order to cover the dewatering well point heads with temporary steel plating.

- C. The Contractor shall provide all labor, materials, tools and equipment necessary to properly control the quality of the discharge from dewatering operations. The Contractor shall comply with all applicable laws, rules and regulations governing the discharge of water from dewatering operations.
- D. The Contractor's dewatering system equipment and materials must be capable of spanning an entire sewer pipe run from manhole to manhole in one installation set-up.
- E. Well point systems or other methods used to dewater groundwater shall be placed at the appropriate depths to efficiently and effectively withdraw the required quantity of groundwater for dewatered construction. If required, the Contractor shall install points or other well systems at various depths based on site subsurface conditions. Contractor shall perform any necessary aquifer materials evaluation during the installation of the dewatering system to properly select depths for the well points or other well devises. The Contractor shall make adjustments to the system as needed for optimal dewatering.
- F. The Contractor is prohibited from discharging dewatering water in a manner that flooding occurs to private property or roadways or to the extent discharge water impairs access to private property by local residents.
- G. The Contractor shall provide the Engineer access to collect water samples as needed to monitor discharge water quality.
- H. Discharge water exiting the Contractor's dewatering system shall not exceed background turbidity of the receiving water body (Loxahatchee River) as referenced by the background sampling location as determined by the Engineer. Discharge shall comply with SFWMD permit conditions and FDEP requirements for a Generic Permit for the discharge of Produced Groundwater from a non-contaminated site activity (62-621.300(2) FAC) and any other applicable regulations governing discharge of dewatering water. Water discharge activities shall be adjusted accordingly and corrective actions taken if the water exiting the dewatering system exceeds these requirements to be complaint with all applicable regulations. Contractor shall implement best management practices (BMPs) and install pollution control devises including but not limited to settling tanks, silt barriers, and hay bales as needed to comply with discharge water quality requirements.
- I. The Contractor shall bear all costs associated with dewatering including costs of damage to property caused by dewatering.
- J. The Contractor shall provide all necessary facilities to provide for attenuation of noise levels associated with dewatering pumps and ancillary equipment.
- K. The Contractor shall at all times during construction provide and maintain proper equipment and facilities to remove all water entering excavations, and shall keep such excavations dry so as to obtain a satisfactory undisturbed subgrade

foundation condition until the fills, structures or pipes to be built thereon have been completed to such extent that they will not be floated or otherwise damaged by allowing water levels to return to natural levels.

- L. Dewatering shall at all times be conducted in such a manner as to preserve the undisturbed bearing capacity of the subgrade soils at proposed bottom of excavation and to preserve the integrity of adjacent structures. Well or sump installation shall be constructed with proper sand filters to prevent drawing of finer grained soil from the surrounding ground.
- M. Water entering the excavation from surface runoff shall be collected in shallow ditches around the perimeter of the excavation, drained to sumps, and pumped from the excavation to maintain a bottom free from standing water.
- N. Storm water from the construction site shall not be allowed to comingle or affect dewatering discharge water in any way. The Contractor shall utilize all required pollution control measures to prevent storm water runoff from negatively affecting the operation of the dewatering system, water quality and turbidity of the dewatering discharge water.
- O. The Contractor shall take all additional precautions to prevent uplift of any structure during construction.
- P. The conveying of water in open ditches or trenches will not be allowed. Permission to use any storm sewers, or drains, for water disposal purposes shall be obtained from the authority having jurisdiction. Any requirements and costs for such use shall be the responsibility of the Contractor. However, the Contractor shall not cause flooding by overloading or blocking up the flow in the drainage facilities, and he shall leave the facilities unrestricted and as clean as originally found. Any damage to facilities shall be repaired or restored as directed by the Owner or the authority having jurisdiction, at no cost to the Owner.
- Q. Flotation shall be prevented by the Contractor by maintaining a positive and continuous operation of the dewatering system. The Contractor shall be fully responsible and liable for all damages which may result from failure of this system.
- R. Removal of dewatering equipment shall be accomplished after the system is no longer required; the material and equipment constituting the system, shall be removed by the Contractor. As the wellpoints are withdrawn, the locations of the voided areas shall backfilled by jetting approved backfill material (grout) into the voids until they are completely filled. These restored wellpoint voids are subject to random density verification testing.
- S. The Contractor shall take all necessary precautions to preclude the accidental discharge of fuel, oil, etc. in order to prevent adverse effects on groundwater and surface water quality.

T. Contractor shall provide for and be responsible for the prevention, control and abatement of erosion and water pollution until completion of the Project (see also Section 01535). Contractor shall provide all temporary erosion control features necessary to prevent, control and abate erosion and water pollution. During the construction of the project, the Contractor shall comply with the Water Quality Standards of the State of Florida FAC 17-302.540.

# SECTION 02210 SITE GRADING

## PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. Remove topsoil and stockpile on site for later use.
- B. Excavate sub-soil and reform to grades, contours and levels.
- C. Excavate or fill for roadways, walks, curbs, gutters, parking areas, landscaped areas and as shown on the Drawings.

#### 1.02 <u>RELATED WORK</u>

- A. Section 02100 entitled: Site Preparation.
- B. Section 02225 entitled: Trench Excavation and Backfill.

#### 1.03 EXISTING CONDITIONS

A. Known underground, surface and aerial utility lines, and buried objects are based on best available data and indicated on the Drawings. Contractor shall verify all locations.

#### 1.04 <u>PROTECTION</u>

- A. Protect trees, shrubs and lawns and other features remaining as part of final landscaping.
- B. Protect bench marks, and existing structures, fences, roads, sidewalks, paving and curbs against damage from equipment and vehicular traffic.
- C. Protect aerial, surface, or underground utility lines or appurtenance which are to remain.
- D. Repair any damage, at no cost to District.

#### PART 2 - PRODUCTS

## 2.01 <u>MATERIALS</u>

- A. Excavated fill material: Soil free from roots, rocks larger than 3-inches, and building debris.
- B. Additional fill material: Shall be approved by the Engineer.

## PART 3 - EXECUTION

## 3.01 <u>PREPARATION</u>

- A. Establish and identify required lines, levels, contours and datum.
- B. Maintain bench marks, monuments, and other reference points. Re-establish if disturbed or destroyed, at no cost to District.
- C. Before start of grading, establish the location and extent of utilities in the work areas. Notify utilities to remove and relocate lines which are in the way of construction.
- D. Maintain, protect, reroute or extend as required existing utilities to remain which pass through the work area.

## 3.02 <u>REMOVAL OF TOPSOIL</u>

- A. Topsoil of horticultural value shall be stripped from areas of construction under this contract and stockpiled in area designated by Engineer. Said material shall be stockpiled separately from fill material.
- B. Do not permit topsoil to be mixed with subsoil
- C. Do not strip topsoil when wet.
- D. Do not drive heavy equipment over stockpiled topsoil.

#### 3.03 <u>ROUGH GRADING</u>

- A. Rough grade site to required levels, profiles, contours and elevations ready for finish grading and surface treatment. Maintain the following:
  - 1. Sodded areas 4 1/2-inches below finished grade elevation.
  - 2. Seeded areas 6-inches below finished grade.
  - 3. Paved areas 18-inches below finished grade elevations.

- 4. Shrub beds 24-inches below finished grade elevations.
- 5. Flower beds 18-inches below finished grade elevations.
- 6. Concrete sidewalks 8-inches below finished grade elevations.
- B. Prior to placing fill material over undisturbed subsoil, scarify surface to depth of 6-inches.

## 3.04 <u>SURPLUS MATERIAL</u>

- A. Remove surplus materials from site.
- B. Dispose of surplus material at no cost to District.

# SECTION 02224 PIPE EMBEDMENT MATERIALS

## PART 1 - GENERAL

#### 1.01 GENERAL

A. Pipe embedment materials, as specified herein, shall be installed as shown on the details, and/or as specified.

#### PART 2 - PRODUCTS

#### 2.01 CLASS 1 MATERIALS (BEDDING ROCK)

A. The material shall be <sup>3</sup>/<sub>4</sub> inch to <sup>1</sup>/<sub>4</sub> inch graded material such as coral, crushed stone, crushed shells or bedding rock, well graded in size, 100% passing a 1-inch sieve opening, and as specified in ASTM 57. The bedding rock shall consist of clean hard and durable particles or fragments, free from dirt, vegetable or other objectionable matter. Samples and gradation analysis shall be approved by the Design Engineer before any material is delivered to the job site.

#### 2.02 CLASS 2 MATERIAL

A. The material shall be well graded, clean course sand and gravels with a maximum particle size of <sup>1</sup>/<sub>4</sub> inch, containing a small percentage of fines and free of organic and other deleterious matter.

#### 2.03 CLASS 3 MATERIAL (SELECT BACKFILL)

A. The material shall be fine sand and clayey gravels, including fine sands, sand-clay mixtures and gravel-clay mixtures, free of organic and other deleterious matter.

#### **PART 3 - EXECUTION**

#### 3.01 PLACING AND COMPACTING

- A. The material shall be spread in layers of uniform thickness and installed to the densities and where shown on the Standard Details or as required.
- B. After each pipe has been brought to grade, aligned and placed in final position, the Embedment material shall be deposited and densified under the pipe haunches

200453 - 9/11/20 BAXTER & WOODMAN on each side of the pipe. Following this operation, the remainder of the embedment material shall be installed as shown on the Standard Details and as specified herein.

# SECTION 02225 TRENCH EXCAVATION AND BACKFILL

## PART 1 - GENERAL

#### 1.01 WORK INCLUDED

- A. This section covers the work necessary for the trench excavation and backfill, complete.
- B. Trenches in existing paved areas shall be backfilled to the level of the bottom of the base course. Installation of base course and pavement shall be as specified in Section 02575, SURFACE RESTORATION.
- C. Concrete backfill will be used where, in the opinion of the Engineer, there is insufficient cover over the pipe for proper cover and protection.

#### 1.02 TRENCH EXCAVATION

A. Excavation is unclassified. Complete all excavation regardless of the type of materials encountered. The Contractor shall make Contractor's own estimate of the kind and extent of the various materials which will be encountered in the excavation.

## PART 2 - PRODUCTS

#### 2.01 TRENCH SAFETY SYSTEM

- A. The Contractor shall follow the provisions of the "Florida Trench Safety Act," (CS/HB 3183), which incorporates OSHA Standards 29 CFR's 1926.650, Subpart P as the state's trench safety standards. Trench excavation 5' or deeper shall have an adequate safety system consisting of sheeting and shoring, suitable trench box, or other suitable system meeting the requirements of the Act.
- B. The Contractor shall be solely responsible for making all excavations in a safe manner. Provide appropriate measures to retain side slopes to ensure that persons working in or near he excavation are protected.

#### 2.02 FOUNDATION STABILIZATION

A. Foundation stabilization shall conform to No. 57 coarse aggregate.

## 2.03 TRENCH BACKFILL

- A. Select Granular Backfill for Pipe Base, and Pipe Zone in Dewatered or Dry Trench: Excavated trench material free from dirt, clay balls, muck, roots, and organic matter and containing less than 10 percent by weight passing the No. 200 sieve. Trench excavated materials may require processing to obtain the required gradation and/or to obtain the moisture contents necessary to meet the compaction requirements. Provide imported material of equivalent quality, if required to accomplish the work.
- B. Granular Backfill Above the Pipe Zone: Excavated trench material free from dirt, clay balls, muck, and organic matter. The material, shall have a maximum particle size of 3" and less than 20 percent passing the No. 200 sieve. Trench excavated materials may require processing to obtain the required gradation and/or to obtain the moisture contents necessary to meet the compaction requirements. Provide imported material of equivalent quality, if required to accomplish the work.
- C. Imported Granular Pipe Bedding and Pipe Zone for Wet Laying (Trench) Condition as Approved by Engineer: Pipe bedding and pipe zone material are identical and shall be drain field lime rock, graded crushed lime rock with a maximum particle size of 1/2", with no more than 5 percent passing the No. 200 sieve, or similar accepted material and shall be imported if necessary at the Contractor's own expense. Lime rock screenings or material resulting from trench excavation, except for lime rock which has been crushed and graded to size as specified, will not be accepted for pipe bedding material.
- D. Imported Granular Pipe Bedding and Pipe Zone Material Acceptance: Imported pipe bedding and pipe zone materials specified in this section are subject to the following requirements:
  - 1. All tests necessary for the Contractor to locate an acceptable source of imported material shall be made by the Contractor. Certification that the material conforms to the Specification requirements along with copies of the test results from a qualified commercial testing laboratory shall be submitted to the Engineer for acceptance at least 10 days before the material is required for use. All material samples shall be furnished to the laboratory by the Contractor at the Contractor's sole expense. Samples shall be representative and be clearly marked to show the source of the material and the intended use on the project. Sampling of the material source shall be done by the Contractor in accordance with ASTM D75. Notify the Engineer at least 24 hours prior to sampling. The Engineer may, at the Engineer's option, observe the sampling procedures. Tentative acceptance of the material source shall be based on an inspection of the source by the Engineer and/or certified test results submitted by the Contractor to the Engineer, at the Engineer's discretion. No imported materials shall be delivered to the site until the proposed source and materials' tests have been tentatively accepted in writing by the Engineer. Final acceptance will be based on tests made on samples of

material taken from the completed and compacted course by the laboratory. The completed course is defined as a course or layer that is ready for the next phase of construction.

- E. Gradation tests by the Contractor shall be made on samples taken at the place of production prior to shipment. Samples of the finished product for gradation testing shall be taken from each 1,500 tons of prepared materials or more often as determined by the Engineer, if variation in gradation is occurring, or if the material appears to depart from the Specifications. Test results shall be forwarded to the Engineer within 48 hours after sampling.
- F. If tests conducted by the Contractor or the Engineer indicate that the material does not meet Specification requirements, material placement will be terminated until corrective measures are taken. Material which does not conform to the Specification requirements and is placed in the work shall be removed and replaced at the Contractor's sole expense. Sampling and testing performed by the Contractor shall be done at the Contractor's sole expense.
- G. Concrete for Trench Backfill: Conform to ASTM C94, Alternate 3. Proportion to obtain a 28-day compressive strength of 2,500 pounds per square inch. Use a minimum of five sacks of cement per cubic yard of concrete.

# 2.04 <u>SELECTED FILL MATERIAL FOR MINIMUM COVER REQUIREMENTS</u>

A. Where shown or directed, waste trench material shall be used to provide minimum cover, provided no piece of material is larger than 3".

## 2.05 <u>IMPORTED TOPSOIL</u>

A. Imported topsoil shall be suitable sandy loam from an approved source, which possesses friability and a high degree of fertility. It shall be free of clods, roots, gravel, and other inert material. It shall be free of quack grass, horsetail, and other noxious vegetation and seed. Should such regenerative material be present in the soil, the Contractor shall remove, at his expense, all such growth, both surface and root, which may appear in the imported topsoil within 1 year following acceptance of the job in a manner satisfactory to the District.

# 2.06 <u>COMPACTION EQUIPMENT</u>

A. Compaction equipment shall be of suitable type and adequate to obtain the amount of compaction specified. Compaction equipment shall be operated in strict accordance with the manufacturer's instructions and recommendations and shall be maintained in such condition that it will deliver the manufacturer's rated compactive effort.

#### 2.07 DRAIN GRAVEL

A. Drain gravel shall be No. 57 stone size as specified in Section 901 of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

## **PART 3 - EXECUTION**

#### 3.01 TRENCH SAFETY SYSTEM

A. Install in trench excavations 5' or deeper to meet requirements of the Florida Trench Safety Act.

#### 3.02 PREPARATION OF PROJECT SITE

- A. Where clearing or partial clearing of the project site limits is necessary, complete prior to the start of trenching. Cut trees and brush as near to the surface of the ground as practicable, remove all stumps, and pile for disposal. Do not permit excavated materials to cover brush or trees prior to disposal.
- B. Do not remove existing trees or tree limbs whether on public or private property, unless they are within 4' of the pipe centerline, without permission form the Engineer.

#### 3.03 DISPOSAL OF CLEARED MATERIAL

- A. The Contractor shall bear all costs of disposing of trees, stumps, brush, roots, limbs, and other waste materials from the clearing operation. Material shall be disposed in such a manner as to meet all requirements of state, county, and local regulations regarding health, safety, and public welfare.
- B. In no case shall any material be left on the project, shoved onto abutting private properties, or be buried in embankments or trenches on the project.

#### 3.04 <u>OBSTRUCTIONS</u>

A. This item refers to obstructions which may be removed and do not require replacement. Remove obstructions within the trench area or adjacent thereto such as tree roots, stumps, abandoned piling, buildings and concrete structures, logs, and debris of all types without additional compensation. The Engineer may, if requested, make changes in the trench alignment to avoid major obstructions, if such alignment changes can be made within the easement or right-of-way without adversely affecting the intended function of the facility. The Contractor shall pay all additional costs or credit the District for any savings resulting from such alignment changes.

B. Dispose of obstructions removed from the excavation in accordance with Paragraph DISPOSAL OF CLEARED MATERIAL.

## 3.05 PAVEMENT, CURB, AND SIDEWALK REMOVAL

- A. Where adjoining pavement is to remain, cut all bituminous and concrete pavements, regardless of the thickness, and all curbs and sidewalks, prior to excavation of the trenches with an approved pavement saw, hydrohammer, or approved pavement cutter. Pavement and concrete materials removed shall be hauled from the site and not used for trench backfill.
- B. The entire roadway, including stabilized subgrade, base and paving, shall be removed and replaced in areas where gravity sewers are installed. The Contractor will install 12 inches of base and 2 inches of pavement for all areas so cut.

## 3.06 <u>TRENCH WIDTH</u>

- A. Minimum width of unsheeted trenches in which pipe is to be laid shall be 18" greater than the inside of the pipe, or as approved. Sheeting requirements shall be independent of trench widths.
- B. The maximum width at the top of the landside trench will be the pipe outside diameter plus 24", except where excess width of excavation would cause damage to adjacent pavement, structures or property.
- C. Confine trench widths to dedicated rights-of-way or construction easements, unless special written agreements have been made with the affected property owner.

## 3.07 <u>GRADE</u>

A. Excavate the trench to the lines and grades shown or as established by the Engineer with proper allowance for pipe thickness and for pipe base or special bedding when required. If the trench is excavated below the required grade, correct any part of the trench excavated below the grade at no additional cost to the District, with gravel of the type specified for pipe base. Place the gravel over the full width of trench in compacted layers not exceeding 6" deep to the established grade with allowance for the pipe base or special bedding.

## 3.08 ADDITIONAL EXCAVATION

A. When unsuitable material is encountered in the excavation, the Contractor shall notify the Engineer for his review. Unsuitable materials existing below the Contract bottom limits for excavation shall be removed as directed in writing by the Engineer. Such

Additional Excavation shall be conducted at a time when the Engineer is present and shall not exceed the vertical and lateral limits as prescribed by the Engineer. Such determination will only be made after the trench has been dewatered.

B. The voids left by the removal of unsuitable material shall be filled with material consisting of either: (1) select granular backfill; (2) imported granular pipe bedding material; (3) concrete for backfill; whichever is ordered by the Engineer. Select granular backfill or pipe bedding shall be compacted to 100 % density as specified under compaction requirements.

## 3.09 SHORING, SHEETING, AND BRACING OF TRENCHES

A. Sheet and brace the trench when necessary to prevent caving during excavation in unstable material, or to protect adjacent structures, property, workers, and the public. Increase trench widths accordingly by the thickness of the sheeting. Maintain sheeting in place until the pipe has been placed and backfilled at the pipe zone. Shoring and sheeting shall be removed, as the backfilling is done, in a manner that will damage the pipe or permit voids in the backfill. All sheeting, shoring, and bracing of trenches shall conform to the safety requirements of the federal, state or local public agency having jurisdiction. The most stringent of these requirements shall apply.

# 3.10 LOCATION OF EXCAVATED MATERIALS

A. During trench excavation, place the excavated material only within the construction easement, right-of-way, permitted, or approved working area. Do not obstruct any private or public-traveled roadways or streets. Conform to all federal, state and local codes governing the safe loading of all trenches with excavated material. For subaqueous installations, place the excavated material as shown on the Drawings.

# 3.11 <u>REMOVAL OF WATER</u>

- A. At all times, except as approved by the Engineer, provide and maintain ample means and devices to promptly remove and dispose of all water entering the trench or effluent junction box excavation during the time the trench is being prepared for the pipe laying, during the laying of the pipe, and until the backfill at the pipe zone has been completed. These provisions shall apply during the noon hour as well as overnight.
- B. The Contractor shall, where applicable, backfill and compact all voids left by dewatering well points located within 3 feet of any paved areas. Compact to 95 percent of maximum dry density per ASTM D-1557, AASHTO T-180.
- C. Dispose of the water in a manner to prevent damage to adjacent property. Drainage of trench water through the pipeline under construction is prohibited.

## 3.12 FOUNDATION STABILIZATION

A. When, in the opinion of the Engineer, after dewatering, the existing material in the bottom of the trench is unsuitable for supporting the pipe, excavate below the flow line of the pipe, as directed by the Engineer. Backfill the trench to subgrade of pipe base with FOUNDATION STABILIZATION material specified hereinbefore. Place the foundation stabilization material over the full width of the trench and compact in layers not exceeding 6" deep to the required grade.

## 3.13 PIPE BASE AND PIPE ZONE BACKFILL

A. Pipe base and pipe zone backfill are included in specification for pipe.

## 3.14 TRENCH BACKFILL ABOVE PIPE ZONE

A. When backfill is placed mechanically, push the backfill material onto the slope of the backfill previously placed and allow to slide down into the trench. Do not push backfill into the trench in such a way as to permit free fall of the material until at least 2' of cover is provided over the top of the pipe. Under no circumstances allow sharp, heavy pieces of material to drop directly onto the pipe or the tamped material around the pipe. Do not use backfill material of consolidated masses larger than 1/2 cubic foot. Place in 8" layers and compact each layer to 98% of maximum dry density per ASTM D-1557, AASHTO T-180.

## 3.15 MAINTENANCE OF TRENCH BACKFILL

- A. Maintain the backfilled trench surface between any two manholes until the following operations have been completed and approved by the Engineer.
  - 1. Manholes and manhole castings installed.
  - 2. Compaction testing.
  - 3. Cleanup and restoration of all physical features.
  - 4. Utilities restored to their original condition or better.
  - 5. And, in general, all work required between the two manholes accomplished with the exception of repaving.
- B. This maintenance shall include, but not be limited to, stabilized subgrade, limestone base, prime coat and sanded in paved areas to keep the surface of backfilled trenches reasonably smooth, free from ruts and potholes, and suitable for normal traffic flow. No more than 1500 linear feet of trench shall be opened without such maintenance being performed, except as provide for elsewhere.

- C. No additional payment will be made for the maintenance of the trench backfill prior to completion of the work outlined above.
- D. No pavement replacement shall be undertaken until all items outlined above have been completed and approved by the Engineer.

## 3.16 DISPOSAL OF EXCESS EXCAVATED MATERIAL

A. Dispose of all excess excavated materials. Make arrangements for the disposal and bear all costs incidental to such disposal. Comply with District's Special Conditions.

## 3.17 <u>BLASTING</u>

A. No blasting of any kind will be permitted.

## 3.18 <u>PIPE COVER</u>

A. In locations where insufficient pipe cover exists, place SELECTED FILL material as specified hereinbefore over the pipe as shown or directed and to provide a minimum cover of 3'. No additional payment will be made for furnishing additional pipe cover. Otherwise, concrete backfill shall be provided.

## 3.19 <u>SETTLEMENT</u>

A. Any settlement noted in backfill, fill, or in structures built over the backfill or fill within the 1-year warranty period in accordance with the General Conditions will be considered to be caused by improper compaction methods and shall be corrected at no cost to the District. Structures damaged by settlement shall be restored to their original condition by the Contractor at no cost to the District.

## 3.20 <u>TESTING</u>

A. The Contractor shall, at his expense, have an independent testing laboratory determine in-place density and moisture content by any one or combination of the following methods; ASTM D2822, D1556, D2216, D3017, or other methods as selected by the Engineer. Cooperate with the testing work by leveling small test areas designated by the Engineer. Backfill test are at Contractor's sole expense. The frequency and location of testing shall be one test per lift for every 300' or portion thereof of pressure pipe.

## 3.21 SPECIAL PROVISIONS

A. The Contractor shall deliver all excess backfill material to District's designated site, which is the LRD Wastewater Treatment Plant on Central Boulevard, in the Town of Jupiter, Florida. Broken pavement of any kind will be properly disposed of by the Contractor at his own expense elsewhere.

# SECTION 02226 GRAVEL AND CRUSHED ROCK BASE FOR STRUCTURES

## PART 1 - GENERAL

## 1.01 <u>DESCRIPTION</u>

A. This includes materials, testing, and installation of gravel and crushed rock bases for structures such as manholes and vaults.

## 1.02 <u>SUBMITTALS</u>

A. Submit six copies of a report from a testing laboratory verifying that material contains less than 1% asbestos by weight or volume and conforms to the specified gradations or characteristics.

## 1.03 <u>TESTING FOR COMPACTION</u>

A. The Contractor will test for compaction or relative density as described in Section 02225.

## PART 2 - MATERIALS

#### 2.01 CRUSHED ROCK AND GRAVEL

A. Crushed rock base shall be No. 57 stone conforming to Section 901, "Coarse Aggregate" of the Florida Department of Transportation Standard Specifications for Road and Bridge Construction.

## PART 3 - EXECUTION

#### 3.01 PLACEMENT OF CRUSHED ROCK OR GRAVEL

- A. Place crushed rock or gravel base beneath structures where shown in the drawings, 6 inches thick unless otherwise indicated. Excavate below the required grade for the bottom of the structure and refill with crushed rock or gravel as specified above. The rock base shall extend a minimum of 12 inches beyond the structure base, floor slab, or footing.
- B. Compact base as follows unless otherwise indicated:
  - 1. Lower Lift: 95% relative density.
  - 2. Upper Lifts: 95% relative density.

C. Place base material in maximum lifts of 6 inches.

# SECTION 02507 PRIME AND TACK COATS

## PART 1 - GENERAL

#### 1.01 WORK INCLUDED

A. The work includes the application of bituminous material on previously prepared bases.

## PART 2 - PRODUCTS

#### 2.01 <u>MATERIALS</u>

- A. Prime Coat: The material used for the prime coat shall be one of the following:
  - 1. Cutback asphalt, Grade RC-70 or RC-250 shall meet the requirements of AASHTO Specifications M81 except that the penetration range shall be from 60-120.
  - 2. Emulsified Asphalt SS-1 or CSS-1, SS-1H diluted in equal proportions with water and shall meet the requirements of AASHTO Specification M208.
  - 3. Emulsified Asphalt, grades AE-60, AE-90, AE-150 or AE-200 shall meet the requirements of AASHTO Specification M140.
- B. Tack Coat: The material used for the tack coat shall be one of the following:
  - 1. Emulsified Asphalt Grades SS-1, CSS-1 or AE-60, AE-90, AE-150 or 200 shall meet the requirements of AASHTO M140 or M200.
  - 2. Emulsified Asphalt, grade RS-2 or CRS-2 shall meet the requirements of AASHTO Specification M208.

#### 2.02 EQUIPMENT

A. The pressure distributor used for placing the tack or prime coat shall be equipped with pneumatic tires having sufficient width of rubber in contact with the road surface to avoid breaking the bond of or forming a rut in the surface. The distance between the centers of openings of the outside nozzles of the spray bar shall be equal to the width of the application required, within an allowable variation of 2-inches. The outside nozzle at each end of the spray bar shall have an area of opening of not less than 25 percent, nor more than 75 percent in excess of the other nozzles which shall have uniform openings. When the application covers less than the full width, the normal opening of the end nozzle at the junction line may remain the same as those of the interior nozzle.

## **PART 3 - EXECUTION**

## 3.01 PREPARATION

- A. Before applying any bituminous material, all loose material, dust, dirt, and foreign material, which might prevent proper bonding with the existing surface, shall be removed. Particular care shall be taken to clean the outer edges of the strip to be treated in order to insure that the prime or tack coat will adhere.
- B. When the prime or tack coat is applied adjacent to curb and gutter, or any other concrete surface (except where they are to be covered with a bituminous wearing course) such concrete surfaces shall be protected by heavy paper or other protective material while the prime or tack coat is being applied. Any bituminous material deposited on such air temperature is less than 50°F in the shade, or when the weather conditions or the condition of the existing surface is unsuitable. In no case shall bituminous material be applied while rain is falling or when there is water on the surface to be covered.

## 3.02 APPLICATION OF PRIME COAT

- A. After the base has been finished, the full width of surface shall be swept with a power broom supplemented with hand coat. Care shall be taken to remove loose dust, dirt and objectionable matter. If deemed necessary, the base shall be lightly sprinkled with water immediately in advance of the prime coat.
- B. The temperature of the prime material shall be such as to insure uniform distribution. The material shall be applied with a pressure distributor as specified above. The amount to be applied shall be sufficient to coat the surface thoroughly and uniformly without any excess to form pools or to flow off the base. For limerock base, the rate of application shall not be less than 0.10 gallons per square yard.
- C. If the roadway is to be opened for use following the application of the prime material, a light uniform application of clean sand shall be applied and rolled. The sand shall be non-plastic, shall be free from silt and rock particles and shall not contain any sticks, vegetation, grass, roots or organic matter. After the sand covering has been applied, the surface may be opened to traffic.

## 3.03 <u>APPLICATION OF TACK COAT</u>

A. Tack coat shall not be applied until the surface has been cleaned and is free from sand, dust or other objectionable material.

- B. The tack coat shall be heated to a suitable consistency and applied in a thin uniform layer at the rate of between 0.02 gallons and 0.08 gallons per square yard and applied as specified above.
- C. The tack coat shall be applied sufficiently in advance of the laying of the asphaltic concrete to permit drying, but shall not be applied so far in advance or over such an area as to lose its adhesiveness as a result of being covered with dust or other foreign material. Suitable precautions shall be taken by the Contractor to protect the surface while the tack coat is drying and until the wearing surface is applied.
- D. Tack coat in quantities prescribed by 3.03 B above shall be applied prior to the application of any asphaltic concrete leveling course.

# SECTION 02513 ASPHALTIC SURFACES

## PART 1 - GENERAL

#### 1.01 WORK INCLUDED

A. The work specified in this section consists of the construction of an asphaltic concrete base course, asphaltic concrete leveling course, asphaltic concrete surface course in accordance with the specifications and in conformity with the line, grades, widths, and thickness indicated in contract documents. Asphaltic concrete shall be Type S-I or S-III.

#### 1.02 **QUALITY ASSURANCE**

- A. Construction of an asphaltic concrete base course, leveling course and surface course shall be in accordance with the 2000 Standard Specifications for Road and Bridge Construction, of the Florida Department of Transportation (FDOT).
- B. The FDOT specifications are hereby made a part of the Contract to the extent they are applicable thereto and shall be binding upon the Contract as though reproduced herein in their entirety.
- C. Laboratory analysis by a Certified Testing Laboratory on all materials shall be complete prior to placement. The result of the laboratory analysis shall be submitted to the Engineer upon request.

#### PART 2 - PRODUCTS

#### 2.01 <u>MATERIALS</u>

- A. Bituminous Material: Asphalt cement, Viscosity Grade AC-20 or AC-30, shall conform with the requirements of FDOT Specifications, Section 916-1.
- B. Coarse Aggregate: Coarse aggregate, stone or slag shall conform with the requirements of FDOT Specifications, Section 901.
- C. Fine Aggregate: Fine aggregate shall conform with the requirements of FDOT Specifications, Section 902 and 332-2.2.3.
- D. Mineral Filler: Mineral filler shall conform with the requirements of FDOT Specifications, Section 917.

#### 2.02 <u>MIXTURES</u>

- A. The bituminous mixture shall be composed of a combination of aggregate (coarse, fine, or mixtures thereof), mineral filler, if required, and bituminous material. The several aggregate fractions shall be sized, uniformly graded and combined in such proportions that the resulting mixture will meet the grading and physical properties of the approved job mix formula. The composition of mixture will conform to FDOT Specifications in Sections 333-3.2, 333-3.3, 333-3.4, 333-3.5.
- B. In all cases, the job mix formula shall be within the design ranges specified in the following table. Gradation Design Range Percent by Weight Passing

	Gradation Design Range			
Sieve Size	% by Weight Passing Type S-III			
1/2-inch	100			
3/8-inch	88-100			
No. 4	60-90			
No. 10	40-70			
No. 40	20-45			
No. 80	10-30			
No. 200	2-6			

C. Proportions of silica sand and local materials shall be not more than 25 percent by weight of total aggregate. Local materials shall conform with all requirements of Section 902-6.

## 2.03 <u>MIX FORMULA</u>

A. The job mix formula shall conform to the requirements of FDOT Specifications, Section 331-4.3. In addition, the job mix formula shall include test data showing that the material as produced meets the requirements of the following table:

	Minimum Marshall		Minimum	Air	VFA Voids Filled with
Mix	Stability	Flow	VMA	Voids	Asphalt
Type	(#/kN)	(0.01 in/mm)	(%)	(%)	(%)
S-I	1500/6.7	8 - 14/2.0-3.3	14.5	4-5	65-75
S-III	1500/6.7	8 - 14/2.0-3.3	15.5	4-6	65-75

B. The minimum effective asphalt content for Type S-1 or S-III shall be 5.5 percent.

## **PART 3 - EXECUTION**

## 3.01 **PREPARATION**

A. Roads: Type S-I or S-III.

#### 3.02 ASPHALTIC CONCRETE BASE COURSE

- A. Excavate the area of the construction to the proper lines and grades. The underlying soil shall be compacted to the approximate density of the surrounding soil and primed.
- B. Place asphaltic base course material by mechanical spreading and finishing machine to the specified thickness. Prior to the placement, Engineer may require motor grader leveling. A motor grader may be used in spreading the first course of multiple course bases where the sub-grade will not support the use of a mechanical spreader.
- C. Place the base course separately from the surface course.
- D. Each layer of base course construction shall not be more than three inches on each pass.
- E. The compaction of base courses may be achieved using a steel roller, or a pneumatic tired roller that will effectively exert a compaction effort. The Contractor shall specify what equipment will be used. This must be approved by the District prior to the start of work.
- F. The completed asphalt base course shall be contiguous to and level with the existing asphaltic pavement. The Contractor is reminded that while a representative slope from the centerline is not required, a measurable pitch in the road is required to assure adequate drainage.

## 3.03 ASPHALTIC CONCRETE LEVELING COURSE

- A. Requirements
  - 1. Requirements consist of the application of Type S-I or S-III asphaltic concrete to provide for leveling as shown on the Plans.
  - 2. Where dips, bumps, surface irregularities, and etc. exist, they shall be filled with an asphalt leveling course to provide a smooth, uniform, and level surface. A site visit by the Contractor prior to bid is vital to determine how much "additional leveling" is needed. This additional asphalt should be included in the bid item for Asphalt Concrete Leveling

Course. It is not the intent of the plans to identify any or all areas where additional leveling may be needed.

- 3. After a thorough brooming, a tack coat in quantities of 0.02 gallons to 0.08 gallons per square yard shall be applied to the existing pavement prior to the application of the leveling course. If a surfacing course is not applied over the leveling course the same day, a tack coat within the quantities above shall be applied to the leveling course prior to application of the surfacing course.
- 4. Spreading shall conform to the applicable provisions of FDOT Specifications, Section 330-9.3.
- 5. Streets have an elevated centerline to insure adequate drainage. Specific percentages of cross slope are not required, however, it is the intent that the application of the leveling course will follow existing cross slope; or where none exists, provide sufficient cross slope to insure adequate drainage.
- 6. The centerline of a roadway shall be an equal distance from each edge of new pavement.

## 3.04 ASPHALTIC CONCRETE SURFACE COURSE

- A. Requirements
  - 1. The surface course requirements consist of the application of compacted Type S-I or S-III asphaltic concrete to provide for surfacing as shown in the Plans.
  - 2. After a thorough motorized brooming, a tack coat in quantities of .02 gallons to .08 gallons per square yard shall be applied to the base prior to the application of the surfacing course.
  - 3. Spreading: Spreading shall conform to the applicable provisions of FDOT Specifications, Section 330-9.2. The surface course shall be completed in one pass. The longitudinal joint, if required due to the width of the pavement, will be at the center of the total proposed paving width, not offset.
  - 4. Other items, such as materials, mixing, transporting, rolling, joints, etc. shall be as specified by other paragraphs of this section.
  - 5. In cases where only a surface is required on top of a limerock base course, the contractor shall install a compacted asphaltic surface course that has a minimum of 1-1/2".

### 3.05 TRANSPORTATION OF MIXTURE

A. The mixture shall be transported in tight vehicles cleaned of all foreign material &, if necessary, each load shall be covered with a waterproof canvas cover of sufficient dimensions to protect it from weather conditions. The inside surface of the truck may be thinly coated with a soapy water, or a mixture of water with not more than 5 percent of lubricating oil, but no excess of either shall be used. After the trucks are coated and before any mixture is placed therein, they shall be raised so that all excess water will drain out. Kerosene, gasoline or similar products shall not be used to prevent adhesion.

## 3.06 **LIMITATIONS FOR SPREADING**

A. The mixture shall be spread only when the surface is properly prepared and is intact, firm, cured and dry. No mixture shall be spread when the air temperature is less than  $40^{\circ}$  F, nor when the spreading cannot be finished and compacted during the daylight hours. The temperature of the mix at the time of spreading shall not be less than  $230^{\circ}$  F.

## 3.07 PLACING MIXTURE

- A. The mixture shall be placed in accordance with the requirements of FDOT Specifications, Section 330-9.
- B. Thickness of layers for Type S-I or S-III asphaltic concrete construction shall be no more than 2" (inches) on each pass for surface and leveling courses.

## 3.08 <u>COMPACTING MIXTURE</u>

A. The mixture shall be compacted in accordance with the requirements of FDOT Section 330-10, except that any portion of the project being constructed as an asphaltic concrete base shall be compacted as shown in Sec. 280-8.6.

## 3.09 <u>JOINTS</u>

A. Joints shall conform with the requirements of FDOT Specifications, Section 330-11.

## 3.10 FIELD QUALITY CONTROL

- A. Surface Requirements
  - 1. For the purpose of testing the finished surface, a fifteen foot straightedge (large paved areas), a six foot straightedge (bike path), and a standard

template cut to the true cross-section of the road shall be provided by the Contractor and available at all times. The Contractor shall provide or designate an employee whose duty it is to handle the straightedge and template in checking all rolled surfaces, under the direction of the Engineer or his representative.

- 2. The finished surface shall be such that it will not vary more than 1/4-inch from the template cut to the cross section of the road/path, nor more than 3/16 inch from the fifteen/six foot straightedge applied parallel to the centerline of the pavement. If necessary, the Contractor shall provide a fifteen foot rolling straightedge to demonstrate whether the leveled surface meets the specified criteria prior to the application of the surface course. Any irregularity exceeding the above limits shall be corrected. Depressions which may develop after the initial rolling shall be remedied by loosening or removing the mixture and adding new material to bring the areas to a true surface. No skin patching shall be done. Such portions of the completed pavement that are defective in surface compaction or in composition, or that do not comply with all other requirements of these specifications, shall be removed and replaced with suitable mixture, properly laid in accordance with these specifications; all at the expense of the Contractor.
- B. Thickness Requirements: The finished thickness of the compacted asphaltic concrete surface course shall be no less than that indicated in the contract documents as determined by the coring. Any surface course found to be less than that thickness shall be removed and replaced.
- C. Protection of Pavement: After the completion of the pavement, no vehicular traffic of any kind shall be permitted on the pavement until it has set sufficiently to prevent rutting or other distortion.

# SECTION 02575 SURFACE RESTORATION

## PART 1 - GENERAL

#### 1.01 WORK INCLUDED

A. This section covers the work necessary to replace all pavement, curbs, sidewalks, drainage facilities, and other street features damaged either directly or indirectly by the operation incidental to the construction of the sewer system, complete.

#### **PART 2 - PRODUCTS**

#### 2.01 ROCK FOR SURFACING AND BASE

- A. Limestone quality and gradation shall conform to Section 911, FDOT Standard Specifications.
- B. Submit proof in the form of test results from a commercial testing laboratory or other evidence satisfactory to the Engineer to show that the materials meet the quality and gradation requirements.

#### 2.02 ASPHALT PAVEMENT

- A. Asphalt mix conforming to the Standard Specifications Type S-3 for pavement restoration
- B. The asphalt for overlay shall be Type S-3 in conformance with Section 331, FDOT Standard Specifications.

#### 2.03 ASPHALT PRIME

A. Liquid asphalt for use as a prime coat under asphalt concrete shall be RC-70 or MC-70 liquid asphalt conforming to AASHTO M 81 or M 82.

#### 2.04 <u>CONCRETE</u>

- A. Concrete Forms: All forms for curbs and sidewalks shall be either 2" dimensioned lumber, plywood, or metal forms. Forms on the face of the curb shall have no horizontal form joints within 7" of the top of the curb.
- B. Curbing Compound: Commercial grade conforming to ASTM C309, Type I.

C. Reinforcing Steel: Conform to ASTM A615, Grade 60.

# PART 3 - EXECUTION

## 3.01 CONSTRUCTION PROCEDURE

- A. The Engineer reserves the right to vary the classes of backfill and the type of resurfacing as best serves the interest of the District. Trench backfill shall be as specified in Section 02225, Trench Excavation and Backfill.
- B. Replace all bituminous pavement damaged under this Contract with asphalt concrete regardless of original type.
- C. In addition to the requirements set forth herein, the work shall conform to the applicable workmanship requirements of the state highway and municipal specifications.

## 3.02 <u>REMOVAL OF PAVEMENT, SIDEWALK, CURBS, AND GUTTERS</u>

A. Removal of all pavement, sidewalks, curbs, and gutters shall conform to Section 02225, Trench Excavation and Backfill.

## 3.03 <u>STREET MAINTENANCE</u>

A. Maintain all trenches as specified under Section 02225 Trench Excavation and Backfill.

## 3.04 ASPHALT PAVEMENT REPLACEMENT

- A. Subgrade:
  - A. Bring the trench to a smooth, even grade at the correct distance below the top of the existing pavement surface so as to provide adequate space for the base course and pavement.
  - B. Stabilize the top 12 inches per FDOT Section 160.
  - C. Compact the subgrade to 98 percent of maximum dry density as determined by ASTM D1557 with mechanical vibratory or impact tampers. Determine the amount and method of compaction necessary to prevent settlement. Any subsequent settlement of the finished surfacing during the warranty period shall be promptly repaired by the Contractor, at the Contractor's sole expense.
- B. Limestone Base Course:

- A. Place sufficient base course on the subgrade in 4" lifts to obtain a minimum thickness of 16" after compaction. Place and process as required to provide a smooth surface without segregation.
- B. Compact the base course to 98 percent of maximum dry density as determined by ASTM D1557 with mechanical vibratory or impact tampers. Determine the amount and method of compaction necessary to prevent subsequent settlement. Any subsequent settlement of the finished surfacing during the warranty period shall be promptly repaired by the Contractor, at the Contractor's sole expense.
- C. Place base course under all pavement to be replaced and, in addition, under gravel surfaced shoulders and other graveled areas.
- D. Testing frequency shall be as specified in Section 02225, Trench Excavation and Backfill.
- C. Prime Coat: After the base course has been compacted, apply an asphalt prime coat, specified above, at 0.25- to 0.45-gallon per square yard to the surface of the base course and to the edges of the existing pavement. Sand to minimize tracking.
- D. Asphalt Pavement
  - A. Place the asphalt concrete on the prepared base course to yield a compacted thickness of not less than 1 3/4"for pavement replacement. Place asphalt concrete after the prime coat has set. Spread and level the asphalt concrete with hand tools or by use of a mechanical spreader, depending upon the area to be paved. Bring the asphalt concrete to the proper grade and compact by rolling or the use of hand tampers where rolling is impossible or impractical.
  - B. Roll with power rollers capable of providing compression of 200 to 300 pounds per linear inch. Begin the rolling from the lower edge of the section progressing toward the center. Overlap each preceding track by at least 1/2 the width of the roller and make sufficient passes over the entire area to remove all roller marks and to produce the desired result, as determined by the Engineer.
  - C. Comply with provisions of FDOT Section 330.
- E. Asphalt Overlay
  - A. Prior to the laying of the asphalt prime coat and asphalt overlay the surface of the pavement to be covered shall be cleaned of all loose and deleterious materials by the use of power brooms or blowers, and supplemented by hand brooming when necessary. An asphalt prime coat (tack coat) is required on all asphalt prior to the laying the asphalt overlay.
  - B. Rolling as specified above Asphalt Pavement.
C. When joining existing pavement, the finished surface of the new paving shall be flush with the surface and shall conform to the grade and crown of the adjacent pavement.

# 3.05 WEATHER CONDITIONS

A. Asphalt shall not be applied to wet material. Asphalt shall not be applied during rainfall, sand or dust storms, or any imminent storms that might adversely affect the construction. The Engineer will determine when surfaces and material are dry enough to proceed with construction. Asphalt concrete shall not be placed (1) when the atmospheric temperature is lower than 40 degrees F, (2) during heavy rainfall, or (3) when the surface upon which it is to be placed is frozen or wet. Asphalt for prime coast shall not be applied when the surface temperature is less than 50 degrees F. Exceptions will be permitted only in special cases and only with prior written approval of the Engineer.

# 3.06 **PROTECTION OF STRUCTURES**

- A. Provide whatever protective coverings may be necessary to protect the exposed portions of bridges, culverts, curbs, gutters, posts, guard fences, road signs, and any other structures from splashing oil and asphalt from the paving operations. Remove any oil, asphalt, dirt, or any other undesirable matter that may come upon these structures by reason of the paving operations.
- B. Where water valve boxes, manholes, catch basin, or other underground utility appurtenances are within the area to be surfaced, the resurfacing shall be level with the top of the existing finished elevation of these facilities. If it is evident that these facilities are not in accordance with the proposed finished surface, the Contractor shall notify the proper authority and either raise or lower the appurtenances or make arrangement with that authority in order to have the facility altered before proceeding with the resurfacing around the obstruction. Consider any delays experienced from such obstructions as incidental to the paving operation. No additional payment will be made. Protect all covers during asphalt application.

# 3.07 EXCESS MATERIALS

Dispose of all excess backfill material to District's designated site, which is the LRD
Wastewater Treatment Plant on Central Boulevard, in the Town of Jupiter, Florida.
Make arrangements for the disposal and bear all costs incidental to such disposal.

# 3.08 CONTRACTOR'S RESPONSIBILITY

A. Settlement of replaced pavement over trenches within the warranty period shall be considered the result of improper or inadequate compaction of the subbase or base

materials. The Contractor shall promptly repair all pavement deficiencies noted during the warranty period at the Contractor's sole expense.

#### 3.09 <u>SODDING</u>

A. Installation of sodding shall be as specified in Section 02936.

# END OF SECTION

# SECTION 02936 SODDING

#### PART 1 - GENERAL

#### 1.01 PERFORMANCE

- A. Section generally defines Contractors responsibilities, unless otherwise indicated for the following:
  - 1. Preparation of subsoil
  - 2. Placing topsoil
  - 3. Fertilizing
  - 4. Sod installation
  - 5. Maintenance

#### 1.02 <u>REFERENCES</u>

A. FDOT - Florida Department of Transportation - Standard Specifications for Road and Bridge - 1991.

#### 1.03 QUALITY ASSURANCE

- A. Sod Producer: Company specializing in sod production and harvesting with minimum five (5) years of experience, and certified by the State of Florida.
- B. Installer: Company approved by the sod producer.
- C. Sod: Minimum age of 18 months, with root development that will support its own weight, without tearing, when suspended vertically by holding the upper two corners.
- D. Submit sod certification for grass species and location of sod source.
- E. The Engineer reserves the right to test, reject or approve all materials before application.

#### 1.04 <u>REGULATORY REQUIREMENTS</u>

A. Comply with regulatory agencies for fertilizer.

#### 1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to site under provisions of Section 01600.
- B. Store and protect products under provisions of Section 01600.
- C. Deliver sod on pallets. Protect exposed roots from dehydration.
- D. Do not deliver more sod than can be laid within 48 hours.
- E. Deliver fertilizer in water proof bags showing weight, chemical analysis, and name of manufacturer.
- F. The Contractor shall furnish the Engineer invoices of all materials received in order that the minimum application rate of materials may be determined.

# 1.06 <u>MAINTENANCE SERVICE</u>

A. Maintain sodded areas immediately after placement until grass is well established and exhibits a vigorous growing condition.

# PART 2 - PRODUCTS

# 2.01 <u>MATERIALS</u>

- A. Sod:
  - 1. The sod shall be Argentine Bahia or Floratam, to closely match existing as directed, with well matted roots.
  - 2. The sod shall be commercial size rectangular measuring 12-inches by 24 inches or larger.
  - 3. The sod shall be sufficiently thick to secure a dense stand of live grass, with a minimum thickness of 2-inches.
  - 4. The sod shall be live, fresh and uninjured at the time of planting.
  - 5. The sod shall have a soil matt of sufficient thickness adhering firmly to the roots to withstand all necessary handling and be reasonably free of weeds and other grasses.
  - 6. The sod shall be planted as soon as possible after being harvested and shall be shaded kept moist from the time of harvesting until it is planted.
  - 7. The source of the sod may be inspected and approved by the Engineer prior to construction

- B. Topsoil:
  - 1. Excavated from site and free of weeds.
- C. Fertilizer:
  - 1. In accordance with FDOT 982-1.
- D. Water:
  - 1. Clean, fresh, and free of substances or matter which could inhibit vigorous growth of grass.

# PART 3 - EXECUTION

# 3.01 <u>INSPECTION</u>

A. Verify that prepared subsoil is ready to receive the work of this Section.

# 3.02 <u>FERTILIZING</u>

- A. Apply fertilizer in accordance with manufacturer's instructions.
- B. Apply after smooth raking of topsoil and prior to installation of sod.
- C. Apply fertilizer no more than 48 hours before laying sod.
- D. Mix thoroughly into upper 2 inches of topsoil.
- E. Lightly water to aid the dissipation of fertilizer.

# 3.03 <u>LAYING SOD</u>

- A. Moisten prepared surface immediately prior to laying sod.
- B. Lay sod tight with no open joints visible, and no overlapping; stagger end joints 12 inches minimum. Do not stretch or overlap sod pieces.

# 3.04 <u>MAINTENANCE</u>

- A. Water to prevent grass and soil from drying out.
- B. Immediately replace sod in areas which show deterioration or bare spots.

C. Contractor shall include in pricing, water and equipment to insure adequate survival of the sod for sixty days after substantial completion.

END OF SECTION

# **DIVISION 3**

# **CONCRETE**

# SECTION 03301 REINFORCED CONCRETE

#### PART 1 - GENERAL

#### 1.01 <u>SUMMARY</u>

- A. Provide cast-in-place concrete, including formwork and reinforcement, as shown on the Drawings, as specified herein, and as needed for a complete and proper installation.
- B. Related work:
  - 1. Documents affecting work of this Section include, but are not necessarily limited to, General Conditions, Special Conditions, and Division 01 General Requirements of these Specifications.

#### 1.02 <u>SUBMITTALS</u>

- A. Prior to placing concrete on the project, submit the following to the Engineer for approval:
  - 1. Testing laboratory reports for each proposed concrete mix, design proportions and sieve analysis, and soundness tests for fine and coarse aggregates.
  - 2. Test results for strength, slump, and entrained air content in accordance with the latest requirements of ASTM C39 and ASTM C192 on trial mix or field-testing records completed within previous 24 months. Perform strength tests on two test cylinders after 7 days curing and on two cylinders after 28 days curing.
  - 3. Evidence of compliance with ASTM specifications for materials proposed to be used in the concrete mix.
  - 4. Detailed reinforcing bar fabrication drawings prepared in accordance with ACI 315 including location of bar splices proposed by the Contractor in addition to those shown on the Drawings.
  - 5. Casting plan indicating the location of construction joints which are proposed by the Contractor in addition to those shown on the Drawings.

- B. Ready mix delivery tickets for each truck with the following information:
  - 1. Name of concrete firm.
  - 2. Serial number of ticket.
  - 3. Date.
  - 4. Truck number.
  - 5. Amount of concrete.
  - 6. Time loaded.
  - 7. Water added.
- C. Submit manufacturer's data to prove compliance with the specifications for the following products:
  - 1. Rubber waterstops.
  - 2. Anchoring adhesive.
- D. Comply with pertinent provisions of Section 01300.

# 1.03 **QUALITY ASSURANCE**

- A. Use adequate numbers of skilled workmen who are thoroughly trained and experienced in the necessary crafts and who are completely familiar with the specified requirements and the methods needed for proper performance of the work of this Section.
- B. Comply with "Specifications for Structural Concrete for Buildings," ACI 301, except as may be modified herein.
- C. Provide access for, and cooperate with, the inspector and testing laboratory described in Section 01410 of these Specifications.

# 1.04 DELIVERY, STORAGE, AND HANDLING

- A. Comply with pertinent provisions of Section 01600.
- B. Provide proper storage for reinforcing steel at the project site, including protective covering and blocking to keep steel off the ground.

# **PART 2 - PRODUCTS**

#### 2.01 <u>FORMS</u>

- A. Use smooth, clean plywood or metal lined panels in good condition for forming exposed concrete surfaces including interior and exterior walls, beams, columns, and slabs. Coat the forms with a non-staining, non-reactive mineral oil.
- B. Provide 3/4-inch chamfers on exposed corners.
- C. When reusing lumber for formwork, remove nails, thoroughly clean, and fill and finish holes to produce smooth concrete surfaces free of defects.
- D. Provide temporary openings at the base of column and wall forms and elsewhere as required to facilitate cleaning and final inspection prior to concrete placement.
- E. Form Ties: Factory-fabricated steel snap-off or coil tie assemblies designed to resist the lateral pressure of fresh concrete on forms and to prevent spalling of concrete on removal.
  - 1. Furnish tie assemblies that will leave no metal or other material except concrete within  $1\frac{1}{2}$  inches of the formed surface when forms, inserts and tie ends are removed.
  - 2. Furnish tie assemblies that provide cone-shaped depressions in the forms at the surface, at least 1-inch in diameter and  $1\frac{1}{2}$  inches deep, to allow filling and patching.
  - 3. Provide ties with integral steel or neoprene waterstop at midpoint for liquid containment structures, sludge storage structures, spill containment areas and below grade structures with accessible spaces.
  - 4. Do not use common wire for form ties.

#### 2.02 <u>REINFORCEMENT</u>

- A. Comply with the following:
  - 1. Bars: Deformed billet steel conforming to ASTM A615, grade 60, unless otherwise shown on the Drawings.
  - 2. Tie wire: 16 gauge annealed steel wire.
- B. Fabricate reinforcement in accordance with the latest provisions of ACI 318 "Building Code Requirements for Structural Concrete".

- C. Shop fabricate bars by cold bending to the dimensions and shapes shown on the detail shop drawings unless otherwise shown on the Drawings or approved by the Engineer.
- D. Use bars that are free from paint, oil, dirt, scale, or excessive rust which will destroy or reduce the bond when embedded in concrete.

# 2.03 <u>CONCRETE</u>

- A. Comply with the following:
  - 1. Portland cement: ASTM C150, Type II.
  - 2. Aggregate, general:
    - a. ASTM C33, uniformly graded and clean;
    - b. 35 to 50 percent ratio of fine aggregate to total aggregate by weight of surface dry materials.
  - 3. Aggregate, coarse: Pass a 1-inch sieve.
  - 4. Aggregate, fine: Pass a 0.375-inch sieve.
  - 5. Water: Fresh, clean, and free of oils, acids, alkalies, organic matter and deleterious substances.
- B. Provide concrete with the following properties:
  - 1. Minimum 28-day compressive strength: 4,000 psi.
  - 2. Maximum water-cement ratio: 0.42 by weight.
  - 3. Minimum cement content: 540 pounds per cubic yard.
  - 4. Minimum slump: 1-inch.
  - 5. Maximum slump: 4 inches
- C. Use air-entrained concrete with a total air content of 4 to 6 percent by volume.

# 2.04 <u>CONCRETE ADMIXTURES</u>

A. Air-entraining admixtures: Conform to the latest requirements of ASTM C260.

- B. Water reducing admixtures:
  - 1. Conform to the latest requirements of ASTM C494.
  - 2. Type A (normal setting type) for all concrete.
  - 3. Type D (retarding setting type) or Type E (accelerating setting type) when approved by the Engineer.
- C. Fly ash or other pozzolan admixtures (when approved by the Engineer):
  - 1. Conform to the latest requirements of ASTM C618.
- D. Ground-granulated blast-furnace slag admixture:
  - 1. Conform to the latest requirements of ASTM C989.
- E. Do not add calcium chloride, salts, or chemical antifreeze compounds to concrete.

# 2.05 <u>ANCHORING ADHESIVE</u>

- A. Provide a cartridge type, injectable two-component, epoxy adhesive system dispensed and mixed through a static mixing nozzle supplied by the manufacturer.
- B. Furnish material suitable for anchorage of reinforcing bars and threaded rods in cracked and uncracked concrete to resist long-term sustained loading, tested and qualified in accordance with the International Code Council Acceptance Criteria for Post-installed Adhesive Anchors in Concrete Elements (AC308).
- C. Acceptable products:
  - 1. Hilti Inc., HIT-RE 500 V3.
  - 2. No substitution permitted.

# 2.06 OTHER MATERIALS

- A. Cement mortar: One part Portland Cement, 2<sup>1</sup>/<sub>2</sub> parts fine aggregate, and sufficient water to obtain a maximum slump of 6 inches.
- B. Bonding grout: One part cement, one part fine aggregate, and sufficient water to obtain the consistency of thick cream.

- C. Patching mortar: One part cement, 2<sup>1</sup>/<sub>2</sub> parts fine aggregate, and sufficient water to obtain a maximum slump of 1-inch.
- D. Rubber Waterstops: Chloroprene rubber and modified chloroprene (hydrophilic) rubber waterstop with delay coating to inhibit initial expansion due to moisture present in fresh concrete.
  - 1. Chloroprene rubber performance requirements:
    - a. Tensile strength (ASTM D412): 1300 psi minimum.
    - b. Ultimate elongation (ASTM D412): 400 percent minimum.
    - c. Tear resistance (ASTM D624): 100 lb./inch minimum.
    - d. Hardness, shore A (ASTM D2240):  $50 \pm 5$ .
  - 2. Modified chloroprene (hydrophilic) rubber performance requirements:
    - a. Tensile strength (ASTM D412): 350 psi minimum.
    - b. Ultimate elongation (ASTM D412): 600 percent minimum.
    - c. Tear resistance (ASTM D624): 50 lb./inch minimum.
    - d. Hardness, shore A (ASTM D2240):  $52 \pm 5$ .
  - 3. Accessory materials: Adhesives, epoxy gel and sealant supplied by the waterstop manufacturer for securing and splicing of rubber waterstop.
  - 4. Acceptable product:
    - a. Sika Corporation, Sika Hydrotite CJ-0725-3k and Accessories.
    - b. No substitution permitted.
- E. Joint sealants: Polyurethane sealant conforming to the latest requirements of ASTM C920, Type S, Grade NS, Class 25, Uses NT, M, A, and O.
- F. Dissipating curing compound: Water based, hydrocarbon resin liquid membrane-forming dissipating curing compound complying with ASTM C309, Type 1, Class B.
  - 1. Maximum VOC content: 100 g/L

- 2. Acceptable products:
  - a. W. R. Meadows, 1100-CLEAR.
  - b. Or equal.
- G. Provide other materials, not specifically described but required for a complete and proper installation, as selected by the Contractor subject to the approval of the Engineer.

# PART 3 - EXECUTION

# 3.01 SURFACE CONDITIONS

A. Examine the areas and conditions under which work of this Section will be performed. Correct conditions detrimental to timely and proper completion of the Work. Do not proceed until unsatisfactory conditions are corrected.

# 3.02 <u>FORMS</u>

- A. Design, erect, support, brace, and maintain formwork to safely support vertical and lateral loads until such loads can be supported safely by the concrete structure.
- B. Assemble forms with tight flush joints securely clamped to prevent leakage of mortar. Brace forms to safely support concrete without deformation under load.
- C. Construct forms within the tolerance limits of permissible variations from lines, grades, and dimensions shown on the Drawings, in accordance with ACI 347 "Recommended Practice for Concrete Formwork".
- D. Construct forms to the exact sizes, shapes, lines, and dimensions shown, and as required to obtain accurate alignment, location, grades, and level and plumb work in the finished structure.
- E. Notify the Engineer when formwork is complete so that a proper check may be made at least 24 hours prior to concrete placement.
- F. Carefully remove forms, ensuring complete protection of the structure.
- G. Remove forms for vertical sides of walls, beams, girders, columns, and other similar structural members 24 hours minimum after placement of concrete, provided the concrete has hardened sufficiently and will not be damaged.
- H. Do not remove forms and bracing for slabs, beams, girders, and similar structural members until the concrete structural members have attained sufficient strength to safely support their own weight and any construction or storage load.

# 3.03 <u>REINFORCING</u>

- A. Comply with the following, as well as the specified standards, for details and methods of reinforcing placement and supports.
  - 1. Clean reinforcement and remove loose dust and mill scale, earth, and other materials that reduce bond or destroy bond with concrete.
  - 2. Accurately place and secure reinforcing steel within the tolerances required by ACI 318 using tie bars, chairs, bolsters, wire, clips or other devices approved by the Engineer.
  - 3. Provide plastic protected bar supports for slab reinforcing.
  - 4. Place bar supports for grade beams and slabs on bearing plates or blocks to prevent displacement into the earth subgrade.
  - 5. Place reinforcement to obtain the following clear concrete coverage for protection, within tolerance limits specified in ACI 318 "Building Code Requirements for Structural Concrete":
    - a. Concrete cast against and permanently exposed to earth: 3 inches.
    - b. Concrete exposed to earth, liquid, weather, or bearing on work mat or slabs supporting earth: 2 inches.
  - 6. Provide the following minimum clear distances between parallel reinforcing bars, between adjacent contact splices, and between a contact splice and an adjacent bar: 1-inch, one bar diameter, or 1.33 times the maximum size of coarse aggregate, whichever is larger.
  - 7. Reinforcing bar splices:
    - a. Use contact lap splices securely tied to adjacent bars and installed with lap lengths shown on the Drawings.
    - b. Stagger splices in adjacent reinforcing bars unless otherwise shown on the drawings or specified.
    - c. Welded only where shown on the Drawings, conforming to the requirements of AWS D12.1.

# 3.04 <u>WATERSTOPS</u>

- A. Install waterstop embedded in concrete and spanning construction, control and expansion joints to create a continuous diaphragm to prevent fluid migration for liquid containment structures, sludge storage structures, spill containment areas and below grade structures with accessible spaces.
- B. Rubber waterstop:
  - 1. Install and splice rubber waterstop in accordance with manufacturer's instructions.
  - 2. Provide a minimum of 2 inches of concrete cover over rubber waterstop.
  - 3. Install centered in joint unless otherwise shown on the Drawings.
  - 4. Prepare concrete surfaces and use manufacturer's recommended accessory materials to install and splice waterstops.

# 3.05 EMBEDDED ITEMS

- A. Provide for the proper placement and support of fittings, inserts, fixtures, and sleeves to be built into the concrete work under other sections of the Specifications.
- B. Shop paint non-ferrous metal surfaces which will contact dissimilar metals, mortar, concrete, plaster, or any other corrosive material with one heavy coat of bituminous paint, using Tnemec 46-465, or equal.

# 3.06 <u>MIXING CONCRETE</u>

- A. Ready-mixed concrete:
  - 1. Pre-mix and transport to project site in accordance with ASTM C94.
  - 2. Water may be added to the ready-mixed concrete once after delivery, only if the maximum water cement ratio and slump will not be exceeded.
  - 3. Reject concrete not in place within 60 minutes after introducing water to the mix when transported in agitator trucks or within 30 minutes after introducing water to the mix when transported in nonagitator trucks.

# 3.07 <u>PLACING CONCRETE</u>

# A. Preparation:

- 1. Remove hardened concrete and foreign material from conveying equipment.
- 2. Remove foreign matter and excess water accumulated in forms.
- 3. Rigidly close temporary openings left in formwork.
- 4. Thoroughly sprinkle earth subgrades for structural slabs without vapor barrier protection to eliminate moisture absorption.
- 5. Before depositing new concrete on or against concrete which has hardened:
  - a. Thoroughly clean hardened concrete and saturate with water.
  - b. Thoroughly cover hardened concrete surface with a 1/8-inch thick coating of neat cement mortar and place new concrete before the mortar has attained its initial set.
- 6. Use only clean tools.
- B. Conveying:
  - 1. Convey concrete from the mixer to place of final deposit as rapidly as practical by methods which will prevent separation or loss of ingredients and assure the required quality of concrete.
  - 2. Deposit concrete as nearly as practicable to its final location to avoid separation due to rehandling and flowing.
  - 3. Do not allow free fall of concrete to exceed 5 feet.
  - 4. Do not use concrete which becomes non-plastic and unworkable, or does not meet required quality control limits, or has been contaminated by foreign materials.
  - 5. Remove rejected concrete from job site.

- C. Placing concrete in forms:
  - 1. Deposit concrete continuously or in layers so that no concrete will be placed on concrete which has hardened sufficiently to cause cold joints in the work.
  - 2. If necessary, add construction joints, approved by the Engineer.
  - 3. Remove temporary spreaders, screeds, etc. as they become unnecessary.
- D. Placing concrete slabs:
  - 1. Deposit and consolidate concrete slabs in a continuous operation, within limits of construction joints, until placing of a panel or section is completed.
  - 2. Bring slab surfaces to correct level with a straightedge, and then strike off.
  - 3. Use bullfloats or darbies to smooth the surface, leaving it free of bumps and hollows.
  - 4. Do not sprinkle water on plastic surface. Do not disturb slab surface prior to start of finishing operations.

# 3.08 <u>CONSOLIDATION</u>

- A. General:
  - 1. Consolidate each layer of concrete immediately after placing, by use of mechanical vibrators supplemented by hand spading, rodding, or tamping so that the concrete is thoroughly worked around reinforcement, embedded items, and into corners of the forms, eliminating all air or stone pockets which may cause honeycomb, pitting, or planes of weakness.
  - 2. Use mechanical vibrators with a minimum frequency of 7,000 revolutions per minute.
  - 3. Insert vibrator at points approximately 18 inches apart for approximately 5 to 15 seconds at each point, sufficient to consolidate concrete, but not to cause segregation.
  - 4. Do not overvibrate or use vibrators to transport concrete inside forms.
  - 5. Provide a spare vibrator and auxiliary power source at the site during placement operations.

#### 3.09 <u>JOINTS</u>

#### A. Construction joints:

- 1. Do not relocate construction joints shown on the Drawings or add construction joints, unless approved by the Engineer. Where additional construction joints are approved by the Engineer, provide waterstops consistent with design.
- 2. Locate horizontal wall and column construction joints at the top of footings and grade slabs and the underside of slabs, beams, and girders.
- 3. Continue reinforcing steel across construction joints as shown on the Drawings or as required by the Engineer.
- 4. Form keyways in construction joints a minimum of  $1\frac{1}{2}$  inches deep and  $3\frac{1}{2}$  inches wide unless otherwise shown on the Drawings.
- B. Contraction joints:
  - 1. Formed joints: Insert preformed plastic or hard board joint strips into the concrete to form <sup>1</sup>/<sub>8</sub>-inch wide joints to a minimum depth of 1-inch.
  - 2. Fully caulk joints with sealant.

#### 3.010 <u>CONCRETE FINISHING</u>

- A. Finish concrete work to smooth, clean surfaces of uniform color with no roughness or imperfections.
- B. Remove roughness, projections, honeycomb, and other defects in formed concrete surfaces to sound concrete.
- C. Patch depressions and tie holes immediately after form removal.
  - 1. Thoroughly wet areas to be patched to prevent absorption of water from patching mortar.
  - 2. Thoroughly brush bonding grout on areas to be patched.
  - 3. Consolidate patching mortar into place and strike off to leave a patch slightly higher than surrounding concrete surface to allow for initial shrinkage.
  - 4. Leave patch area undisturbed for at least one hour before final finishing.

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- 5. Prepared proprietary compounds for bonding grout and patching mortar may be used in lieu of or in addition to the above patching procedure, if approved by the Engineer.
- D. Unless otherwise shown on the Drawings, provide the following finishes at the indicated locations:
  - 1. Float finish:
    - a. Monolithic slab surfaces that are to receive trowel finish and other slab finishes specified herein.
  - 2. Trowel finish:
    - a. Monolithic slab surfaces that are to be exposed to view, unless otherwise shown.
    - b. Slab surfaces of channels, tanks, reservoirs, basins, and chambers.
  - 3. As-formed finish:
    - a. Surfaces adjacent to earth and more than 12 inches below finished grade level.
    - b. Other surfaces not exposed to view.
  - 4. Smooth rubbed grout finish:
    - a. Exposed concrete surfaces including walls, beams, columns, and other vertical and inclined surfaces.
    - b. Surfaces adjacent to earth, stone, sand, or other special media to a depth of 12 inches below the required material grade line or low water level.
    - c. Apply finish to freshly hardened concrete as soon as possible after removal of forms.
    - d. Apply grout slurry, consisting of one part cement to 1½ parts fine aggregate mixed with water, uniformly over a predampened surface with clean burlap pads or with sponge-rubber or cork floats.
    - e. Rub grout surface with carborundum stone or similar abrasive to produce a uniform color and texture.
    - f. Remove excess grout with a dry burlap pad or a brush.

#### 3.011 CONCRETE CURING

- A. Protect fresh concrete and grout surfaces from premature drying and excessively hot or cold temperatures.
- B. Cure fresh concrete and grout surfaces in a moist condition at a relatively constant temperature for at least 7 days after placement of concrete, or longer if necessary for hydration and proper hardening of the concrete.
- C. Perform curing by one of the following methods:
  - 1. Ponding or continuous water spraying on concrete surface.
  - 2. Covering concrete surfaces with continuously wetted burlap, cotton, or other absorptive mats or fabric.
  - 3. Covering concrete surfaces with impervious waterproof paper or polyethylene film having 4-inch tape-sealed laps at common edges and taped-sealed and weighted perimeter.
  - 4. Applying curing compound on concrete surfaces to which additional concrete will not be bonded in strict accordance with manufacturer's instructions:
    - a. For horizontal surfaces, apply uniform coat of dissipating curing compound when the surface water disappears and the concrete surface will not be marred by walking workers.
    - b. For vertical surfaces, apply uniform coat of dissipating curing compound promptly after removal of forms.
- D. Maintain temperature of fresh concrete between 50 degrees and 70 degrees F for the required curing period.
- E. Provide and erect necessary facilities for heating, covering, insulating, or housing the concrete work for cold weather protection.

#### 3.012 <u>CONCRETE TESTING</u>

- A. The Owner may have sampling and testing completed by an approved testing laboratory.
- B. Sample concrete in accordance with ASTM C172.
- C. Slump testing in accordance with ASTM C143.

- D. Air content testing: Perform in accordance with one of the following methods:
  - 1. ASTM C231 pressure method.
  - 2. ASTM C173 volumetric method.
  - 3. ASTM C138 gravimetric method.
- E. Compression testing:
  - 1. ASTM C31 making, curing, protecting, and transporting concrete test specimens under field conditions.
  - 2. ASTM C39 Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens
  - Acceptance and evaluations of concrete strength shall be in accordance with ACI 318.

# 3.013 CUTTING AND PATCHING OF EXISTING CONCRETE

- A. Provide neat and smooth finished exposed surfaces.
- B. Provide 1-inch deep (minimum) saw cuts.
- C. Cut off exposed reinforcing bars a minimum of 1<sup>1</sup>/<sub>2</sub>-inch back of finished surface and fill remaining cavity with patching mortar.
- D. Provide straight and square lines at finished openings and <sup>3</sup>/<sub>4</sub>-inch chamfers at exposed corners.
- E. Core drill openings for new pipes and conduits and patch with non-shrink grout.
- F. Grind exposed finished surfaces flush to meet and match existing surfaces.

# 3.014 ANCHORING WITH ADHESIVE

- A. Drill holes, prepare surface, dispense and mix adhesive through a static mixing nozzle supplied by the manufacturer, and set reinforcement bars and threaded rod anchors in accordance with the manufacturer's recommendations where shown on the Drawings.
  - 1. Identify position of reinforcing steel and other embedded items prior to drilling holes. Do not cut or damage reinforcing steel, prestressed steel tendons, piping, conduits or other embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling.

- 2. Use rotary impact hammer drills with carbide-tipped bits of diameters as specified by the adhesive manufacturer.
- 3. Drill holes perpendicular to surface of concrete after has achieved full design strength.
- 4. Clean holes to remove loose material and drilling dust prior to installation of adhesive.
- 5. Follow manufacturer's recommendations to ensure proper mixing of adhesive components.
- 6. Inject adhesive into holes proceeding from the bottom of the hole and progressing toward the surface in such a manner as to avoid introduction of air pockets in the adhesive.
- 7. Inject sufficient adhesive in the hole to ensure that the annular gap is filled to the surface. Remove excess adhesive from the surface. Shim anchors with suitable device to center the anchor in the hole. Do not disturb or load anchors before manufacturer specified cure time has elapsed.
- 8. Observe manufacturer's recommendations with respect to installation temperatures.

# 3.015 <u>REMEDIAL WORK</u>

A. Repair or replace deficient work as directed by the Engineer and at no additional cost to the Owner.

# END OF SECTION

# **DIVISION 5**

# **METALS**

# SECTION 05500 METAL FABRICATIONS

#### PART 1 - GENERAL

#### 1.01 <u>THE REQUIREMENT</u>

A. The Contractor shall furnish and install miscellaneous metal items as shown on the Drawings and specified herein for a complete installation.

#### 1.02 <u>SUBMITTALS</u>

A. The Contractor shall submit shop drawings and other information to the Engineer for review in accordance with Section 01300 entitled "Submittals". No fabrication shall be started until shop drawings have been reviewed by the Engineer. The drawings shall be made in conformity with standard practice and indicate: fabrication, assembly and erection details, sizes of members, profiles, fastenings, supports and anchors, finishes, patterns, clearances, and connections to other work.

#### PART 2 - PRODUCTS

#### 2.01 <u>MATERIALS</u>

- A. All materials shall be of the best quality and entirely suited for the particular service. Metals shall be free from defects and have structural properties to safely render required service.
- B. Fastenings shall, insofar as practicable, be noncorrosive, nonstaining and concealed. Exposed welds shall be ground smooth to form a neat uniform fillet without weakening base metal. Unexposed welds shall have all slag removed before applying shop coating. Moulded, bent or shaped members shall be formed and clean, sharp rises, without dents, scratches, cracks or other defects. All anchors, bolts, shims and accessory items shall be provided as required for building into or fastening to adjacent work. All ferrous metals shall be galvanized, except as otherwise specified.
- C. Unless otherwise specified the miscellaneous metal work shall be equal to or exceed the requirements of the following standards:

Carbon and Low Alloy Steel	ASTM Designation
Plates and Structural Fabrication	A 36, A 529 or A 283, Grade C
Sheet Steel	A 570, Grade C

Bars and Rods Pipe - general use process pipe	A 36 or A 306, Grade 60 A 53 or A 120 Schedule 40 A 524 Grade I
<u>Fasteners*</u> Standard Strength Bolts High Strength Bolts Eyebolts	A 307, Grade A A 325 A 489
<u>Steel Coatings</u> Zinc - Electrodeposited Hot Dipped Cadmium	A 164 A 123 and A 386 A 165
Stainless Steel Plate and Sheets Bars and Shapes Fasteners*	A 167, Type 316 A 276, Type 316 A 167 and A 276, Type 316
<u>Cast Iron</u> Gray Malleable Ductile	A 48. Class 30B A 47 A 536, Grade 60-40-18
Wrought Iron Plates Sheets Shapes and Bars Pipe	A 42 A 162 A 207 A 72
Bronze Rods, Bars, and Shapes	B 138, Alloy B Soft
<u>Fasteners</u> Yellow Brass Cap Screws and Other Small Fasteners Silicon Bronze Bolts	B 16, B 36, or B 134 B 97, B 98, B 99 and B 124
<u>Aluminum</u> Structural Shapes Castings Extruded Bars, Rods and Tubes	B 308, Alloy 6061- T6 B 26, B 85 and B 108 B 221 Bars - Alloy 6061 Other - Alloy 6063
Plates and Sheet	B 209 Plates - Alloy 6061 Sheets - Alloy 3003

\*All fasteners shall be manufactured in the U.S.A. Certifications of compliance shall be submitted for all fasteners supplied on this project.

D. Materials with more than one specification or grade listed shall conform to specification or grade providing the highest strength and appropriate mechanical properties for the fabrication technique used.

# 2.02 <u>STEEL</u>

- A. Unless otherwise noted, all steel shall conform to the following:
  - 1. Stainless steel floor plates shall conform to ASTM A 793 and shall be furnished with checkered design.
  - 2. Galvanized steel pipe shall conform to ASTM A 53.
  - 3. Carbon steel bolts and fasteners shall conform to ASTM A 307 and shall be galvanized.
  - 4. Carbon steel rails, 40 pound, shall conform to the dimensions listed in AISC Specifications.
  - 5. Other steel shall be mild steel.
  - 6. All stainless steel anchor bolts and fasteners shall be of Type 316 stainless steel.

# 2.03 STRUCTURAL AND MISCELLANEOUS ALUMINUM

A. All structural and miscellaneous aluminum shapes, bars and plates shall be Alloy 6061- T6. Aluminum to be placed adjacent to concrete, masonry or dissimilar metals shall be protected with one coat of bitumastic paint. Mill finish shall be provided.

# 2.04 <u>FASTENERS</u>

A. <u>General:</u> Bolts, screws, nuts, washers, anchors and other fasteners shall be first quality and shall conform to the material specifications named herein. All necessary bolts, anchor bolts, nuts, washers, plates and bolt sleeves shall be furnished by the Contractor in accordance herewith. Anchor bolts shall have suitable washers and, where so required, their nuts shall be hexagonal. Stainless steel and silicon bronze bolts shall have a raised letter or symbol on the bolts indicating the manufacturer.

Concrete and masonry inserts shall be drill-in type as manufactured by Phillips Drill Company, Michigan City, Indiana; Hilti, Tulsa, OK; or equal. Powder or gun-driven, fiber, and plastic inserts shall not be used unless specifically noted.

B. <u>Material:</u> All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel.

If any bolts, anchor bolts, nuts and washers, are specified to be galvanized, they shall be zinc coated, after being threaded, by the hot dip process in conformity with ASTM A 123, or A 153, as is appropriate.

- C. <u>Concrete Inserts:</u> Concrete inserts shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the bolts used in the inserts.
- D. <u>Dissimilar Metal:</u> All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal. Unless otherwise specified, aluminum shall be fastened with ASTM A276 Type 316 stainless steel bolts and insulated with micarta, nylon, rubber, or equal.
- E. <u>Anchor Bolts:</u> Anchor bolts shall be set accurately and be carefully held in suitable templates of approved design. Where indicated on the Drawings, specified, or required, anchor bolts shall be provided with square plates at least 4-inches by 1/8 inch or shall have square heads and washers and be set in the concrete forms with suitable pipe sleeves, or both. Drill-in type anchors shall be as shown on the Drawings.

# PART 3 - EXECUTION

# 3.01 <u>FABRICATION</u>

- A. <u>General:</u> All workmanship shall be first class and conform to recognized and accepted best practice. All structural materials shall be thoroughly straightened in the shop by methods that will not injure them before templates are placed on same for laying out and before any work is done upon them.
- B. Finished members shall be absolutely straight and free from open joints and distortions of any kind. All shearings shall be neatly finished. Flame cutting may be used in the preparation of the various members provided this operation is performed by a machine. All necessary fillets, connections, brackets, posts, and other details not shown on the drawings, but necessary for the work, shall be furnished by the Contractor. Fabrication shall be by welding except where riveted construction is specifically allowed by the Contract Documents.
- C. <u>Steel</u>: Steel fabrication shall meet the applicable requirements of the AISC Specification for Design, Fabrication, and Erection of Structural Steel for Buildings.
- D. <u>Aluminum:</u> Aluminum fabrication shall meet the applicable requirements of the Aluminum Construction Manual, Specifications for Aluminum Structures.

- E. <u>Welding:</u> All welding shall be in accordance with the latest revised standards and recommendations of the American Welding Society. The welding of all joints shall produce complete fusion with the parent metal and shall be free from deleterious metals and cracks. Machine welding shall be used insofar as practicable. Tack welding will not be permitted on exposed surfaces. Finished welded joints shall be reasonably smooth and free from grooves, depressions or other irregularities. Any other irregularities shall be corrected by welding and/or grinding. All scale or flux shall be removed after each pass. Bronze shall be welded by either the inert gas shielded arc method or by brazing with the proper flux and filler metal. All flush welds of butt joints shall be ground smooth where exposed to view.
- F. Castings:
  - 1. Castings shall be tough, sound and free from blow holes, shrinkage cracks or other defects. Castings shall be smooth and clean. Units that have been plugged or filled will be rejected.
  - 2. Iron castings shall be close-grained gray iron or ductile iron.

# 3.02 INSTALLATION

A. All miscellaneous items shall be installed in conformance with specifications and details as shown on the drawings, or processed shop drawings. Installation and erection shall conform to the best practice with each item set plumb, level, true to line and securely anchored in its proper place.

# END OF SECTION

# SECTION 05531 ACCESS HATCHES

#### PART 1 - GENERAL

#### 1.01 <u>THE REQUIREMENT</u>

A. The Contractor shall furnish, fabricate, and install access hatches and appurtenances, complete, all in accordance with the requirements of the Contract Documents.

#### 1.02 <u>SUBMITTALS</u>

A. Shop drawings of all miscellaneous metalwork shall be submitted to the Engineer for review in accordance with Section 01300 entitled "Submittals." No fabrication shall be started until shop drawings have been reviewed and approved by the Engineer. The shop drawings shall indicate the following: fabrication, assembly and erection details, sizes of members, profiles, fastenings, supports and anchors, finishes, patterns, clearances, loading calculations and connections to other work.

#### **PART 2 - PRODUCTS**

#### 2.01 <u>MATERIALS</u>

- A. All material shall be of the best quality and entirely suited for the particular service. Metals shall be free from defects and shall have structural properties to safely render required service.
- B. Fastenings shall, insofar as practicable, be noncorrosive, non-staining and concealed. Exposed welds shall be ground smooth to form a neat uniform fillet without weakening the base metal. Unexposed welds shall have all slag removed. Molded, bent or shaped members shall be formed with clean, sharp rises, without dents. Scratches, cracks, or other defects. All anchors, bolts, shims, and accessory items shall be provided, as required, for building into or fastening to adjacent work.
- C. Unless otherwise specified, the metalwork shall be equal to or exceed the requirements of the following ASTM Standards:

Stainless Steel Fasteners

A167 and A276, Type 316

<u>Aluminum</u>

Structural Shapes	B308, Alloy 6061-T6
Castings	B26, B85 and B108
Extruded Bars, Rods and Tubes	B221 Bars – Alloy 6061-T6
Plates and Sheet	B209 Plates – Alloy 6061-T6

Materials with more than one specification or grade listed shall conform to the specification or grade providing the highest strength and appropriate mechanical properties for the fabrication technique used.

#### 2.02 <u>PROTECTIVE COATINGS</u>

A. Aluminum to be placed in contact with concrete, masonry or dissimilar metals shall be protected with two coats of coal tar epoxy, min. 8 mils DFT per coat.

#### 2.03 <u>STEEL</u>

- A. All steel shall conform to the following:
  - 1. All stainless steel anchor bolts and fasteners shall be of Type 316 stainless steel.

#### 2.04 STRUCTURAL AND MISCELLANEOUS ALUMINUM

A. All structural and miscellaneous aluminum shapes, bars, and plates shall be Alloy 6061-T6. All fasteners for aluminum shall be AST A276, Type 316 stainless steel. Aluminum to be placed in contact with concrete, masonry, or dissimilar metals shall be protected with two coats of coal tar epoxy, min. 8 mils DFT per coat.

#### 2.05 <u>SAFETY CHAINS</u>

A. Safety chains shall be 316 stainless steel coil-proof chain. Chains shall be straight link style, 3/16–inch diameter, with at least twelve links per foot, and with snap hooks on each end. Snap hooks and eye bolts for attachment of chains shall be stainless steel 3/8-inch bolt with 3/4–inch eye diameter, anchored as required. Chains shall be 4-inches longer than the anchorage spacing for each guarded area.

#### 2.06 <u>FASTENERS</u>

- A. General
  - 1. Bolts, screws, nuts, washers, anchors, and other fasteners shall be first quality and shall conform to the material specifications named herein. All necessary bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be furnished by the Contractor in accordance herewith. Anchor bolts shall

have suitable washers and, where so required, their nuts shall be hexagonal. Stainless steel bolts shall have a raised letter or symbol on the bolts indicating the material grade.

Concrete and masonry inserts shall be drill-in type, as manufactured by Phillips Drill Company – Michigan City, Indiana; Hilti – Tulsa, Oklahoma or equal. Powder or gun-driven, fiber, and plastic inserts shall not be used.

- B. Material: All bolts, anchor bolts, nuts, washers, plates, and bolt sleeves shall be Type 316 stainless steel unless otherwise indicated or specified.
- C. Concrete Inserts: Concrete inserts shall be designed to support safely, in the concrete that is used, the maximum load that can be imposed by the bolts used in the inserts.
- D. Dissimilar Metal: All dissimilar metal shall be connected with appropriate fasteners and shall be insulated with a dielectric or approved equal. Unless otherwise specified, aluminum shall be fastened with Type 316 stainless steel bolts and insulated with felt, micarta, nylon, rubber, or equal.

# 2.07 ACCESS HATCHES

- A. General
  - 1. Door opening sizes, number and direction of swing of door leaves, and locations shall be as shown on the Drawings. The Drawings show the clear opening requirements.
  - 2. Aluminum access hatches shall have <sup>1</sup>/<sub>4</sub>" thick aluminum "checkered" floor plate reinforced to a H-20 wheel load. The frame shall drain through a 1 <sup>1</sup>/<sub>2</sub>" pipe coupling. The handle shall be drop-type flush mounted. All hinges and associated hardware shall be stainless steel. The access door shall have a watertight stainless steel slam lock operated by a flush drop handle from the outside and fixed handle inside. Hatch shall include recessed staple for padlock. Hatch shall have covers bolted to the frame to prevent rattling and vibration. Hatches shall be Type AHS as manufactured by U.S. Foundry or equal.
  - 3. Fall Through Safety-Prevention Systems shall be supplied and installed by the Contractor.

# PART 3 - EXECUTION

#### 3.01 FABRICATION

- A. General: All workmanship shall be first class and conform to recognized and accepted best practice. All structural materials shall be thoroughly straightened in the shop by methods that will not injure them before templates are placed on same for laying out and before any work is completed upon them. Finished members shall be absolutely straight and free from open joints and distortions of any kind. All shearings shall be neatly finished. All necessary fillets, connection, brackets, posts, and other details not shown on the Drawings, but necessary for the work, shall be furnished by the Contractor.
- B. Aluminum: Aluminum fabrication shall meet the applicable requirements of the Aluminum Construction Manual, Specifications for Aluminum Structures.
- C. Welding: Fabrication shall be by welding. All welding shall be in accordance with the latest revised standards and recommendations of the American Welding Society. The welding of all joints shall produce complete fusion with the parent metal and shall be free from deleterious metals and cracks. Machine welding shall be used insofar as practicable. Tack welding will not be permitted on exposed surfaces. Finished welded joints shall be reasonable smooth and free from grooves, depressions, or other irregularities. Any other irregularities shall be corrected by welding and/or grinding. All scale or flux shall be removed after each pass. All flush welds of butt joints shall be ground smooth where exposed to view.
- D. Castings: Castings shall be tough, sound, and free from blow holes, shrinkage cracks, or other defects. Castings shall be smooth and clean. Units that have been plugged or filled will be rejected.

# 3.02 EXAMINATION

- A. Verify that opening sizes and dimensional tolerances are acceptable.
- B. Verify that supports and anchors are correctly positioned.

# 3.03 <u>INSTALLATION</u>

- 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 to prevent movement.

#### 3.04 <u>WARRANTY</u>

A. Warranty: The hatches and all ancillary components shall be warranted by the manufacturer for the proper operation and against defects in material or workmanship for a period of five years. The manufacturer shall also warranty that the hatch will be water-tight for the duration of the warranty period.

# END OF SECTION

# SECTION 05540 SLUICE GATES

# PART 1 - GENERAL

#### 1.01 <u>GENERAL</u>

A. The Contractor shall furnish, fabricate, and install sluice gates and appurtenances, complete, all in accordance with the requirements of the Contract Documents.

#### 1.02 <u>MANUFACTURER</u>

- A. The sluice gates shall be manufactured from Aluminum material as specified and shall be Flange back type suitable for wall mounting and generally manufactured in line with provisions of AWWA C-562-12 with improvements as desired and specified hereunder.
- B. Sluices Gates shall be as manufactured by Rodney Hunt, Waterman or equal.
- C. The sluice gates shall be capable of performing the isolation duties in pumping station wetwells and water control structures.
- D. The sluice gates shall be designed for water tightness for seating and unseating conditions as specified on the Contract Drawings.
- E. The sluice gates shall have an on-seating and unseating leakage rate of not more than 50% of the leakage rate tolerated under AWWA-C562-12 or its latest revision.
- F. All the Sluice gates shall be shop tested to verify the leakage performance at operating head, torque tested at operating head to verify the suitability of actuating mechanism and PMI tested to verify the correctness of the material used. This testing will be done in presence of the District or the District's Representative.
- G. The sluice gates shall be rising spindle type and the operation shall be by means of manual / electric operating mechanism as mentioned elsewhere in the specification.
- H. The sluice gate shall be supplied along with all accessories such as gates assembly, gasket between wall and gate assembly, studs and nuts for mounting on wall, stem connecting block, spindle, spindle couplings, spindle guides, pedestal, operating mechanism as required, gate opening indicating arrangement and required anchor bolts and fasteners for stem guides and pedestal.

- I. The sluice gate manufacturer shall be ISO-9001:2008 certified and have an existing track record of supplying wall mounted gates for more than 5 years and should have at least 50 installations in various projects.
- J. The sluice gate manufacturer shall have a suitable representative in the area, having expertise in installation / installation supervision of such gates and the ability to undertake maintenance of such gates.
- K. The sluice gate manufacturer shall conduct welding using the welding process described in AWS D 1.6 and ASME Welding code Section IX using qualified welding process and welders. Process qualification and welders' qualification will be submitted via shop drawing before commencement of manufacturing.
- L. The sluice gate manufacturer shall ensure that all the submerged weld joints shall be continuous welded and not stitch welded so as to avoid start of intergranular and crevice corrosion under submergence.
- M. The sluice gate manufacturer shall ensure that all the weld joints are fully Dye penetrative tested using qualified inspectors.
- N. The corrosion resistant property of aluminum gets reduced when exposed to heat while cutting by plasma. To avoid this, all the cutting of aluminum material shall be done using heat less water jet cutting procedure.
- O. All the aluminum material used on the assembled product shall be checked for correct chemical composition using Positive Material Identification equipment. This shall be re-verified at the time of inspection in presence of the District or District's Representative.
- P. The manufacturing and assembly of aluminum products shall be carried out in a clean area / plant where only aluminum manufacturing is carried out. This clean area is to be maintained in line with good manufacturing practices to be observed while working with aluminum so as to avoid ferrous contamination which results into corrosion impregnation.
- Q. After manufacturing, the gates shall be cleaned to remove any surface contamination and, thereafter, the gates shall be wrapped in plastic foils to prevent possibility of ferrous contamination while handling at site.

# 1.03 <u>SUBMITTALS</u>

A. Shop drawings of all miscellaneous metalwork shall be submitted to the Engineer for review in accordance with Section 01300 entitled "Submittals."

# PART 2 - PRODUCTS
## 2.01 GENERAL

A. Each sluice gate will be manufactured as detailed hereunder and shall be supplied duly tested as per requirement. The main gate assembly comprising of frame, guides and shutter will be supplied as a factory assembled unit and shipped to site as a ready to install unit on the wall to be supplied earlier or together with gate. This gate assembly will be uncrated at site and installed as complete assembled unit without stripping down into components. This is to ensure that the performance integrity of the sluice gates remains as factory tested and supplied condition, thus minimizing the influence of the installation process to achieve optimum performance at site after installation.

# 2.02 <u>MATERIALS</u>

A. The slide gates shall be manufactured generally as per AWWA C-562-12. The constructional features and details of components of the required gates are to be as under.

# 2.03 <u>GATE FRAME</u>

- A. The gate frame will be made of Aluminum and shall be sufficiently rigid to withstand the designated water head.
- B. The gate frames will be provided with low friction UHMWPE guides to ensure that galling between aluminum frame and aluminum shutter does not take place during gate operation.
- C. In case of self-contained gates, the frames shall have full length extension guides and shall be provided with a yoke at their top. The length of extension guides in such cases shall be sufficient to engage the overall vertical height of door when the gate is full open position.
- D. In case of non-self-contained gates, the frames shall have short length extension guides and shall be without yoke at their top. The length of extension guides in such cases shall be sufficient to engage at least half the overall vertical height of door when the gate is full open and shall be in accordance with the relevant provisions of AWWA C-562.

# 2.04 GATE SLUICE / SHUTTER / DOOR

A. The gate slide / shutter / door will be made from aluminum and shall be sufficiently ribbed to withstand the designated water head. The slide / shutter shall be designed for the minimum safety factor of 4 with regards to ultimate tensile, compressive and shear strength and a minimum safety factor of 2 with regards to

the tensile, compressive and shear yield strength. Slide deflection shall not exceed 1/720 of gate width or 1.6 mm whichever be lower at maximum design head.

B. The gate slide / shutter will be provided with either bolted type or integral pocket to house the thrust nut used to connect the stem with the slide.

## 2.05 <u>SEATING / SEALING FACES</u>

- A. Sealing arrangement shall comprise of low friction self-lubricating UHMWPE seals mounted on frame and remaining in forced contact with slide / door through use of resilient back up seal. This sealing arrangement has to be integrated with auto pressurized flushing arrangement to ensure that hard grit particles trapped at the bottom of the guide does not affect full closure of the gate.
- B. Alternate sealing arrangement comprising of low friction self-lubricating UHMWPE seat mounted on shutter and remaining in forced contact with resilient rubber seal mounted on frame shall also be acceptable.
- C. The sealing arrangement should be so finished that the clearance or gap, if any, between the mating sealing faces, in gate closed position, does not exceed 0.1 mm.
- D. Provision of any sealing arrangement wherein resilient seals are in direct contact with aluminum or metal faces will not be accepted as this result into high friction, higher wear and tear and comparatively lower seal life.
- E. Any resilient seal used should be of NSF certified EPDM material.

# 2.06 <u>WEDGING DEVICES</u>

A. Depending upon requirement, sluice gates subjected to unseating head can be provided with adjustable wedging devices to ensure forced contact between frame and shutter sealing faces, when the gate is in closed position.

# 2.07 <u>CONVENTIONAL OR FLUSH BOTTOM CLOSING</u>

- A. The sluice gates shall be provided with Conventional bottom closure or flush bottom closure arrangement as may be required as per site conditions.
- B. Flush Bottom Closing shall involve a flexible rubber seal mounted on the bottom of gate frame, ensuring that the sealing face remains flush with the floor or opening.
- C. In those cases where the invert of gate and invert of opening on either side of the gate is required to be flush the bottom portion of frame is required to be embedded in the channel / chamber floor and for this a cut out / recess of ample

dimensions is required to be provided beneath the waterway opening along the gate invert, while constructing the floor. The dimensions of this cut out shall be provided depending upon the feasibility to do so as per actual site conditions. The depth of this cut out below the invert of opening shall not be more than 200 mm.

- D. This cut out/recess should be later on filled up with removable asphalt or loose concrete mixed with sand dust or vermiculate after putting the gate in position so that it is possible to break open this second stage grout for removal of the gate in future.
- E. The rubber seal employed shall be made of EPDM and NSF certified and the rubber seal retainer bar as well as the fasteners for fitting the rubber seal and the retainer bar shall be of stainless steel.

# 2.08 MANUAL GATE OPERATING HEADSTOCK / LIFT MECHANISM

- A. The operating headstocks shall be designed in such a manner as to permit the gate operation by a single person under the specified maximum operating head with an effort of less than 18 kgs on the crank / handwheel.
- B. The headstock may be ungeared or geared type and the geared headstock may be either of single speed or of double speed, as might be necessary to make it convenient for one person to open or close the gate as fast as practicable. Two speed headstocks shall be supplied with gates requiring higher hoisting capacities. In this type of headstock the low speed is meant for crack opening the gate when the effort required to open the gate is maximum and the high speed is meant for further faster opening after the gate is crack opened.
- C. Geared headstock shall be supplied with easily removable crank handle or handwheel with a radius not exceeding 375 mm.
- D. All the gears of geared headstock shall be kept completely encased in cast iron housing to protect them from damage, dirt, dust, water etc. and other atmospheric effects and thus ensure their smooth operation. Grease nipples shall be provided at proper places for lubricating with grease.
- E. Headstock meant for mounting on operating platform shall be supplied with a pedestal / floor stand to provide a convenient operating height of approximately 900 mm. The pedestal of the headstock shall be provided with a covered window opening to enable cleaning and greasing of stem threads.

# 2.09 <u>LIFTING SPINDLE / STEM</u>

A. The sluice gates shall be supplied with rising type lifting spindles / stems. The stem shall be provided with acme / square threading, length of threaded portion being about 400 mm more than the height of waterway opening. This much extra

length is required to allow for a minor variation of approximately 100 mm on either side of the specified height of operating platform.

B. The design of stem will be done as per the provision in AWWA standard.

# 2.10 STEM BLOCK / CONNECTING BLOCK / THRUST NUT

A. The rising type stem shall be connected to the door through a stem block / thrust nut housed in a ribbed pocket cast integral with the door. The bottom end of stem shall thread into the stem block and is locked in place by a set screw to prevent the stem from unscrewing. The Stem block shall be cast bronze or Gunmetal.

# 2.11 <u>SAFETY STOP NUT</u>

- A. The stem shall be provided with a safety stop nut to prevent the chances of over closing of gate which may otherwise damage either the stem or the lifting platform. The stop nut shall be furnished with a set screw for setting it in a fixed position after the gate is installed.
- B. Upon installation the safety stop nut should be set in such a way that its bottom remains about 1 to 2 mm away from the top of headstock, in gate closed position.
- C. In case of stainless steel stem, the stop nut shall also be of stainless steel material of the same grade.

# 2.12 <u>STEM / SPINDLE COUPLINGS</u>

- A. For ease in transportation and handling, maximum length of one piece stem shall be restricted within 5 meter length. Where the stem are required to be furnished in more than one piece, threaded stem couplings shall be furnished to interconnect different sections of the stem. The couplings shall have provision for pinning after inserting in the threaded end of the stem.
- B. In case of Stainless steel stem, the couplings shall also be of Stainless steel material of the same grade.

# 2.13 STEM GUIDE BRACKETS

A. Longer stems shall be provided with sufficient number of stem guides to prevent buckling of stem. The stem guide bracket to be provided shall be Adjustable Centre Type - wherein a separate stem guide is bolted on to the wall bracket. The stem guide shall be adjustable in the slots on wall bracket in a direction perpendicular to the face of wall. Wall bracket should also offer minor adjustment in the direction parallel to the wall. B. The stem guides shall have machine bored split journals to facilitate erection. The journal shall be lined with UHMWPE bush.

# 2.14 <u>PIPE HOOD FOR STEM</u>

A. A Pipe hood shall be provided on the top of headstock in case of rising spindle / stem gates to cover the spindle threads for protection against damage, dirt, dust, water etc. It shall be made of transparent fracture resistant polycarbonate material or galvanized steel tube. Transparent pipe hood shall have vent holes to prevent condensation.

# 2.15 GATE OPENING INDICATING ARRANGEMENT

A. Gate opening indicating arrangement shall be provided to indicate the position of the shutter. This shall comprise of scale mounted on the pipe hood and an indicator nut mounted on the rising spindle to show the extent of the opening and closing. The minimum scale graduation shall be 25 mm.

# 2.16 FOOT PLATE WALL BRACKET

- A. Foot plate wall bracket shall be provided for gates in those locations where a platform floor or headstock support beam is not available as a part of the structure. In such cases the Headstock is to be mounted on such bracket. The thrust is transmitted from the headstock through the anchor bolts of the bracket to the wall.
- B. The foot plate wall bracket shall either be made from cast iron or steel. Steel brackets shall be galvanized as well as epoxy painted.

# PART 3 - EXECUTION

# 3.01 MATERIALS OF CONSTRUCTION

A. The materials of construction for various components of the sluice gates offered shall be as under:

a) Gate frame, Door / Shutter / Slide:	Aluminum Grade 6061-T6 *
b) Seat facings and shutter guides:	Low friction UHMWPE ASTM D4020
c) Thrust Nut / Stem block:	Stainless Steel Grade 304 or 316 *
d) Lifting Nut:	Phosphor Bronze BS 1400 grade PB4C or BS 2874 PB102
e) Wedges:	Aluminum 6061-T6 or Stainless Steel 316L * or Low
	friction UHMWPE ASTM D4020
f) Spindle / Lifting rod / Stem:	Stainless Steel Grade 304 or 316 *
g) Assembly bolts and nuts for gate	Stainless Steel Grade 304 or 316 *
frame and wall guide bracket:	Plastic isolation washers & tubes shall be used

h) Anchor fasteners for gate frame,	Stainless Steel Grade 304 or 316 *				
extension guides and wall guide	Plastic isolation washers & tubes shall be used				
bracket:					
i) Assembly bolts and nuts and	Stainless Steel Grade 304 or 316 *				
anchor bolts for headstock:					
j) Coupling and Stop nut:	Stainless Steel Grade 304 or 316 *				
k) Pipe hood:	Polycarbonate				
l) Rubber seals / Gasket **:	EPDM Rubber ASTM D2000 NSF certified				
m) Headstock body and gearbox:	Plain Cast Iron to ASTM A126 / Stainless steel grade 304				
n) Stem guide bracket and wall	Stainless Steel Grade 304L or 316L *				
bracket:					
o) Foot Plate wall bracket:	Carbon Steel, galvanized & epoxy painted / Stainless steel				
	grade 304L or 316L *				

\* Positive Material Identification (PMI) tests to be carried out for these components at manufacturer works during the inspection.

\*\* All resilient seals used shall be NSF certified. Certificate to this effect will be submitted at the time of inspection.

## 3.02 <u>FINISHING / PAINTING</u>

- A. Aluminum gate assembly coating per AWWA C562-12: Portions of guides and frames in contact or embedded in concrete shall be coated with bitumastic paint, epoxy, or polyamide.
- B. The final coating thickness inclusive of priming on cast iron headstock shall be maintained 150 microns. The epoxy paint to be used to be NSF certified.

#### 3.03 <u>SHOP TESTING</u>

- A. Following shop tests at manufacturers place shall be conducted.
- B. Shop leakage test Shop leakage test by applying unseating hydraulic pressure will be conducted at manufacturer's shop. A hydrostatic pressure equal to maximum seating / unseating head shall be applied to gate at center line of gate opening from the back, i.e. Unseating face of the gate in closed position, through positive displacement screw pump.
  - 1. A suitable scaled calibrated pressure gauge put on the unseating face of the gate shall indicate reading equal to unseating pressure head. Water leakage through the gate under above condition shall be collected in a collection pan and measured. The leakage so measured should not exceed 50% of the limit as stated in AWWA C-562-12.

- 2. After the first Leakage test the gate will be opened by at least 150 mm to fully un-wedge shutter and frame wedges and then closed. Leakage test will be once again conducted and the leakage so measured should not exceed 50% of the limit as stated in AWWA C-562-12.
- 3. No alternate testing arrangement and procedure will be permitted in place of above.
- C. Torque test at operating head for manual / electric operating arrangement After conducting hydrostatic body test a Torque test at operating head would be conducted at manufacturer's shop for gates up to 2000 x 2000 mm size. The torque required to open the gate with manual operating arrangement should not be in excess of 7 Kg-m. In case of electrical operating mechanism, the torque and amperage measured should not exceed 80% of rated torque and amperage of the actuator. This test is required to verify the suitability of offered operating arrangement at actual operating head.
- D. Movement Test Movement test should be conducted in horizontal / vertical assembled condition using stems & headstock. The gate should be operated once from full close to full open and back to full close condition with a max. Force of 135 Newton-meter on the crank or hand wheel.
- E. Seat clearance check With the gate in closed condition 0.1 mm thick feeler gauge should not pass through between sealing faces.
- F. Dimensional Check Important Dimensions shall be checked with reference to approved drawing.
- G. Material Test Certificates Material tests certificates for all important components of gates such as Frame, Shutter, Spindle, & Rubber seals etc. to be furnished at the time of inspection.
- H. Positive Material Identification Test Positive Material Identification (PMI) test to be conducted for Frame, Shutter, Rubber Seal Retainer Bar, fasteners & Stem / Spindle during the inspection to verify that the correct material as specified has been actually used on gate assembly.

# 3.04 PAINTING AND COATINGS

A. Sluice gates shall be shop primed and field finish painted for interior and exposed service. Except where otherwise specified, all exposed interior ferrous surfaces, exclusive of stainless steel surfaces shall receive a fusion-bonded epoxy coating in accordance with AWWA C550. The Contractor through the sluice gate manufacturer shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.

# 3.05 <u>WARRANTY</u>

A. Warranty: The sluice gate and all ancillary components shall be warranted by the manufacturer for the proper operation and against defects in material or workmanship for a period of five years.

# END OF SECTION

# **DIVISION 13**

# **CONTROLS**

# SECTION 13300 INSTRUMENTATION AND CONTROLS

#### PART 1 – GENERAL

#### 1.01 <u>SUMMARY</u>

- A. The Contractor shall furnish, install and place into service operating process instrumentation, control systems and panels including accessories, related to the IQ-511 Bypass Piping system, all as shown on plans and specified herein.
  - 1. Modify existing PLC/RIO panel located at the Electrical Room No.2 and add new input/output (I/O) signals using existing spare I/O points. Field verify spare I/O points location and adjust accordingly. Make all necessary modifications, terminations, etc. for a complete and working PLC system in place.
  - 2. See electrical drawings and specifications for additional work required of the instrument contractor and for relocation and modification instructions for equipment not necessarily shown on the instrument drawings.
  - 3. The Contractor shall modify existing plant PLC/RIO and SCADA programs to include new control strategy as describes in section 2.12 of this specification. Coordinate with District to obtain the latest copy for the existing plant PLC and IQ pump station PLC program and modify as required by this project.
- B. Work Includes: Engineering, furnishing, installing, calibrating, adjusting, testing, documenting, starting up, and District training for a complete Instrumentation and Control System.

Major parts are:

- 1. Modification of existing PLC/RIO panel at Electrical Room No.2
- 2. Start-up and testing of new I/O points and control strategy.
- C. Instrument and Control (I&C) Supplier work scope:
  - 1. For I&C equipment and ancillaries provide the following:
    - a. Completing detail design.
    - b. Required Submittals.
    - c. Equipment and ancillaries.
    - d. Instructions, details, and recommendations to, and coordination with,

Contractor for proper installation.

- e. Verify readiness for operation.
- f. Verify the correctness of final power and signal connections.
- g. Adjusting and calibrating.
- h. Starting up.
- i. Testing and coordination of testing.
- j. Training.
- k. Specifications/documents including: System External Specification, System Internal Specification, I/O Checklist, Site Acceptance Test Plan.
- l. Loop checks.
- m. As-built documentation for I/O added to the existing system.
- 2. Verify the following work, not by I&C Supplier, is provided:
  - a. Correct type, size, and number of signal wires with their raceways.
  - b. Correct electrical power circuits and raceways.
  - c. Correct size, type, and number of I&C related pipes, valves, fittings, and tubes.
  - d. Correct size, type, materials, and connection of process mechanical piping for in-line primary elements.
- 3. For equipment not provided under I&C Supplier, but directly connected to equipment required by I&C Supplier:
  - a. Obtain from Contractor, manufacturer's information on installation, interface, function, and adjustment.
  - b. Coordinate with Contractor to allow required interface and operation with I&C System.
  - c. For operation and control, verify that installations, interfacing signal terminations, and adjustments have been completed with manufacturer's recommendations.
  - d. Test to demonstrate required interface and operation with existing Plant PLC System.

- e. Examples of items in this category, but not limited to the following:
  - 1) Motorized valves.
- f. Examples of items not in this category:
  - 1) Internal portions of equipment provided under Division 16, Electrical, that are not directly connected to equipment under I&C System.
  - 2) Internal portions of I&C Systems provided as part of package systems and that are not directly connected to equipment provided under I&C System.
- 4. Wiring external to equipment provided by I&C Supplier:
  - a. Special control and communications cable such as fiber optic cable: Provided by I&C Supplier.
- D. Software Engineering work scope:
  - 1. I&C contractor shall perform the programming of the IQ-511 Bypass system control in the existing PLC system as well as the SCADA system.
  - 2. Start-up support, including system testing and loop checks.
  - 3. System training.

# 1.02 <u>SINGLE INSTRUMENT SUPPLIER</u>

- A. The Contractor shall assign to the Single Instrument and Control (I&C) supplier full responsibility for the functional operation of all new instrumentation systems. The Contractor shall have said supplier perform all engineering necessary in order to select, to furnish, to program, to supervise installation, connection, to calibrate, to place into operation of all sensors, instruments, alarm equipment, control panels, accessories, and all other equipment as specified herein. The I&C supplier shall have a maintenance office within a 150 mile radius of the project.
- B. The single instrument and controls supplier shall demonstrate his ability to successfully complete projects of similar sizes and nature. Provide references (including phone number and contact name) for at least three projects successfully completed in which the following tasks were performed: system engineering, documentation including panel assembly, schematics and wiring diagram, programming, field testing, calibration and start-up, operator instruction and maintenance training.
- C. The foregoing shall enable the Contractor and the District to be assured that the full responsibility for the requirements of this Section shall reside in an organization which is

qualified and experienced in the water management field and its process technology on a functional systems basis.

D. The single I&C supplier shall have a UL approved shop and shall build all panels according to UL 508A.

# 1.03 INSTALLATION WORK

A. Manufacturer's organization, or any division thereof, to accomplish the physical installation of any elements, instruments, accessories or assemblies specified herein. However, the Contractor shall employ installers who are skilled and experienced in the installation and connection of all elements, instruments, accessories and assemblies; portions of their work shall be supervised or checked as specified in Part 3, herein.

# 1.04 PREPARATION OF SUBMITTAL OF DRAWINGS AND DATA

- A. It is incumbent upon the Contractor to coordinate the work specified in these Sections so that a complete well I&C system shall be provided and shall be supported by accurate Shop and record Drawings. As a part of the responsibility as assigned by the Contractor, the Single I&C supplier shall prepare and submit through the Contractor, complete organized Shop Drawings, as specified in Part 2.02, herein. Interface between instruments, motor starters, etc. shall be included in his Shop Drawing submittal.
- B. During the period of preparation of this submittal, the Contractor shall authorize direct, informal liaison between his Single I&C supplier and the Engineer for exchange of technical information. As a result of this liaison, the Engineer may authorize certain minor refinements and revisions in the systems as specified informally, but these shall not alter the scope of work or cause increase or decrease in the Contract Price. During this informal exchange, no oral statement by the Engineer shall be construed to give formal approval of any component or method, nor shall any statement be construed to grant formal exception to, or variation from these Specifications.

# 1.05 ADDITIONAL TECHNICAL SERVICES

- A. At no separate additional cost to the District, the Contractor shall provide the following services of qualified technical representatives of the Single I&C supplier (See Part 3, herein).
  - 1. To supervise installation and connection of all instruments, elements, and components of every system, including connection of instrument signals to primary measurement elements and to final control elements such as pumps, valves, and chemical feeders;
  - 2. To make all necessary adjustments, calibrations and tests; and
  - 3. To instruct plant operating and maintenance personnel on instrumentation. This time shall be in addition to whatever time is required for other facets of work at the site, and shall be during the District's normal working days and hours.

## 1.06 <u>GUARANTEE</u>

A. The Contractor shall guarantee all equipment and installation, as specified herein, for a period of one (1) year following the date of completion of the work. To fulfill this obligation, the Contractor shall utilize technical service personnel designated by the Single I&C supplier to which the Contractor originally assigned project responsibility for instrumentation. Services shall be performed within two (2) calendar days after notification by the District.

# 1.07 ADDITIONAL PROVISIONS

- A. The applicable provisions of the following Sections under Electrical Work shall apply to work and equipment specified herein, the same as if stated in full, herein:
  - 1. Codes and Standards
  - 2. Equipment, Materials and Workmanship
  - 3. Testing
  - 4. Grounding
  - 5. Equipment Anchoring
  - 6. Conductor and Equipment Identification
  - 7. Terminal Cabinets and Control Compartments
  - 8. Process Control Devices

# 1.08 <u>NEWEST MODEL COMPONENTS</u>

A. All meters, instruments, and other components shall be the most recent field proven models marketed by their manufacturers at the time of submittal of Shop Drawings unless otherwise specified to match existing equipment. All technical data publications included with submittals shall be the most recent issue.

# 1.09 INSPECTION OF THE SITE AND EXISTING CONDITIONS

- A. The instrumentation drawings were developed from past record drawings and information supplied by the District.
- B. Before submitting a bid, visit the site and determine conditions at the site and at all existing structures in order to become familiar with all existing conditions and instrumentation and control systems which will, in any way or manner, affect the work required under this Contract. No subsequent increase in Contract cost will be allowed for additional work required because of the Contractor'S failure to fulfill this

requirement.

## 1.10 <u>RELATED WORK</u>

A. Division 16 – Electrical

## PART 2 - PRODUCTS

### 2.01 INSTRUMENTATION CRITERIA

#### A. DESIGNATION OF COMPONENTS:

In these Specifications and on the Drawings, all systems, meters, instruments, and other elements are represented schematically, and are designated by numbers, as derived from criteria in Instrument Society of American Standard ANSI/ISA S5.1-1973. The nomenclature and numbers designated herein and on the Drawings shall be employed exclusively throughout Shop Drawings, data sheets, and similar materials. Any other symbols, designations, and nomenclature unique to the manufacturers standard methods shall not replace these prescribed above, used, herein and on the Drawings. Existing PLC system at this site are Allen-Bradley Controllogix PLC family. Existing spare I/O points will be used for new signals to be added under this Contract. Contractor shall modify the existing PLC panel and add all necessary relays, surge suppressors, terminal blocks, fuses, etc. for a complete and functional PLC system.

# 2.02 DETAILED SYSTEMS DRAWINGS AND DATA

# A. CONTENT:

The Contractor shall submit detailed Shop Drawings and data prepared and organized by the Single I&C supplier designated at the time of bidding. The quantity of submittal sets required shall be six (6). These Drawings and data shall be submitted as a complete bound package at one time within 80 calendar days after date of Notice to Proceed and shall include:

- 1. Drawings showing definite diagrams for every instrumentation loop system. These diagrams shall show and identify each component of each loop or system using legend and symbols from ISA Standard S5.4, each having the format of ISA Standard S5.1 as used on the Project Drawing. (Each system or loop diagram shall be drawn on a separate Drawing sheet.)
- 2. Data sheets for each component, together with a technical product brochure or bulletin. The data sheets shall show:
  - a. Component function description used herein and on the Drawings;
  - b. Manufacturer's model number or other product designation;
  - c. Project tag number used herein and on the Drawings;

- d. Project system loop of which the component is a part;
- e. Project location or assembly at which the component is to be installed;
- f. Input and output characteristics;
- g. Scale range and units (if any) and multiplier (if any);
- h. Requirements for electric supply (if any);
- i. Requirements for air supply (if any);
- j. Materials of component parts to be in contact with, or otherwise exposed to, process media;
- k. Calibration curves as required.
- 1. Special requirements or features.
- 3. A complete index shall appear in the front of each bound submittal volume. A separate technical brochure or bulletin shall be included with each instrument data sheet. The data sheets shall be indexed in the submittal by systems or loops, as a separate group for each system or loop. If, within a single system or loop, a single instrument is employed more than once, one data sheet with one brochure or bulletin may cover all identical uses of that instrument in that system. Each brochure or bulletin shall include a list of tag numbers for which it applies. System groups shall be separated by labeled tags.
- 4. Drawings showing both schematic and wiring diagrams for control circuits. Complete details on the circuit interrelationship of all devices within and outside each control panel shall be submitted first, using schematic control diagrams. Subsequent to return of this first submittal by the Engineer, piping and wiring diagrams shall be prepared and submitted for review by the Engineer; the diagrams shall consist of component layout Drawings to scale, showing numbered terminals on components together with the unique number of the wire to be connected to each terminal. Piping and wiring diagrams shall show terminal assignments from all primary measurement devices, such as flow meters, and to all final control devices, such as samplers, pumps, valves, and chemical feeders. The Contractor shall furnish all necessary equipment supplier's Shop Drawings to facilitate inclusion of this information by the I&C system supplier.
- 5. Schematic and wiring diagram criteria shall be followed as established in NEMA Standards Publication ANSI/NEMA 1CS-1-1978, "Industrial Control and Systems."
- 6. Assembly and construction Drawings for each control panel and for other special enclosed assemblies for field installation. These Drawings shall include dimensions, identification of all components, surface preparation and finish data, nameplates, and

the like. These Drawings also shall include enough other details, including prototype photographs, to define exactly the style and overall appearance of the assembly; a finish treatment sample shall be included.

- 7. Installation, mounting and anchoring details for all components and assemblies to be field-mounted, including conduit connection or entry details.
- 8. Complete and detailed bills of materials. A master Bill of Materials listing all field mounted devices, control panels and other equipment that shall be shipped to the job site. A Bill of Materials for each control panel listing all devices within the panel.
- 9. Modifications to existing equipment. A complete description of all proposed modifications to existing instrumentation equipment, control panels, control devices, cabinets, etc., shall be submitted with the Shop Drawings complete with detailed Drawings of the proposed modifications.

## B. ORGANIZATION AND BINDING:

1. The organization of initial Shop Drawing submittal required above shall be compatible to eventual inclusion with the Technical Manuals submittal and shall include final alterations reflecting "as built" conditions. Accordingly, the initial multiple copy Shop Drawing submittal shall be separately bound in 3-ring binders of the type specified under Part 2.03, herein, for the Technical Manuals.

# 2.03 <u>TECHNICAL MANUALS</u>

- A. Five (5) final sets of technical manuals shall be supplied for the District, and one (1) final set shall be supplied for the Engineer, as a condition of acceptance of the project. Each set shall consist of one (1) or more volumes, each of which shall be bound in a standard size, three-ring, loose-leaf, vinyl plastic hard cover binder suitable for bookshelf storage. Binder ring size shall not exceed 3.0 inches.
- B. Initially, two (2) sets of these manuals shall be submitted to the Engineer for favorable review after return of favorably reviewed Shop Drawings and data required under Part 3, herein. Following the Engineer's review, one (1) set shall be returned to the Contractor with comments. The sets shall be revised and/or amended as required and the requisite final sets shall be submitted to the Engineer fifteen (15) days prior to start-up of systems. The Engineer shall distribute the copies.
- C. In addition to updated Shop Drawing information to reflect actual existing conditions, each set of technical manuals shall include installation, connection, operating, trouble-shooting, maintenance, and overhaul instructions in complete detail. This shall provide the District with comprehensive information on all systems and components to enable operation, service, maintenance, and repair. Exploded or other detailed views of all instruments, assemblies, and accessory components shall be included together with complete parts lists and ordering instructions.

#### 2.04 <u>SPARE PARTS</u>

- A. None.
- 2.05 <u>CONTROL PANELS</u>

#### A. GENERAL:

New control panels shall be furnished and installed under this Contract, if shown on drawings. They shall house the instrumentation, PLC's control devices, indicating lights, motor starters, control transformers, overload relays, all necessary accessories, wiring and terminal blocks as necessary and as shown on the Drawings and as described herein. Control panel doors shall be equipped with a door latch kit or a fast operating clamp assembly as applicable. Each control panel shall 480V AC, 3-phase external power supply. 120 volt AC control voltage in a control panel shall be supplied with a control transformer externally mounted specified elsewhere in this Section. Each control panel shall be properly grounded and as such be provided with a ground terminal block. Control panels shall be properly sized for installation through new and existing entry ways and custom fit for locations as shown on the drawings. Refer to electrical one line drawings and instrumentation drawings for additional information. Control panels shall be manufactured to UL 508A standards and shall bear a UL508A label. Control panels shall meet the requirements of NEC article 419 for short circuit ratings. Refer to electrical drawings for required fault current ratings.

#### B. CONSTRUCTION:

#### 1. OUTDOOR:

All outdoor control panels shall be NEMA 3R with drip shield kit, 3 point latch mechanism and 304L stainless steel 14 gauge construction. Provide sunshield on top and on each side as per control panel detail as shown on drawings.

#### 2. COOLING

Control panels shall have sufficient cooling and/or ventilation not to exceed the maximum operating temperature of any of the internal components. Ambient temperature limits shall be 90 degrees F for indoor and 100 degrees F for outdoor control panels. Outdoor control panels with electronic equipment shall be furnished with sun shields around and on top of the control panels.

#### C. SIGNAL AND CONTROL CIRCUIT WIRING: (INTERNAL)

#### 1. WIRE TYPE AND SIZES

Conductors shall be flexible stranded copper wire; these shall be U.L. listed Type THHN and shall be rated 600 volts. Wire for control signal circuits and alarm input circuits shall be 16 AWG. All instrumentation cables shall be shielded No. 20 AWG minimum with a copper drain wire. All special instrumentation cable such as between sensor and transmitter shall be supplied by the I&C supplier.

#### 2. WIRE INSULATION COLORS

Conductors supplying 120 volt AC power on the line side of a disconnecting switch shall have a black insulation for the ungrounded conductor. Grounded circuit conductors shall have white insulation. Insulation for ungrounded 120 volt AC control circuit conductors shall be red. All wires energized by a voltage source external to the control board(s) shall have yellow insulation. Insulation for all DC conductors shall be blue.

#### 3. WIRING INSTALLATION

All wires shall be run in plastic wireways except (1) field wiring, (2) wiring run between mating blocks in adjacent sections, (3) wiring run from components on a swing-out panel to components on a part of the fixed structure, and (4) wiring run to panel mounted components. Wiring run from components on a swing-out panels to other components on a fixed panel shall be made up in tied bundles. These shall be tied with nylon wire ties, and shall be secured to panels at both sides of the "hinge loop" so that conductors are not strained at terminals.

Wiring run to control devices on the front panels shall be tied together at short intervals with nylon wire ties and secured to the inside face of the panel using adhesive mounts.

Wiring to rear terminals on panel mount instruments shall be run in plastic wireways secured to horizontal brackets run above or below the instruments in about the same plane as the rear of the instruments.

Shields of shielded instrument cable shall only be grounded on one side of each cable run. The side to be grounded shall always be in the field as applicable.

Care shall be exercised to properly insulate the ungrounded side, to prevent ground loops from occurring.

Conformance to the above wiring installation requirements shall be reflected by details shown on the Shop Drawings for the Engineer's review.

#### 4. WIRE MARKING

Each signal, control, alarm, and indicating circuit conductor connected to a given electrical point shall be designated by a single unique number which shall be shown on all Shop Drawings. These numbers shall be marked on all conductors at every terminal using permanently marked heat-shrink plastic. Instrument signal circuit conductors shall be tagged with unique multiple digit numbers. Black and white wires from the circuit breaker panelboard shall be tagged including the one (1) or two (2) digit number of the branch circuit breaker.

#### 5. TERMINAL BLOCKS

Terminal blocks shall be molded plastic with barriers and box lug terminals, and shall be rated 15 amperes at 600 volts. White marking strips, fastened securely to the molded sections, shall be provided and wire numbers or

circuit identifications shall be marked thereon with permanent marking fluid. Terminal blocks shall be General Electric Type CR 151A1 with mounting rack, equivalent by Cinch-Jones or equal.

#### D. PAINTING:

Control panels shall be thoroughly cleaned and sandblasted per SSPC-SP-6 (Commercial Blast) after which surfaces shall receive a prime coat (Amercoat 185, Koppers 622HB, or equal) 3-mils dry, followed by two (2) or more finish coats (Amercoat 5401, Koppers 501, or equal) 3-mils dry, for a total thickness of the complete system of 6 mils. The inside surfaces shall have a white finish coat.

#### 2.06 ACCESSORIES

- A. General purpose relays in the control panels shall be plug in type with contacts rated 10 amperes at 120 volts AC. The quantity and type of contacts shall be as shown on the Drawings. Each relay shall be enclosed in a clear plastic heat and shock resistant dust cover. Sockets for relays shall have screw type terminals. Relays shall be Potter and Brumfield Type KRP or KUP, Square-D Type K, or equal.
- B. Time delay relays shall be solid state on-delay or off-delay type with contacts rated 10 amperes at 120VAC. Units shall include adjustable dial with graduated scale covering the time range in each case. Time delay relays shall be Agastat Series 7000, Omron series H3, SSAC type TDM or approved equal.
- C. Additional slave relays shall be installed when the number or type of contacts shown exceed the contact capacity of the specified relays and timers.
- D. Switches and indicating lights shall be round 30.5mm configuration, heavy duty and corrosion resistant. Legend plate shall be standard size square style laminate with white field and black markings as shown.
- E. Indicating lights shall have 6VAC lamps and integral transformer for operation from 120VAC, unless otherwise noted. Lens color shall be as noted. All indicating lights shall be push-to-test type. Pushbuttons shall include full guard with flush button and selector switches shall include a black non-illuminated knob on switch, unless otherwise noted. Contact arrangement and configuration shall be as shown.
- F. Circuit breakers shall be single pole, 120 volt, 15 ampere rating or as required to protect wires and equipment and mounted inside the panels as shown.
- G. Nameplates shall be supplied for identification of all field mounted elements, including flow meters and their transmitters. These nameplates shall identify the instrument, or meter, descriptively, as to function and system. These nameplates shall be fabricated from black-face, white-center, laminated engraving plastic. A nameplate shall be provided for each signal transducer, signal converter, signal isolator, each electronic trip, and the like, mounted inside the control panels. These shall be descriptive, to define the function and system of such element. Adhesives shall be acceptable for attaching nameplates. Painted

surfaces must be prepared to allow permanent bonding of adhesives. Nameplates shall be provided for instruments, function titles for each group of instruments and other components mounted on the front of the control panels as shown. These nameplates and/or individual letters shall be fabricated from VI-LAM, Catalog No. 200, manufactured by N/P Company, or equivalent by Formica, or equal. Colors, lettering, style and sizes shall be as shown or as selected by the Engineer.

H. Provide UL listed, specification grade, totally enclosed, ac type, quiet tumbler switches meeting NEMA WD 1 performance standards and Federal Specification W-S-896E, and capable of control of 100 percent tungsten filament and fluorescent lamp loads. Use switches rated at 20 amps, 120/277 volts. Provide operating handles colored brown. Use switches with screw terminals.

## 2.07 <u>CIRCUIT BREAKER, 0 TO 600 VOLTS</u>

- A. NEMA AB I, UL 489 listed for use at location of installation.
- B. Minimum Interrupt Rating: As shown or as required.
- C. Thermal-magnetic, quick-make, quick-break, indicating type, showing ON/OFF and TRIPPED indicating positions of the operating handle.
- D. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- E. Locking: Provisions for padlocking handle.
- F. Multipole breakers to automatically open all poles when an overload occurs on one-pole.
- G. Enclosure: as shown on dawing.
- H. Interlock: Enclosure and switch shall interlock to prevent opening cover with switch in the ON position.
- I. Do not provide single-pole circuit breakers with handle ties where multipole circuit breakers are shown.

# 2.08 <u>TRANSIENT VOLTAGE SURGE SUPPRESSION (TVSS) PROTECTION</u> (INSTRUMENTATION)

A. GENERAL:

TVSS protection shall be provided to protect the electronic instrumentation system from<br/>induced surges propagating along the signal and power supply lines. The protection<br/>systems shall be such that the protective level shall not interfere with normal operation,<br/>but shall be lower than the instrument surge withstand level, and be maintenance free and<br/>self-restoring. Instruments shall be housed in a suitable case, properly grounded. Ground<br/>wires for all TVSS shall be connected to a good earth ground and where practical, each<br/>ground wire run individually and insulated from each other. These protectors shall be<br/>200453 - 9/14/20IQ-511 PS Piping Improvements

mounted within the instrument enclosure or a separate NEMA 4X junction box coupled to the enclosure.

## B. POWER SUPPLY:

Protection of all 120 VAC instrument power supply lines shall be provided. Control panels shall be protected by line noise suppressing isolation transformers and TVSS. Field instruments shall be protected by TVSS. For control panels, the line noise suppressing isolation transformer shall be Topaz Series 30 Ultra isolators or approved equal. The suppressor shall be Edco HSP-121 and U.L. 1449 compliant.

# C. ANALOG SIGNALS:

Protection of analog signal lines originating and terminating not in the same building shall be provided by TVSS. For analog signal lines, the TVSS shall be Edco PC-642. For field mounted two-wire instruments, the TVSS shall be encapsulated in stainless steel pipe nipples and shall be Edco SS64 series, and U.L. 497B compliant.

For field mounted four-wire 120VAC instruments, the TVSS shall be in a NEMA 4X polycarbonate enclosure, Edco SLAC series.

## 2.09 WIRING DEVICES

- A. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.
  - 1. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
  - 2. Size: For 2-inch by 4-inch outlet boxes.
  - 3. Standard Model: NEMA WD 1 with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
  - 4. Feed-Through Model: NEMA WD 1, with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.

# 5. Manufacturers:

- a. Pass and Seymour.
- b. Bryant.
- c. Leviton.
- d. Hubbell.
- e. Arrow Hart.

#### 2.10 TRANSIENT VOLTAGE SURGE SUPPRESSION (POWER)

A. This section describes the material and installation requirements for transient voltage surge suppression devices (TVSS) in switchboards, panelboards, and motor control centers for 200453 - 9/14/20
13300-13
IQ-511 PS Piping Improvements

the protection of all AC electrical circuits.

- B. TVSS shall be listed and component recognized in accordance with UL 1449 4<sup>th</sup> edition and UL 1283.
- C. TVSS shall be installed and warranted by and shipped from the electrical distribution equipment manufacturer's factory.
- D. TVSS shall provide surge current diversion paths for all modes of protection; L-L, L-N, L-G, N-G in WYE systems, and L-L, L-G in DELTA systems.
- E. TVSS shall be modular in design. Each module shall be fused with a surge rated fuse.
- F. A UL approved disconnect switch shall be provided as a means of disconnect in the switchboard device only.
- G. TVSS shall meet or exceed the following criteria:
  - 1. Maximum surge current capability (single pulse rated) shall be:
    - a. Service entrance switchboard 300kA
    - b. Branch panelboards, outdoor panels 150kA
    - c. Motor control centers 80kA
  - 2. UL 1449 Listed and Recognized Component Suppression Voltage Ratings shall not exceed the following:

Voltage	<u>L-N</u>	<u>L-G</u>	<u>N-G</u>
208Y/120	400V	400V	400V
480Y/277	800V	800V	800V

- H. TVSS shall have a minimum EMI/RFI filtering of -44dB at 100kHz with an insertion ration of 50:1 using MIL STD 220A methodology.
- I. TVSS shall be provided with 1 set of NO/NC dry contacts.
- J. TVSS shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period. Warranty will be the responsibility of the electrical distribution equipment manufacturer.
- K. Approve manufactures are:
  - 1. Cutler Hammer
  - 2. General Electric

#### 2.11 FUSE, 0 to 600 VOLTS

- A. Current-limiting, with 200,000 ampere rms interrupting rating.
- B. Provide to fit mountings specified with switches and features to reject Class H fuses.
- C. Motor and Transformer Circuits, 0- to 600-Volt:
  - 1. Amperage: 0 to 600.
  - 2. UL 198E, Class RK-1, dual element, with time delay.
  - 3. Manufacturers:
    - a. Bussmann; Type LPS-RK.
    - b. Littlefuse; Type LLS-RK.
- D. Feeder and Service Circuits, 0- to 600-Volt:
  - 1. Amperage: 0 to 600.
  - 2. UL 198E, Class RK-I, dual element, with time delay.
  - 3. Manufacturers:
    - a. Bussmann; Type LPS-RK.
    - b. Littlefuse; Type LLS-RK.

## 2.12 <u>CONTROL STRATEGY DESCRIPTIONS</u>

- A. The control strategies are written descriptions of the programming required to implement regulatory and sequential control of the unit processes. Control strategies shall fully reside in the memory of the designated PLC. Coefficients pertaining to control strategies shall be modifiable through the operator interface in the monitoring / control mode. Contractor shall include an additional 8 hours on-site to fine tune control system and make minor software modifications in order to resolve any logic discrepancies encountered during start-up, and supply the District with a complete functional system. This shall be part of the bid package with no additional cost to the District.
- B. <u>IQ-511 Bypass Piping Control Strategy:</u>

The signals and control of new gate actuator and existing concentrate valve shall be programmed in the existing plant PLC program. There is an existing fiber optic connection between plant PLC system and existing IQ-511 pump station PLC system. The plant PLC system shall communicate (data exchange) with the IQ-511 pump station PLC system.

Existing IQ-511 pump station PLC control strategy will remain and shall function independent of the "IQ Bypass mode" operation. The control strategy for IQ Bypass piping control shall be programmed in the Plant PLC system. A copy of the existing PLC program is available from the District, if needed.

The operator shall manually select the IQ-511 Bypass mode from the SCADA screen when it is desired to place in the IQ Bypass Mode operation. Additionally, the operator shall manually close the 36" valve on the pipe that discharges water from Diversion Structure "B" to the IQ storage lakes (Valve "A" on Contract Drawings) and shall also manually close the valve on the 36" intake pipe from the IQ storage lakes to the IQ-511

pump station (Valve "B" on Contract Drawings) before placing the "IQ Bypass Mode" in operation. "IQ Bypass Mode" selection on the SCADA screen or PLC logic shall only be available when the existing level of stabilization pond (lined) is at elevation 18.5' or above (adjustable from SCADA screen). If the level is below 18.5' (adjustable) at the stabilization pond (lined), the "IQ Bypass Mode" shall be disabled by the PLC logic. There is an existing level measurement device at the stabilization pond (lined) and the signal is transmitted thru the radio to the Plant PLC/SCADA system. Coordinate with District to transfer the stabilization pond (lined) level signal to the PLC program and map signal as needed.

If IQ Bypass mode is selected, the PLC logic shall automatically open the new motorized gate "A" at Diversion Structure "B" to a preset opening position (40%, field adjustable) and let the water flows into the IQ wetwell. The PLC logic shall monitor the IQ-511 wetwell level and adjust the gate position automatically to keep the IQ wetwell level at elevation 14' (adjustable) with +/- 0.5' deadband. If the IQ wetwell level exceeds the elevation 16.0' (adjustable), the PLC logic shall automatically close the motorized gate "A" at Diversion Structure "B" and will enable the automatic level control using gate "A" when the IQ wetwell level drops below 14'. The elevation setpoint values and gate open position value shall be fine tune during the startup and adjusted accordingly.

The operator shall manually open the 36" valve on the pipe that discharges water from Diversion Structure "B" to the IQ storage lakes (Valve "A" on Contract Drawings) and the valve on the 36" intake pipe from the IQ storage lakes to the IQ-511 pump station before disabling the "IQ Bypass mode". If IQ Bypass mode is disabled by the operator, the PLC logic shall fully close the new motorized gate "A" at Diversion Structure "B".

- C. <u>General Logic Description</u>: The following items are general logic and shall be provided where applicable, unless otherwise noted in drawings.
  - Auto-Manual Start-Stop scheme for all equipment (pump or valves) shall operate on the following way: Any equipment shall have Auto and Manual mode selectable from the HMI screen. In Auto mode the particular pump or valve shall follow the auto control strategy described above. In Manual mode, operator shall be able to Start, Stop, Open or Close pump/ Valve from the HMI screen. VFD pump or modulating valve shall have in addition the manual set point for speed/ position.
  - All alarms that are generated by the PLC and have active roll in PLC logic, shall be latched, and shall be resetable from the HMI screens, except the alarms that need to be reset on the field.
  - All control valves or gates shall be monitored for PLC position command to the valve and position feed back from the valve or gate. More than 10% discrepancy for analog signals, and any discrepancy for digital signals shall generate an alarm in the HMI.
  - All alarms generated by the PLC shall have selectable value in HMI for alarm set point, and selectable time delay.

# PART 3 – EXECUTION

## A. GENERAL:

Under the supervision of the Single I&C supplier, all systems specified in this Section shall be installed, connected, calibrated and tested, and in coordination with the Engineer and the District, shall be started to place the processes in operation. This shall include final calibration in concert with equipment specified elsewhere in these Specifications, including pumps, valves, as well as certain existing equipment.

## B. Testing

- 1. All systems shall be exercised through operational tests in the presence of the Engineer in order to demonstrate achievement of the specified performance. Operational tests depend upon completion of work specified elsewhere in these Specifications. The scheduling of tests shall be coordinated by the Contractor among all parties involved so that the tests may proceed without delays or disruption by incomplete work.
- 2. Check the function of each loop, including set points, alarms, displays, and operator interface. Check one loop of each type and 20% (min.) of all loops. Check data logging, alarm logging, and event logging.
- 3. Test all non-loop-specific functions including, but not limited to the following:
  - a. Demonstrate capacity of system for expansion. Include tests for both storage capacity and processing capacity.
  - b. Include tests for timing requirements.
  - c. Demonstrate online and offline diagnostic tests, procedures and displays.
  - d. Demonstrate Failure Mode and Backup Procedures: Power failure, auto restart, disk backup and reload, retentive outputs.
- 4. Correct deficiencies found and complete correction of deficiencies prior to shipment to site.
- 5. Failed Tests shall be repeated and witnessed by the Engineer. With approval of the Engineer certain tests may be conducted by the I&C Supplier and Witnessed by the Engineer during START-UP.
- 6. See section 3.02 supplements for sample "Loop Status Report" and "Functional Acceptance Test Sheet".
- C. INSTALLATION AND CONNECTION:

- 1. The Contractor shall install and connect all field-mounted components and assemblies under the criteria imposed in Part 1, 1.03, herein. The installation personnel shall be provided with a final reviewed copy of the Shop Drawings and data.
- 2. The instrument process sensing lines and air signal tubing shall, in general, be installed in a similar manner to the installation of conduit specified under Section 16001. Individual tubes shall be run parallel and near the surfaces from which they are supported.
- 3. Supports shall be used at intervals of not more than 3 feet of rigid tubing.
- 4. Bends shall be formed with the proper tool and to uniform radii and shall be made without deforming or thinning the walls of the tubing. Plastic clips shall be used to hold individual plastic tubes parallel. Ends of tubing shall be square cut and cleaned before being inserted in the fittings. Bulkhead fittings shall be provided at all panels.
- 5. The Contractor shall have a technical field representative of the I&C supplier to instruct these installation personnel on any and all installation requirements; thereafter, the technical field representative shall be readily available by telephone to answer questions and supply clarification when needed by the installation personnel.
- 6. Where primary elements (supplied by I&C supplier) shall be part of a mechanical system, the I&C supplier shall coordinate the installation of the primary elements with the mechanical system manufacturer.
- Finally, after all installation and connection work has been completed, the technical 7. field representative shall check it all for correctness, verifying polarity of electric power and signal connections, making sure all process connections are free of leaks, and all such similar details. If the initial inspection finds no deficiencies, the technical field representative shall proceed to the certification to the Contractor. Anv completed work that is found to have deficiencies shall have those deficiencies corrected by installation personnel at no additional cost to the District. The technical field representative shall then recheck the work after the identified deficiencies are corrected. If the technical field representative finds deficiencies in the follow-up inspection, then remedial action shall be taken by the Contractor at no cost to the District. This pattern shall be repeated until the installation is free from The technical field representative shall then certify in writing to the defect. Contractor that for each loop or system that he has inspected is complete and without discrepancies.
- 8. The field representative of the Single I&C supplier shall coordinate all work required to interface the new equipment and control devices with the existing equipment, including all required modifications to existing equipment and related devices.

# D. Calibration

the component manufacturer's written instructions. This shall provide that those components having adjustable features are set carefully for the specific conditions and applications of this installation, and that the components and/or systems are within the specified limits of accuracy. Defective elements that cannot achieve proper calibration or accuracy, either individually or within a system, shall be replaced. This calibration work shall be accomplished by the technical field representatives of the I&C system supplier who shall certify in writing to the Contractor that for each loop or system all calibrations have been made and that all instruments are ready to operate. See section 3.02 supplements for sample "Instrumentation Calibration Sheet".

2. Proof of Conformance - The burden of proof of conformance to specified accuracy and performance is on the Contractor using its designated Single I&C supplier. The Contractor's designer shall supply necessary test equipment and technical personnel if called upon to prove accuracy and/or performance, at no separate additional cost to the District, wherever reasonable doubt or evidence of malfunction or poor performance may appear within the guarantee period.

# E. PRE-COMMISSIONING

- 1. The I&C Supplier shall test each loop (discrete and analog) to determine if it is functioning correctly. The I&C Supplier shall furnish a loop sheet for each loop to be tested. The loop sheet shall represent the actual "as-built" condition of the loop. The I&C Supplier shall perform a field functional loop test which shall be witnessed by the Engineer and District. If the loop fails the functional test, the I&C Supplier shall coordinate repairs for the Contractor to correct whatever is wrong with the loop. The I&C Supplier shall retest the loop until it is approved.
- 2. Each loop shall be tested and approved by Engineer and District until all loops have been approved.
- F. Start-up and Instruction
  - 1. When all systems are assessed by the Contractor to have been successfully carried through complete operational tests with a minimum of simulation, and the Engineer concurs in this assessment, plant start-up by the District's operating personnel can follow. For a minimum of (2) hours prior to start-up of each well, operating and maintenance personnel shall be instructed in the functions and operation of each system and shall be shown the various adjustable and set point features which may require readjustment, resetting or checking, re-calibration or maintenance by them from time to time. This instruction shall be scheduled at a time arranged with the District at least two (2) weeks in advance. Instruction shall be given by qualified persons who have been made familiar in advance with the systems. All equipment shall be checked during the first year of operation at intervals of three months for a period of not less than one day or as may be required to correct any defects to the satisfaction of the District.

- 1. The Single I&C supplier shall carefully examine all work to be performed relative to existing I&C equipment and the installation of new equipment and control devices. Work shall be scheduled to minimize required plant shutdown times.
- H. Coordination with Other Concurrent Projects
  - 1. The single I&C supplier shall coordinate extensively with other I&C suppliers of concurrent projects. Some of the equipment shown in this contract as existing might be installed while this contract is underway.

## 3.02 <u>SUPPLEMENTS</u>

- A. Supplements listed below; following "END OF SECTION" are part of this Specification.
  - 1. Instrumentation Calibration Sheet
  - 2. Loop Status Report

# END OF SECTION

# PROJECT NAME: \_\_\_\_\_\_ PROJECT NO.:\_\_\_\_\_

#### PROJECT NO. FUNCTIONAL REQUIREMENTS

			COMPONENT	STATIS		
				STATUS		
TAG NO.	DELIVERED*	TAG/IDENTIFI- CATION CHECK*	INSTALLATION CHECK	TERMINATION WIRING*	TERMINATION TUBING*	CALIBRATED*
DEMADIZO						
REMARKS				LOOP READ	Y FOR START	C-UP
			BY			
			DATE			

\* INITIAL AND DATE WHEN COMPLETE

# INSTRUMENTATION CALIBRATION SHEET

COMPONENT			MANUFAC	MANUFACTURER:			PROJECT						
CODE:			MODEL:				NUMBER	:					
NA	ME:				SERIAL:				NAME:				
		RANGE	VALU	E		E			□ CONTR	OL			
UNI	UNITS			FUNCTIONS				ACTION (DIRECT/REVERSE) MODES (P/I/D)					
□IN RE/	□INDIATE/ CHART			TONCHONS			SWITCH						
	con	SCALE							UNIT R	ANGE (VALUE	/UNITS)		
	□TRANS/ INPUT						DIFFERENTIAL (FIXED/ADJUSTABLE)						
	NVER I	OUTPUT		-					KESEI (A	AUTOMATIC/M	ANUAL)		
ANALOG				DIS			CRETE						
	REQUIRED AS CALIBE			RATED RE(		UIRED		AS CALIBRATED		REMARKS			
	IN	SCALE	OUT	SCALE	OUT	SCALE	OUT	NUMBER	TRIP PT	RESET PT	TRIP PT	RESET PT	CODE
	C. MODE	E SETTINGS: P		I	D								
<u> </u>													
	READY FOR START-UP BY DATE						ATED AND P						
											TAG NO.		

# **DIVISION 15**

# **MECHANICAL**

# SECTION 15000 PIPING

## PART 1 - GENERAL

A.

## 1.01 <u>THE REQUIREMENT</u>

A. The Contractor shall furnish and install all piping systems shown and specified, in accordance with the requirements of the Contract Documents. Each system shall be complete with all necessary fittings, hangers, supports, anchors, expansion joints, flexible connectors, valves, accessories, lining and coating, testing, excavation, backfill and encasement, to provide a functional installation.

#### 1.02 <u>REFERENCE SPECIFICATIONS, CODES AND STANDARDS</u>

Commercial Standards:

ANSI/ASME B1.20.1 Pipe Threads, General Purpose (inch). ANSI B16.1 Cast Iron Pipe Flanges and Flanged Fittings, Class 125. ANSI B16.12 Cast Iron Threaded Drainage Fittings **ANSI B16.5** Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and other Special Alloys. ANSI/ASME B16.3 Malleable Iron Threaded Fittings, Classes 150 and 300. ANSI/ASME B16.4 Cast Iron Threaded Fittings, Class 125 and 250 ANSI/AWWA C104/A21.5 Cement-Mortar Lining for ductile-Iron Pipe and Fittings for Water. ANSI/AWWA C110/A21.10 Ductile-Iron and Gray-Iron Fittings 3-in. through 48-in. for Water and Other Liquids. Rubber-Gasket Joints for Ductile-Iron and ANSI/AWWA C111/A21.11 Gray-Iron Pressure Pipe Fittings.

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ANSI/AWWA C151/A21.51	Ductile-Iron Pipe, Centrifugally Cast in Metal Molds or Sand-Lined Molds, for Water or Other Liquids.
ANSI/AWWA C600	Installation of Ductile-Iron Water Mains and Appurtenances.
ANSI/AWWA C900	Polyvinyl Chloride (PVC) Pressure Pipe 4- inc. through 12-in. for Water.
ANSI/AWWA L115/A21.15	Flanged Ductile Iron Pipe with Threaded Flanges. Steel Pipe Flanges for Water Works Service, Sizes 4 in. through 144 in.
ANSI/AWS D1.1	Structural Welding Code.
ASTM A 307	Specification for Carbon Steel Externally Threaded Standard Fasteners.
ASTM D 2000	Classification System for Rubber Products in Automotive Applications.
ASTM D 1784	Specifications for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinted Poly (Vinyl Choride) (CPVC) Compounds.
ASTM D 2241	Specification for Poly (Vinyl Chloride) (PVC) Pressure-Rated Pipe (SDR-Series).
ASTM D 2321	Recommended Practice for Underground Installation of Flexible Thermoplastic Sewer Pipe.
ASTM D 3034	Specification for Type PSM Poly (Vinyl Chloride) (PVC) Sewer Pipe and Fittings.
ASTM D 1785	Specification for Poly (Vinyl Chloride) (PVC) Plastic Pipe, Schedule 40, 80, and 120.
ASTM D 695	Test for Compressive Properties of Rigid Plastics.
ASTM D 1599	Test for Short-Time Rupture Strength of Plastic Pipe, Tubings and Fittings.

## 1.03 <u>SUBMITTALS</u>

- A. The Contractor shall submit complete shop drawings and certificates, test reports, affidavits of compliance, of all piping systems, in accordance with the requirements in Section 01300, "Submittals", and as specified in the individual piping sections.
- B. Each shop drawing submittal shall be complete in all aspects, incorporating all information and data listed herein and all additional information required to evaluate the proposed piping material's compliance with the Contract Documents. Partial or incomplete submissions will be returned to the Contractor without review.
- C. Data to be submitted shall include, but not be limited to:
  - 1. Catalog Data consisting of specifications, service, pipe size, working pressure, wall thickness, lining, coating, illustrations and a parts schedule that identifies the materials to be used for the various piping components and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
  - 2. Complete layout and installation drawings with clearly marked dimensions and elevations.
  - 3. Weight of all component parts.
  - 4. Design calculations where specified.
- D. <u>Certifications</u>: Prior to installation, the Contractor shall furnish an Affidavit of Compliance certified by the pipe manufacturer that the pipe, fittings and specials furnished under this Contract comply with all applicable provisions of AWWA and these specifications. No pipe or fittings will be accepted for use in the Work on this project until the affidavits have been submitted and accepted in accordance with Section 01300, "Submittals".
- E. All expenses incurred in making samples for certification of tests shall be borne by the Contractor.

# 1.04 <u>QUALITY ASSURANCE</u>

- A. <u>Tests</u>: Except where otherwise specified, all materials used in the manufacture of the pipe shall be tested in accordance with the applicable Specifications and Standards.
- B. <u>Welding Requirements</u>: All welding procedures used to fabricate pipe shall be prequalified under the provisions of ANSI/AWS D1.1. Welding procedures shall be required for, but not necessarily limited to, longitudinal and girth or spiral welds

for pipe cylinders, spigot and bell ring attachments, reinforcing plates and ring flange welds, and plates for lug connections.

# 1.05 <u>MANUFACTURER'S SERVICE REPRESENTATIVE</u>

A. Where the assistance of a manufacturer's service representative is advisable, in order to obtain correct pipe joints, supports, or special connections, the Contractor shall furnish such assistance at no additional cost to the District.

# 1.06 SHIPPING, HANDLING AND STORAGE

- A. Special care in handling shall be exercised during delivery, distribution and storage of pipe to avoid damage and setting up stresses. Damaged pipe will be rejected and shall be replaced at the Contractor's expense. Pipe and specials stored prior to use shall be stored in such a manner as to keep the interior free from dirt and foreign matter.
- B. No pipe shall be dropped from cars or trucks to the ground. All pipe shall be carefully lowered to the ground by mechanical means. In shipping, pipe and fittings shall be blocked in such manner as to prevent damage to castings or lining. Any broken or chipped lining shall be carefully patched. Where it is impossible to repair broken or damaged lining in pipe because of its size, the pipe shall be rejected as unfit for use.
- C. All mechanical joint pipe shall be laid with 1/8-inch space between the spigot and shoulder of pocket.

# 1.07 <u>CLEANUP</u>

A. After completion of the work, all remaining pipe cuttings, joining and wrapping materials, and other scattered debris, shall be removed from the site. The entire piping system shall be handed over in a clean and functional condition.
# PART 2 - PRODUCTS

## 2.01 <u>GENERAL</u>

- A. All pipes, fittings, and appurtenances shall be installed in accordance with the requirements of the applicable Sections of Division 2 and furnished as specified herein.
- B. All piping systems shall be designed for the maximum expected pressure as defined herein.
- C. All pipes shall be adequately supported in accordance with the requirements of the Section entitled "Pipe Supports".

## 2.02 <u>DUCTILE IRON PIPE</u>

- A. Pipe shall be centrifugally cast in metal molds or sand lined molds in accordance with ANSI A21.51 (AWWA C151) of grade 60-42-10 ductile iron. The above standard covers ductile iron pipe with nominal pipe sizes from three inches up to and including sixty-four inches in diameter. Working pressure for the pipe shall be 150 psi or as otherwise identified in the pipe schedule.
- B. Wall Thickness
  - 1. The following design parameters shall be provided for all ductile iron piping in addition to the requirements contained in the pipe schedule. This wall thickness shall conform to the following classes of AWWA C 150-91, as specified in Table 50.15, Special Thickness Classes of Ductile Iron Pipe for the following sizes unless noted otherwise in the schedule. Flanged pipe shall not be less than Class 53 as identified in Table 50.15 of AWWA C150-91.

PIPE	NOMINAL PIPE DIAMETER		TYPE OF
MATERIAL	(INCHES)	CLASS	JOINT
DI	4	51	RJ or PO
	6 THRU 54	50	RJ or PO
DI	All	53	FLG

- 2. Buried push-on, mechanical, and restrained joint pipe shall have a wall thickness class equal to or greater than the specified working pressure. Refer to pipe schedule for type of joint required for each type of service.
- C. Joints
  - 1. All pipe below grade shall have restrained joints.
  - 2. Mechanical and push-on type joints shall be in accordance with ANSI A21.11 (AWWAC 111).
  - 3. Restrained joints for pipe to sixty-four inch nominal pipe size shall be:
    - a. FLEX-RING, LOK-RING, or push-on joints with Fast Grip Gasket manufactured by American Cast Iron Pipe Co.
    - b. TR- FLEX or push-on joint pipe with Field Lock 350 Gasket joints by U.S. Pipe
    - c. Super-Lock by McWayne Corporation
    - d. Snap Lok or Bolt Lock by Griffin
  - 4. Restrained joints on fittings shall be retainer gland mechanical joints, or the fittings may be specifically arranged for joining with restrained joint pipe.
  - 5. Thrust restrained mechanical joints for ductile iron pipe and fittings shall utilize a restraining follower gland which when actuated imparts multiple wedging action against the pipe increasing its resistance as the pressure increases. Glands shall be manufactured of ductile iron conforming to ASTM A536. Restraining devices shall be of ductile iron heat treated to a minimum hardness of 370 BHN. Dimensions shall be such that the gland can be used with the standardized mechanical joint bell and tee head bolts. Twist off nuts, sized same as tee head bolts, shall be used to insure proper actuating of restraining devices. The mechanical joint shall have a working pressure of at least 250 psi with a minimum safety factor of 2:1 and shall be MEGALUG Series 1100 as manufactured by EBAA Iron, Inc., or equal.
- D. Fittings
  - Shall be manufactured in accordance with ANSI A21.1 0 (AWW A C11 0) for nominal pipe sizes three inches to sixty-four inches, and shall be either flanged or mechanical joint. Any other fittings, not included in ANSI A21.1 0 (AWWA C110) shall conform in design and performance to the requirements of this Standard.
  - 2. Shall have a rated pressure equal to or greater than the specified working pressure for nominal pipe sizes of three inches to sixty-four inches (350 psi fittings available through and including twenty-four inches, only).

- 3. Grey iron fittings which conform to the specifications contained herein may be used with ductile iron pipe providing the piping systems minimum working pressure is met or exceeded.
- E. Coatings and Linings for Pipe and Fittings
  - 1. Where scheduled, asphaltic coating shall be applied prior to shipment to the exterior wall of buried pipe and fittings in accordance with ANSI A21.51 (AWWA C151).
  - 2. Where scheduled (e.g. for wastewater or reclaimed water) the interior of all ductile iron pipe and fittings shall be lined with an epoxy lining. The epoxy lining shall be Protecto 401 Ceramic Epoxy as manufactured by the Protecto Division of Vulcan Painters, Inc. All pipe and fittings shall be lined with a minimum dry film thickness of 40 mils, except for the gasket groove and spigot end up to six inches back from the end of the spigot which shall be lined with ten mils of the material. All ductile iron pipe and fittings shall be checked for dry film thickness in accordance with the SSPC-PA2. Each pipe joint and fitting shall be marked with the date of application of the lining system and with its numerical sequence of application on that date. The pipe supplier shall furnish a certificate stating that lining applicator has complied with all specification requirements relative to the material, its application and inspection. Surface preparation, number of coats, application of the lining material and field touch-up shall be in strict accordance with the lining material manufacturer's recommendations. During the installation of the pipe, the lining material manufacturer shall provide the services of a field engineer to instruct and demonstrate to the Contractor's personnel the procedure for the field touch-up of lining where field cuts and taps were required. Holiday inspection shall be conducted using test equipment described in American Water Works Association Standard, AWWA C210, Section 5.3.3.1. In accordance with coating manufacturers recommendation, holiday testing may be conducted any time after the coating has reached sufficient cure.

# 2.03 <u>SLEEVES</u>

- A. Pipe sleeves shall be provided where shown on the Drawings. All PVC pipe passing through cast-in-place concrete walls or slabs shall be provided with a sleeve whether or not shown on the Drawings.
- B. Except for core drilled holes in existing concrete, sleeves shall be equipped with a waterstop centered in the wall penetration.
- C. As a minimum, sleeves shall be of the same material as the pipe passing through it.

- D. Sleeves shall be of sufficient size to pass the pipe and any required coverings of the pipe and shall extend two (2) inches above finished floor.
- E. Sleeves shall be caulked with a fire retardant caulking compound at fire walls and a gas tight compound at gas tight walls.
- F. All sleeves penetrating water/wastewater tanks or wet wells and all below grade walls or floors shall be provided with penetration seals, "Link Seal" as manufactured by Thunderline Corporation, or equal. Penetration seals shall be covered with a two part polysulfide sealant on the earth or wet side of the sleeve and penetration seals as shown on the Drawings.
- G. All sleeves in building interiors shall be sealed with non-shrink grout or foam sealant and caulking.

# PART 3 - EXECUTION

# 3.01 GENERAL

- A. The Contractor shall furnish all labor, tools, materials, and equipment necessary for installation and jointing of the pipe. All piping shall be installed in accordance with the Drawings in a neat workmanlike manner and shall be set for accurate line and elevation. The District reserves the right, however, to make minor changes in grade and/or alignments as the Work progresses. All piping shall be thoroughly cleaned before installation, and care shall be taken to keep the piping clean throughout the installation.
- B. Before setting wall sleeves, pipes, castings and pipes to be cast in place, the Contractor shall check the Drawings and equipment manufacturer's drawings which may have a direct bearing on the pipe location. The Contractor shall verify existing piping tie-in connections and verify size, type, and location before fabricating new piping assemblies.
- C. Piping shall be attached to pumps, valves, equipment, etc., in accordance with the respective manufacturers' recommendations. This includes the use of flexible connectors as required.
- D. For piping assembled with threaded, solvent cemented, welded or soldered joints, liberal use of unions shall be made. Unions shall be provided close to main pieces of equipment and in branch lines to permit ready dismantling of piping without disturbing main pipe lines or adjacent branch lines. A minimum of one union per straight run of pipe between fitting and/or valves with multiple lengths of pipe shall be used.

E. All changes in directions or elevations shall be made with fittings, unless otherwise shown.

# 3.02 <u>LAYING PIPE</u>

- A. Proper and suitable tools and appliances for the safe convenient handling and laying of pipe shall be used and shall, in general, agree with manufacturer's recommendations. At the time of laying, the pipe shall be examined carefully for defects, and should any pipe be discovered to be defective after being laid, it shall be removed and replaced with sound pipe by the Contractor at his expense.
- B. The Contractor shall perform all earthwork including excavation, backfill, bedding, compaction, sheeting, shoring and bracing, dewatering and grading in accordance with Division 2 "Sitework."
- C. Upon satisfactory excavation of the pipe trench and completion of the pipe bedding, a continuous trough for the pipe barrel and recesses for the pipe bells, or couplings, shall be excavated by hand digging. When the pipe is laid in the prepared trench, true to line and grade, the pipe barrel shall receive continuous, uniform support and no pressure shall be exerted on the pipe joints from the trench bottom.
- D. Pipe shall be installed in accordance with the manufacturer's recommendation. Before being lowered into the trench, the pipes and accessories shall be carefully examined and the interior of the pipes shall be thoroughly cleaned of all foreign matter and other acceptable methods. At the close of each work day and during suspension of work for any reason at any time, a suitable stopper shall be placed in the end of the pipe last laid to prevent mud or other foreign material from entering the pipe.
- E. Lines shall be laid straight and depth of cover shall be maintained uniform with respect to finish grade, whether grading is completed or proposed at time of pipe installation. Where a grade or slope is shown on the Drawings, the Contractor shall use laser based surveying instruments to maintain alignment and grade. At least one elevation shot shall be taken on each length of pipe and recorded. No abrupt changes in direction or grade will be allowed.
- F. After pipe has been laid, inspected and found satisfactory, sufficient backfill shall be placed along the pipe barrel to hold the pipe securely in place during the conduction of the hydrostatic test. No backfill shall be placed over the joints until the hydrostatic tests are satisfactorily completed, leaving the exposed to view for the detection of visible leaks. Upon satisfactory completion of the hydrostatic test, backfilling of the trench shall be completed. Pipe trenches may be backfilled prior to hydrostatic testing subject to the permission of the Engineer.

G. All underground piping shall be properly restrained at all fittings where the pipeline changes direction, changes size, or ends, using restrained joint pipe

# 3.03 <u>THRUST RESTRAINT</u>

- A. Restrained joints shall be located at valves, changes in direction of piping, and major branch connections as specified herein and shown on the Drawings. Restrained joints shall be of a type recommended by the pipe manufacturer and accepted by the Engineer.
- B. On all piping, where sleeve type couplings and flanged adapters are located near fittings or valves, tie rods shall span across the coupling as specified herein to restrain movements of the pipe along its axial direction. Such restraints can be deleted if both ends of the pipe are anchored in a concrete structure with no fitting or valve occurring within the span length, in the suction piping to a pump where the coupling is between the pump and valve, or when the water pressure measured at the crown of the pipe is less than five feet.
- C. All sleeve type couplings shall be harnessed except where noted specifically on the Drawings. The harnessing shall be as shown on the Drawings or as specified herein.
- D. All buried tie rods and associated hardware shall be 316 stainless steel.
- E. In general, all valves and fittings shall be restrained in an acceptable manner such that the unbalanced force developed at them shall be supported independent of the piping system.

# 3.04 AS-BUILT DRAWINGS

A. As-built Drawings shall be submitted to the Engineer prior to acceptance of the Work and placing the piping in service.

# END OF SECTION

# SECTION 15100 VALVES AND PIPING APPURTENANCES

# PART 1 - GENERAL

## 1.01 <u>THE REQUIREMENT</u>

- A. The Contractor shall provide all tools, supplies, materials, equipment, and labor necessary for furnishing, epoxy coating, installing, adjusting, and testing of all valves and appurtenant work, complete and operable, in accordance with the requirements of the Contract Documents. Where buried valves are shown, the Contractor shall furnish and install valve boxes to grade, with covers, extensions, and position indicators.
- B. The provisions of this Section shall apply to all valves and valve operators specified in the various Sections of these Specifications except where otherwise specified in the Contract Documents. Valves and operators in particular locations may require a combination of units, sensors, limit switches, and controls specified in other sections of these Specifications.
- C. All below grade valves installed in water, wastewater or drainage systems owned and maintained by the District shall be equipped with identification markers as shown on the Drawings. All valve information shall be approved by the District prior to installation.

### 1.02 <u>REFERENCE SPECIFICATIONS, CODES, AND STANDARDS</u>

### A. Commercial Standards:

ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings, Class 25, 125, 250, and 800.
ANSI B16.5	Pipe Flanges and Flanged Fittings, Steel Nickel Alloy and Other Special Alloys.
ANSI B16.21	Nonmetalic Flat Gaskets for Pipe Flanges
ANSI B18.21	Square and Hex Bolts and Screws - Inch Series
ANSI/ASME B1.20.1	General Purpose Pipe Threads (Inch).
ASTM A 48	Specification for Gray Iron Castings.

ASTM A 126	Specification for Gray Iron Castings for Valves, Flanges, and Pipe Fittings.
ASTM A 536	Specification for Ductile Iron Castings.
ASTM B 62	Specification for Composition Bronze or Ounce Metal Castings.
ASTM B 584	Specification for Copper Alloy Sand Castings for General Applications.
AWWA C550	Protective Interior Coatings for Valves and Hydrants.

## 1.03 <u>SUBMITTALS</u>

- A. <u>Shop Drawings</u>: Shop drawings of all valves and operators including associated wiring diagrams and electrical data, shall be furnished as specified in Section 01300, "Submittals".
- B. Data to be submitted shall include but not be limited to:
  - 1. Catalog data consisting of specifications, assembly and installation drawings, and a parts schedule that identifies the materials to be used various parts and accessories. The illustrations shall be in sufficient detail to serve as a guide for assembly and disassembly.
  - 2. Weight of al component parts and assembled weight.
  - 3. Listing of all lubricants required for the equipment.
  - 4. Spare parts and special tools.
  - 5. Operation and maintenance manuals as required by Section "Submittals".

### 1.04 QUALITY ASSURANCE

- A. Unless otherwise specified, each valve body shall be tested under a test pressure equal to twice its design water-working pressure.
- B. Unless otherwise specified, all interior bronze parts of valves shall conform to the requirements of ASTM B 62, or, where not subject to dezincification, to ASTM B 584.

## 1.05 <u>TOOLS</u>

A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

# PART 2 - PRODUCTS

## 2.01 <u>VALVES – GENERAL REQUIREMENTS</u>

- A. The Contractor shall furnish all valves, stem extensions, and other accessories as shown or specified. All valves shall be new and of current manufacture.
- B. All valves shall have a minimum design pressure rating of 150 psi and capable of a test pressure of 300 psi. For service applications with pressures in excess of 150 psi, valves shall have a minimum pressure rating in excess of the service application working pressure.
- 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. Cast iron parts of valves shall meet the requirements of ASTM A 126, "Standard Specifications for Grey Iron Castings for Valves, Flanges and Pipe Fittings, Class 'B''. Flanged ends shall be flat-faced and have bolt circle and bolt patterns conforming to ANSI B16.1 Class 125 unless otherwise specified hereinafter.
- E. All castings shall be clean and sound, without defects of any kind and no plugging, welding or repairing of defects will be permitted. All bolt heads and nuts shall be hexagonal conforming to ANSI B18.2.1. Gaskets shall be full face and made of natural or synthetic elastomers in conformance with ANSI B16.21 suitable for the service characteristics, especially chemical compatibility and temperature. Nonferrous alloys of various types shall be used for parts of valves as specified. Where no definite specification is given, the material shall be the recognized acceptable standard for that particular application.
- F. All buried valves shall have mechanical joint pipe ends and shall be provided with cast-iron valve boxes unless otherwise indicated. Valve boxes shall be as specified elsewhere in this Section.
- G. All buried valves shall have an operator shaft extension from the valve or valve operator to finish grade, a 2-inch square AWWA operating nut, and cover or box and cover as may be required.
- H. The flanges of valves shall be in accordance with Section 15000, "Piping."

- I. Where subject to dezincification, gate valve stems shall be of bronze to ASTM B 62, containing not more than 5 percent of zinc nor more than 2 percent of aluminum. Where dezincification is not a problem, bronze to ASTM B 584 may be used. For valve stems with a minimum tensile strength of 60,000 psi, a minimum yield strength of 40,000 psi, and an elongation of at least 10 percent in 2 inches, as determined by a test coupon poured from the same ladle from which the valve stems to be furnished are poured.
- J. Except where otherwise specified, ferrous surfaces, exclusive of stainless steel surfaces, in the water passages of all valves 4 inch and larger, as well as the exterior surfaces of all submerged valves, shall receive a fusion-bonded epoxy coating in accordance with AWWA C550. Flange faces of valves shall not be epoxy coated. The Contractor, through the valve manufacturer, shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.

# 2.02 OPERATORS, GENERAL

- A. Valves and gates shall be furnished with operators, provided by the valve or gate manufacturer. All operators of a given type shall be furnished by the same manufacturer. All valve operators, regardless of type, shall be installed, adjusted, and tested by the valve manufacturer at the manufacturing plant. Operator orientation shall be verified with the Engineer prior to installation. If this requirement is not met, changes to orientation shall be made at no additional cost.
- B. All operators, unless otherwise specified, shall turn counter- clockwise to open. Operators shall have the open direction clearly and permanently marked. All valve operators, manual, electric and pneumatic, shall be provided with the valve by the valve manufacturer. The Contractor, through the valve manufacturer, shall be solely responsible for the selection of the proper operator to meet the operating conditions specified herein. Field calibration and testing of the operators and valves to ensure a proper installation and an operating system shall be the responsibility of the Contractor.
- C. All manual operators shall have levers or handwheels, unless otherwise shown. Where buried, the valves shall have extensions with square nuts or floor stands. Valves mounted higher than 6 feet above floor or operating level shall have chain operators. Chains shall extend to within three (3) feet from operating floor. Unless otherwise shown or specified, valves of sizes 4-inch and larger shall have gearassisted operators. Valves over five (5) feet to center line shall be rolled toward the operating side to make the handwheel or wrench more accessible.
- D. Operation of valves and gates shall be designed so that the effort required to operate the handwheel, lever or chain shall not exceed 40 pounds applied at the extremity of the wheel or lever. The handwheels on valves 14 inches and smaller

shall not be less than 8 inches in diameter, and on valves larger than 14 inches the handwheel shall not be less than 12 inches in diameter.

E. Floor stands shall be cast iron, non-rising stem type with lockable hand wheel operator, valve position indicator and steel extension stem. Hand wheel shall be lockable in the full closed position. The floor stand shall be furnished with an armored padlock and six keys. Lock shall be as manufactured by Master, Schlage or equal. Floor stand shall be standard pattern type as manufactured by Clow Corporation, or equal.

# 2.03 <u>VALVE BOXES</u>

- A. All buried plug valves and resilient seat gate valves shall be equipped with valve boxes. Valve boxes shall be heavy duty construction for traffic loading type, cast iron, three piece, slide type, or screw type with drop covers. The valve boxes shall be adjustable to six inches up or down from the nominal required cover of the pipe. A number six base section shall be provided. Minimum shaft diameter shall be 5-1/4 inches and minimum metal thickness shall be 3/16 inch. Boxes shall be coated with an approved bitumastic or epoxy coating. Valve box covers shall have the word "SEWER" or "REUSE" cast thereon depending on the application.
- B. Valve boxes shall be installed on firmly compacted material at a level approximately equal to the elevation of the valve packing plate. No contact between the valve and the box shall be permitted. On plug valves, the positioner on the operating mechanism shall be kept free of rocks, debris, etc.
- C. Where valves are installed with over six feet of cover, or where the ground water table is within three feet of the ground level, an extension stem shall be provided to bring an operating nut within two feet of the finished grade. This extension stem shall be satisfactorily pinned to the valve operation nut to prevent dislodging during operation of the valve.

# 2.04 <u>PLUG VALVES</u>

A. All plug valves shall be of the non-lubricated eccentric type. Valves shall be rated for not less than 125 psi pressure differential acting in either direction (bi-directional). At this differential, the valve shall provide drip tight shutoff. All components shall be of corrosion resistant construction. Valve flanges shall be ANSI B16.5, Class 150 pound with a full round or other acceptable type port to assure minimum turbulence and minimum pressure drop. Valve bodies shall be ductile iron, ASTM A536, Grade 65-45-12 construction and seats shall be of nickel alloy. Valves are to have a balance plug, coated with a resilient material solidly bonded to a ductile iron core, as required, to assure low torque and bubble-tight shutoff. The valve plug shall touch on the seat when in the closed position.

- B. Plug valve port areas shall be at least 100% through 24 inches in diameter. For plug valves 30 inches and larger, a port area of at least 75% is required.
- C. Buried plug valves shall be installed vertically with non-rising stems and shall open by turning a two (2) inch square operating nut counterclockwise. An arrow shall be cast into the nut skirt to indicate the open direction.
- D. Plug valves shall be as manufactured by DeZurik Corporation, Keystone Valve Manufacturing Company (Ballcentric Type), Milliken, or approved equal.

# PART 3 - EXECUTION

# 3.01 <u>VALVE INSTALLATION</u>

- A. All valves and appurtenances shall be installed in accordance with the manufacturer's written instructions and in the locations shown, true to alignment and rigidly supported. Any damage to the valves and appurtenances shall be repaired to the satisfaction of the Engineer before they are installed.
- B. All valves shall be installed to provide easy access for operation, removal, and maintenance and to avoid conflicts between valve operators and structural members or handrails.
- C. Install all floor boxes, brackets, extension rods, guides, the various types of operators and appurtenances as shown on the Drawings that are in masonry floors or walls, and install concrete inserts for hangers and supports as soon as forms are erected and before concrete is poured. Before setting these items, the Contractor shall check all plans and figures which have a direct bearing on their location, and he shall be responsible for the proper location of these valves and appurtenances during the construction of the structures.
- D. Valve boxes with concrete bases shall be installed as shown on the Drawings. Mechanical joints shall be made in the standard manner. Valve stems shall be vertical in all cases. Place cast iron box over each stem with base bearing on compacted fill and top flush with final grade. Boxes shall have sufficient bracing to maintain alignment during backfilling. Knobs on cover shall be parallel to pipe. Remove any sand or undesirable fill from valve box.

# 3.02 PAINTING AND COATINGS

A. Valves shall be shop primed and field finish painted for interior and exposed service. Except where otherwise specified, all exposed interior ferrous surfaces, exclusive of stainless steel surfaces, of valves 4-inch and larger, as well as the exterior surfaces of all submerged and buried valves, shall receive a fusion-bonded

epoxy coating in accordance with AWWA C550. Flange faces of valves shall not be epoxy coated. The Contractor through the valve manufacturer shall certify in writing that such coating has been applied and tested in the manufacturing plant prior to shipment, in accordance with these Specifications.

## 3.03 <u>TESTING</u>

A. All valves shall be hydrostatically field tested at the specified pipeline test pressures specified in the piping sections. Any leakage or "sweating" of joints shall be stopped and all joints shall be tight.

## END OF SECTION

# SECTION 15200 SLUICE GATE ELECTRIC ACTUATORS

## PART 1 - GENERAL

## 1.01 <u>THE REQUIREMENT</u>

- A. Provide sluice gate electric actuators as shown on the Drawings, as specified herein, and as needed for a complete and proper installation and operation. Actuators must be sized to be compatible with the associated sluice gates for the proper function and operation of the sluice gates.
- B. Related work:
  - 1. Documents affecting work under this Section include, but are not necessarily limited to, General Conditions, Supplementary Conditions, and Division 01 General Requirements of these Specifications.

#### 1.02 <u>SUBMITTALS</u>

- A. <u>Shop Drawings</u>: Shop drawings of all sluice gate electric actuators including associated wiring diagrams and electrical data, shall be furnished as specified in Section 01300, "Submittals".
- B. Data to be submitted shall include but not be limited to:
  - 1. Equipment assembly layout, drawings and dimensions;
  - 2. Product data sheets;
  - 3. Motor data;
  - 4. Controls and wiring diagrams;
  - 5. Panel/field interconnecting diagrams;
  - 6. Manufacturer's detailed specifications;
  - 7. Manufacturer's recommended installation procedures.
  - 8. Operation and Maintenance Manuals
  - 9. Certificates and Guarantees:
    - a. Manufacturer's Certificate of Inspection
    - b. Contractor's Verification of Equipment Inspection
    - c. Contractor's Equipment Guarantee for equipment

d. Report including configuration data

## 1.03 SPARE PARTS

A. Comply with pertinent provisions of Section 01630.

# 1.04 DELIVERY, STORAGE, AND HANDLING

A. Comply with pertinent provisions of Section 01600.

# 1.05 <u>TOOLS</u>

A. Special tools, if required for normal operation and maintenance shall be supplied with the equipment.

# PART 2 - PRODUCTS

# 2.01 ELECTRIC ACTUATORS

- A. Provide electric actuators for sluice gates as shown in the Drawings complete with gear train in cast aluminum housing, motor, declutchable hand wheel operator, Bluetooth non-intrusive integral control components, and mounting hardware.
- B. Provide motor, gear train, and control components prewired and mounted in a NEMA 4 enclosure unless otherwise noted.
- C. Provide integral control components including 480 volt reversing starter with three thermal overloads.
  - 1. Step-down transformer to power any lower voltage components.
  - 2. 3-position local-stop-remote selector switch.
  - 3. Open-close selector.
  - 4. Local position indicator
  - 5. Adjustable open and close limit switches.
  - 6. Adjustable torque switch.
  - 7. Indicator lights.
- D. Actuator Motors
  - 1. Sluice Gates:

- a. Provide watertight reversible, high torque, low inertia motor with Class F insulation, overload protection and permanently lubricated bearings for operation on 480 volts, three phase, 60 Hertz A.C.
- b. Vertical Gate Travel speed: 12 inches per minute.
- c. Maximum 2 horsepower.
- 2. Provide actuators rated for modulation as required or when shown on Drawings.
- E. Refer to Electrical Drawings for actuator type. Provide terminals for hard-wired actuator control/status as follows:
  - 1. For non-modulating (full open/close) actuators:
    - a. Inputs for full open and full close commands.
    - b. Relay contact outputs for full open and full closed position feedback.
  - 2. For modulating actuators:
    - a. 4-20 mA input for position command to modulate between 0-100%.
    - b. 4-20 mA output for position feedback of 0-100%.
  - 3. For all actuators:
    - a. Relay contact output for switch in "Remote" position.
    - b. Relay contact output for overtorque alarm.
- F. Acceptable manufacturers:
  - 1. Rotork IQT or IQM Series, Limitorque QX or MX series, or approved equal.

# PART 3 - EXECUTION

### 3.01 <u>INSTALLATION</u>

A. Install sluice gate electric actuators in accordance with manufacturer's recommendations.

# END OF SECTION

# SECTION 15995 PIPELINE TESTING

## PART 1 - GENERAL

## 1.01 <u>THE REQUIREMENT</u>

A. The Contractor shall perform flushing and testing of all pipelines and appurtenant piping, complete, including conveyance of test water to point of use and all disposal thereof, all in accordance with the requirements of the Contract Documents. The cost of all testing shall be borne by the Contractor.

### 1.02 <u>TESTING RECORDS</u>

- A. Provide records of each piping installation during the testing. These records shall include:
  - 1. Date and times of test
  - 2. Identification of pipeline, or pipeline section tested or retested
  - 3. Identification of pipeline material
  - 4. Identification of pipe specification
  - 5. Test fluid
  - 6. Test pressure
  - 7. Remarks: Leaks identified (type and location), types of repairs, or corrections made
  - 8. Certification by Contractor that the leakage rate measured conformed to the specifications

### 1.03 <u>DESCRIPTION</u>

- A. Perform testing of piping systems in accordance with AWWA C600 and as specified below.
- B. Provide instruments required for testing of piping systems.
  - 1. Make instruments available to Engineer to facilitate spot checks during testing.
  - 2. Retain possession of instruments, remove from site at completion of services.

- C. Provide all water required for flushing and testing.
- D. Provide all necessary pumping equipment and other equipment, materials and facilities required for proper completion of the flushing and testing specified.
- E. Source and quality of water, procedure and test equipment shall be by approval of the Engineer.
- F. All tests shall be made in the presence of the Engineer. Notify Engineer at least 72 hours before any Work is to be inspected or tested.
- G. If inspection or test shows defects, the piping system(s) shall be repaired and replaced and inspection repeated, until such piping is acceptable to the Engineer.
- H. Sections of the system may be tested separately, but when so tested it shall be distinctly understood that any defect which may subsequently develop in a section already tested and accepted shall promptly be corrected and that section retested.
- I. Disposal of the water used for testing shall be subject to the approval of the Engineer.

# PART 2 - PRODUCTS

# 2.01 <u>TESTING FLUID</u>

- A. Testing fluid shall be potable water for hydrostatic testing and flushing.
- B. Submit request for use of water from waterlines of Town of Jupiter 48 hours in advance.
- C. The Contractor may obtain the water from the Town of Jupiter at the Town of Jupiter's rate of charges.

# 2.02 <u>TESTING EQUIPMENT</u>

A. Provide calibrated pressure gauges, pipes, bulkheads, pumps, and meters to perform the hydrostatic testing.

# PART 3 - EXECUTION

# 3.01 <u>GENERAL</u>

A. The District will inspect all reuse water facilities prior to acceptance and again just prior to the expiration of the one year guarantee.

- B. When a section of pipe of a length deemed adequate by the Design Engineer is ready for testing, the pipe shall be flushed and then tested in accordance with the applicable testing method as described herein. Suitable temporary testing plugs or caps shall be installed. All necessary pressure pumps, pipe connections, meters, gauges, water, weirs, bulkheads, and other necessary equipment and all labor required for carrying out these tests shall be furnished. The Design Engineer shall notify the District at least 48 hours prior to any testing so that it may, at its option, have representative present during the testing.
- C. Gravity reuse water pipelines shall be tested in accordance with the Hydraulic Infiltration/Exfiltration Test as described herein.
- D. Sections of pipe tested for infiltration and exfiltration prior to completion of the project shall be subject to a final inspection at completion of the project, and also subject to additional leakage tests, if warranted in the opinion of the District Engineer.
- E. If the section fails to pass the applicable tests, the Contractor shall do everything necessary to locate, uncover and repair or replace the defective pipe, fitting or joint, all at his own expense. Additional testing will be required to assure passage of the test.

# 3.02 <u>HYDRAULIC INFILTRATION/EXFILTRATION TESTS</u>

- A. Upon completion of a section of the gravity reuse water pipeline, the pipe shall be dewatered and tested to measure the infiltration for at least three (3) consecutive days.
- B. The amount of infiltration/exfiltration including connections shall not exceed 200 gallons / (inch of internal diameter) (miles of pipeline) (24 hours) for DIP. Refer to ASTM F2487.
- C. For making the infiltration tests, underdrains, if used, shall be plugged, well points and other groundwater drainage shall be stopped to permit the groundwater to return to its normal level. Infiltration shall be measured by the use of weirs designed specifically for this purpose or other acceptable means approved by the District Engineer.
- D. As required, suitable bulkheads shall be installed to permit the test of the reuse water pipeline.
- E. Where the crown of the pipe is below the natural groundwater table at the time and place of testing, the pipe shall be tested for infiltration. Suitable watertight plugs shall be installed and section of pipe to be tested shall be pumped dry before start of test. Where the crown of the pipe is above the natural water table, the pipe shall be tested for exfiltration by installing necessary plugs and filling pipes with water and maintaining a static head of water of a minimum of two feet above

the crown of the pipe during the test. Exfiltration tests shall be conducted on main lines, unless waived by the District Engineer. The water level of internal pressure to be used for exfiltration test shall be determined by the Design Engineer.

F. The gravity reuse water pipelines shall pass the applicable test before any connections are made.

# END OF SECTION

# **DIVISION 16**

# ELECTRICAL

# SECTION 16010 BASIC ELECTRICAL REQUIREMENTS

### PART 1 – GENERAL

#### 1.01 <u>RELATED SECTIONS</u>

A. Requirements specified within this section apply to all sections in Division 16, ELECTRICAL. Work specified herein shall be performed as if specified in the individual sections.

### 1.02 ELECTRICAL SUBCONTRACTOR QUALIFICATIONS

- A. The electrical subcontractor shall meet or exceed the criteria described below:
  - 1. The electrical subcontractor shall be licensed in the State of Florida.
  - 2. The electrical subcontractor shall have successfully completed electrical construction on three water or wastewater treatment plant related projects within the past ten years.
  - 3. The electrical subcontractor shall have, in their employ, the following full time employees that will be assigned to perform the electrical work of this contract:
    - a. A minimum of (1) Licensed Master Electrician who is overall responsible for the supervision of personnel performing the construction, installation startup and testing of all electrical related facilities and systems.
    - b. A minimum of (1) Licensed Journeyman Electrician responsible for the daily construction activities and guidance of the electrical contractor's on site employees. The Licensed Journeyman's primary assignment will be the construction of the electrical facilities of this project until project completion. The Licensed Journeyman shall be certified in the County or shall meet the reciprocity standards of Florida State Statue 489 Part II.
  - 4. The electrical subcontractor shall not be involved in any current or pending litigation which may have a material negative impact on the ability to complete the project. The electrical subcontractor shall provide a statement advising all current or pending litigations.

#### 1.03 DESIGN REQUIREMENTS

- A. All electronic boards as part of electrical equipment shall meet the atmospheric conditions of the space the equipment is installed in. All electronic boards which are not installed in a conditioned environment shall be fungus-resistant.
- B. All electrical equipment shall be rated for the conditions the equipment is installed in.

## 1.04 STANDARDS, CODES, PERMITS, AND REGULATIONS

- A. Perform all work; furnish and install all materials and equipment in full accordance with the latest applicable rules, regulations, requirements, and specifications of the following:
  - 1. Local Laws and Ordinances.
  - 2. State and Federal Laws.
  - 3. National Electrical Code (NEC).
  - 4. State Fire Marshal.
  - 5. Underwriters' Laboratories (UL).
  - 6. National Electrical Safety Code (NESC).
  - 7. American National Standards Institute (ANSI).
  - 8. National Electrical Manufacturer's Association (NEMA).
  - 9. National Electrical Contractors Association (NECA) Standard of Installation.
  - 10. Institute of Electrical and Electronics Engineers (IEEE).
  - 11. Insulated Cable Engineers Association (ICEA).
  - 12. Occupational Safety and Health Act (OSHA).
  - 13. National Electrical Testing Association (NETA).
  - 14. American Society for Testing and Materials (ASTM).
  - 15. Florida Building Code, including Local County amendments.
- B. Conflicts, if any, which may exist between the above items, will be resolved at the discretion of the Engineer.

- C. Wherever the requirements of the Specifications or Drawings exceed those of the above items, the requirements of the Specifications or Drawings govern. Code compliance is mandatory. Construe nothing in the Contract Documents as permitting work not in compliance with these codes.
- D. Obtain all permits and pay all fees required by any governmental agency having jurisdiction over the work. Arrange all inspections required by these agencies. On completion of the work, furnish satisfactory evidence to the Engineer that the work is acceptable to the regulatory authorities having jurisdiction.

## 1.05 ELECTRICAL COORDINATION

- A. Work Provided Under this Contract:
  - 1. Demolish two existing solar powered light poles as shown on the drawings.
  - 2. Remove the existing power and control system for the existing concentrate MOV as shown on the drawings.
  - 3. Provide and install a new electrical power and control system for a new Gate "A" MOV and the existing concentrate MOV including modification of the existing MCC and a new breaker panel.
  - 4. Provide and install new lighting and convenience power systems, indicated on the drawings, complete in place.
  - 5. Provide and install new underground conduit duct banks, pull boxes and wiring indicated on drawings complete in place.
  - 6. Provide and install all electrical required to support instrumentation and control systems as shown on the drawings complete in place.
  - 7. Provide and install new grounding system as indicated on the drawings.
  - 8. Provide all miscellaneous electrical including switches, terminations, fittings, wiring, conduit, disconnects, junction boxes, mounting supports, etc. not specified but obviously necessary for a complete working system in place.
- B. Temporary Power:
  - 1. Provide temporary power during modification of major electrical equipment that requires power shutting down. Coordinate with Owner for equipment that requires temporary power during shut down.
- C. Emergency Power:

1. No new emergency power is needed as part of this project.

## 1.06 <u>SUBMITTALS</u>

- A. The submittal shall be provided with check-marks as stated below:
  - 1. A copy of each specification section, with addendum updates included, and all referenced and applicable sections, with addendum updates included, with each paragraph check-marked to indicate specification compliance or marked to indicate requested deviations from specification requirements. Check-marks ( $\sqrt{}$ ) shall denote full compliance with a paragraph as a whole. If deviations from the specifications are indicated, and therefore requested by the Contractor, each deviation shall be underlined and denoted by a number in the margin to the right of the identified paragraph. The remaining portions of the paragraph not underlined shall signify compliance on the part of the Contractor with the specifications. The submittal shall be accompanied by a detailed, written justification for each deviation.
  - 2. Electrical equipment submittals shall be made by specification section. Submit one package per specification section and do not group multiple specification sections under one submittal package.
- B. Provide a conduit plan/electrical site plan for major power, instrumentation and control conduits, both interior and exterior, showing routing, size and stub up locations for buried or in slab conduits.

# 1.07 ENVIRONMENTAL CONDITIONS

- A. All chemical rooms and areas shall be designated as corrosive.
- B. All indoor chemical and process equipment areas shall be considered wet locations.
- C. Electrical equipment in rooms designated as Classified by NFPA 70 (national electrical code) as Division 1 or Division 2 shall meet all requirements set forth for that classification as described in NEC article 500.

### 1.08 INSPECTION OF THE SITE AND EXISTING CONDITIONS

- A. The Electrical Drawings were developed from past record drawings and information supplied by the Owner. Verify all scaled dimensions prior to submitting bids.
- B. Before submitting a bid, visit the site and determine conditions at the site and at all existing structures in order to become familiar with all existing conditions and electrical system which will, in any way or manner, affect the work required under this Contract. No subsequent increase in Contract cost will be allowed for additional work required because of the Contractor's failure to fulfill this requirement.

- C. Carry out any work involving the shutdown of the existing services to any piece of equipment now functioning in existing areas at such time as to provide the least amount of inconvenience to the Owner. Do such work when directed by the Engineer.
- D. After award of Contract, locate all existing underground utilities at each area of construction activity. Protect all existing underground utilities during construction. Pay for all required repairs without increase in Contract cost, should damage to underground utilities occur during construction.

## 1.09 <u>RESPONSIBILITY</u>

- A. The Contractor shall be responsible for:
  - 1. Complete systems in accordance with the intent of these Contract Documents.
  - 2. Coordinating the details of facility equipment and construction for all Specification Divisions which affect the work covered under Division 16, ELECTRICAL.
  - 3. Furnishing and installing all incidental items not actually shown or specified, but which are required by good practice to provide complete functional systems.

## 1.10 INTENT OF DRAWINGS

- A. Electrical plan Drawings show only general location of equipment, devices, and raceway, unless specifically dimensioned. The Contractor shall be responsible for the proper routing of raceway, subject to the approval of the Engineer.
- B. Electrical equipment sizes and characteristics have been based on the following manufacturers:
  - 1. Existing MCC modifications: Square D.

If the Contractor chooses to and is allowed to substitute, the Contractor shall be responsible for fitting all the equipment in the available space as shown on the Drawings or re-designing the space, at no additional cost to the owner, and shall reimburse the engineer for time and materials spent in reviewing revised design.

## PART 2 – PRODUCTS

## 2.01 <u>GENERAL</u>

A. Provide materials and equipment listed by UL wherever standards have been established by that agency. If a UL listing is not available, equipment shall have a label and listing

from a nationally recognized testing laboratory (NRTL) acceptable to the authority having jurisdiction (AHJ) over the project location.

- B. Equipment Finish:
  - 1. Provide manufacturers' standard finish and color, except where specific color is indicated.
  - 2. If manufacturer has no standard color, provide equipment with ANSI No. 61, light gray color.

## PART 3 – EXECUTION

### 3.01 <u>GENERAL</u>

- A. Electrical Drawings show general locations of equipment, devices, and raceway, unless specifically dimensioned.
- B. Install work in accordance with NECA Standard of Installation, unless otherwise specified.

### 3.02 LOAD BALANCE

- A. Drawings and Specifications indicate circuiting to electrical loads and distribution equipment.
- B. Balance electrical load between phases as nearly as possible on switchboards, panel boards, motor control centers, and other equipment where balancing is required.
- C. When loads must be reconnected to different circuits to balance phase loads, maintain accurate record of changes made, and provide circuit directory that lists final circuit arrangement.

### 3.03 <u>CHECKOUT AND STARTUP</u>

- A. Voltage Field Test:
  - 1. Check voltage at point of termination of power company supply system to project when installation is essentially complete and is in operation.
  - 2. Check voltage amplitude and balance between phases for loaded and unloaded conditions.
  - Unbalance Corrections: Make written request to power company to correct condition if balance (as defined

by NEMA) exceeds 1 percent, or if voltage varies throughout the day and from loaded to unloaded condition more than plus or minus 4 percent of nominal.

- a. Obtain a written certification from a responsible power company official that the voltage variations and unbalance are within their normal standards if corrections are not made.
- B. Equipment Line Current Tests:
  - 1. Check line current in each phase for each piece of equipment.
  - 2. Make line current check after power company has made final adjustments to supply voltage magnitude or balance.
  - 3. If any phase current for any piece of equipment is above rated nameplate current, prepare Equipment Line Phase Current Report that identifies cause of problem and corrective action taken.
- C. Startup:
  - 1. Demonstrate satisfactory operation of all 480-volt electrical equipment. Participate with other trades in all startup activities.
  - 2. Assist the I&C Contractor in verifying signal integrity of all control and instrumentation signals.

# END OF SECTION

# SECTION 16050 BASIC WIRING AND METHODS

#### PART 1 – GENERAL

#### 1.01 <u>REFERENCES</u>

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI):
    - a. C55, 1, Standard for Shunt Power Capacitors.
    - b. C62.11, Standard for Metal-Oxide Surge Arrestors for AC Circuits.
    - c. Z55.1, Gray Finishes for Industrial Apparatus and Equipment.
  - 2. American Society for Testing and Materials (ASTM):
    - a. A167, Standard Specification for Stainless and Heat-Resisting Chromium-Nickel Steel Plate, Sheet, and Strip.
    - b. A240, Standard Specification for Heat-Resisting Chromium and Chromium-Nickel Stainless Steel Plate, Sheet, and Strip for Pressure Vessels.
    - c. A570, Standard Specification for Steel, Sheet, and Strip, Carbon, Hot-Rolled, Structural Quality.
  - 3. Federal Specifications (FS):
    - a. W-C-596, Connector, Receptacle, Electrical.
    - b. W-S-896E, Switches Toggle, Flush Mounted.
  - 4. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.
  - 5. National Electrical Manufacturers Association (NEMA):
    - a. 250, Enclosures for Electrical Equipment (1000 Volts Maximum).
    - b. AB 1, Molded Case Circuit Breakers and Molded Case Switches.
    - c. CP I, Shunt Capacitors.

- d. ICS 2, Industrial Control Devices, Controllers, and Assemblies.
- e. KS 1, Enclosed Switches.
- f. LA I, Surge Arrestors.
- g. PB 1, Panelboards.
- h. ST 20, Dry-Type Transformers for General Applications.
- i. WD I, General Requirements for Wiring Devices.
- 6. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
- 7. Underwriters Laboratories, Inc. (UL):
  - a. 67, Standard for Panelboards.
  - b. 98, Standard for Enclosed and Dead-Front Switches.
  - c. 198C, Standard for Safety High-Interrupting-Capacity Fuses, Current-Limiting Types.
  - d. 198E, Standard for Class Q Fuses.
  - e. 486E, Standard for Equipment Wiring Terminals.
  - f. 489, Standard for Molded Case Circuit Breakers and Circuit Breaker Enclosures.
  - g. 508, Standard for Industrial Control Equipment.
  - h. 810, Standard for Capacitors.
  - i. 943, Standard for Ground-Fault Circuit Interrupters.
  - j. 1059, Standard for Terminal Blocks.
  - k. 1561, Standard for Dry-Type General-Purpose and Power Transformers.

#### 1.02 <u>SUBMITTALS</u>

A. Shop Drawings:

- 1. Device boxes for use in hazardous areas.
- 2. Junction and pull boxes for interior and exterior.
- 3. Hardware.
- 4. Terminal junction boxes.
- 5. Panelboards and circuit breaker data.
- 6. Fuses.
- 7. Contactors.
- 8. Transformers.
- 9. Wiring devices and plates
- 10. All other miscellaneous material part of this project.
- B. Quality Control Submittals:
  - 1. Test Report: Sound test certification for dry type power transformers (O to 600-volt, primary).

### 1.03 **QUALITY ASSURANCE**

- A. UL Compliance: Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.
- B. Hazardous Areas: Materials and devices shall be specifically approved for hazardous areas of the class, division, and group shown and of a construction that will ensure safe performance when properly used and maintained.

# **PART 2 – PRODUCTS**

### 2.01 OUTLET AND DEVICE BOXES

- A. Sheet Steel: One-piece drawn type, zinc- or cadmium-plated.
- B. Cast Metal:
  - 1. Box: Cast ferrous metal.
  - 2. Cover: Gasketed, weatherproof, cast ferrous metal, with stainless steel screws.

- 3 Hubs: Threaded.
- 4. Lugs (Cast Mounting) Manufacturer:
  - a. Crouse-Hinds; Type FS or FD.
  - b. Appleton; Type FS or FD.
- C. Cast Aluminum:
  - 1. Material:
    - a. Box: Cast, copper-free aluminum.
    - b. Cover: Gasketed, weatherproof, cast copper-free aluminum with stainless steel screws.
  - 2. Hubs: Threaded.
  - 3. Lugs: Cast mounting.
  - 4. Manufacturers:
    - a. Crouse-Hinds; Type FS-SA or FD-SA.
    - b. Appleton; Type FS or FD.
- D. Nonmetallic:
  - 1. Box: PVC.
  - 2. Cover: PVC, weatherproof, with stainless steel screws.
  - 3. Manufacturer: Carlon; Type FS or FD, with Type E98 or E96 covers.

### 2.02 JUNCTION AND PULL BOXES

- A. Outlet Boxes Used as Junction or Pull Box: As specified under Article OUTLET AND DEVICE BOXES.
- B. Large Stainless Steel Box: NEMA 250, Type 4X.
  - 1. Box: 14-gauge, ASTM A240, Type 316 stainless steel.

- 2. Cover: Hinged with screws.
- 3. Hardware and Machine Screws: ASTM A167, Type 304 stainless steel.
- 4. Manufacturers:
  - a. Hoffman Engineering Co.
  - b. Robroy Industries.
- C. Large Nonmetallic Box (Use only for corrosive area and if shown on drawings):
  - 1. NEMA 250, Type 4X.
  - 2. Box: High-impact, fiberglass-reinforced polyester or engineered thermoplastic, with stability to high heat.
  - 3. Cover: Hinged with screws.
  - 4. Hardware and Machine Screws: ASTM A167, Type 316 stainless steel.
  - 5. Conduit hubs and mounting lugs.
  - 6. Manufacturers:
    - a. Crouse-Hinds; Type NJB.
    - b. Carlon; Series N, C, or H.
    - c. Robroy Industries.

## 2.03 MINI-POWER ZONE (MPZ) OR MINI-POWER CENTER (MPC) – Not Used

### 2.04 <u>WIRING DEVICES</u>

A. Switches:

NEMA WD I and FS W-S-896E.

- 2. Specification grade, totally enclosed, ac type, with quiet tumbler switches and screw terminals.
- 3. Capable of controlling 100 percent tungsten filament and fluorescent lamp loads.

- 4. Rating: 20 amps, 120/277 volts.
- 5. Color:
  - a. Office Areas: Ivory.
  - b. Other Areas: Brown.
- 6. Switches with Pilot Light: 125-volt, neon light with red jewel, or lighted toggle when switch is ON.
- 7. Manufacturers:
  - a. Bryant.
  - b. Leviton.
  - c. Hubbell.
  - d. Pass and Seymour.
  - e. Arrow Hart.
- B. Receptacle, Single and Duplex:
  - 1. NEMA WD 1 and FS W-C-596.
  - 2. Specification grade, two-pole, three-wire grounding with screw type wire terminals suitable for No. 10 AWG.
  - 3. High strength, thermoplastic base color.
  - 4. Color:
    - a. Office Areas: Ivory.
    - b. UPS receptacle: Red.
    - c. Other Areas: Brown.
  - 5. Contact Arrangement: Contact to be made on two sides of each inserted blade without detent.
  - 6. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps.

- 7. Manufacturers:
  - a. Bryant.
  - b. Leviton.
  - c. Hubbell.
  - d. Pass and Seymour.
  - e. Sierra.
  - f. Arrow Hart.
- C. Receptacle, Ground Fault Circuit Interrupter: Duplex, specification grade, tripping at 5 mA.
  - 1. Color: Ivory.
  - 2. Rating: 125 volts, NEMA WD 1, Configuration 5-20R, 20 amps, capable of interrupting 5,000 amps without damage.
  - 3. Size: For 2-inch by 4-inch outlet boxes.
  - 4. Standard Model: NEMA WD 1 with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
  - 5. Feed-Through Model: NEMA WD 1, with No. 12 AWG copper USE/RHH/RHW-XLPE insulated pigtails and provisions for testing.
  - 6. Manufacturers:
    - a. Pass and Seymour.
    - b. Bryant.
    - c. Leviton.
    - d. Hubbell.
    - e. Arrow Hart.
- D. Receptacle, Special-Purpose:
  - 1. Rating and number of poles as indicated or required for anticipated purpose.

2. Matching plug with cord-grip features for each special-purpose receptacle.

# 2.05 <u>DEVICE PLATES</u>

- A. General: Sectional type plates not permitted.
- B. Plastic:
  - 1. Material: Specification grade, 0.10-inch minimum thickness, noncombustible, thermosetting.
  - 2. Color: To match associated wiring device.
  - 3. Mounting Screw: Oval-head metal, color matched to plate.
- C. Metal:
  - 1. Material: Specification grade, one-piece, 0.040-inch nominal thickness stainless steel.
  - 2. Finish: ASTM A167, Type 302/304, satin.
  - 3. Mounting Screw: Oval-head, finish matched to plate.
- D. Cast Metal:
  - 1. Material: Malleable ferrous metal, with gaskets.
  - 2. Screw: Oval-head stainless steel.
- E. Engraved:
  - 1. Character Height: 3/16 inch.
  - 2. Filler: Black.
- F. Weatherproof:
  - 1. For Receptacles: Gasketed cast metal or stainless steel, with individual cap over each receptacle opening.
  - 2. Mounting Screw: Stainless steel.
    - a. Cap Spring: Stainless steel.
- b. Manufacturers:
  - i. General Electric.
  - ii. Bryant.
  - iii. Hubbell.
  - iv. Sierra.
  - v. Pass and Seymour.
  - vi. Crouse-Hinds; Type WLRD or WLRS.
  - vii. Bell.
  - viii. Arrow Hart.
- 3. For Switches: Gasketed, cast metal incorporating external operator for internal switch.
  - a. Mounting Screw: Stainless steel.
  - b. Manufacturers:
    - i. Crouse-Hinds; DS-181 or DS-185.A
    - ii. Appleton; FSK-LVTS or FSK-IVS.
- G. Raised Sheet Metal: <sup>1</sup>/<sub>2</sub>-inch high zinc- or cadmium-plated steel designed for one-piece drawn type sheet steel boxes.

### 2.06 <u>LIGHTING AND POWER DISTRIBUTION PANELBOARD</u>

- A. NEMA PB I, NFPA 70, and UL 67, including panelboards installed in motor control equipment.
- B. Panelboards and Circuit Breakers: Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- C. Short-circuit Current Equipment Rating: Fully rated; series connected unacceptable.
- D. Rating: Applicable to a system with available short-circuit current as shown on drawings.
- E. Where ground fault interrupter circuit breakers are indicated or required by code: 5 mA trip, 10,000 amps interrupting capacity circuit breakers.
- F. Integral Transient Voltage Suppression (TVSS) with panelboard assembly as one entity with overall UL rating.

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G. Cabinet: As shown on plans.

## H. Bus Bar:

- 1. Material: Copper, full sized throughout length.
- 2. Provide for mounting of future circuit breakers along full length of bus regardless of number of units and spaces shown. Machine, drill, and tap as required for current and future positions.
- 3. Neutral: Insulated, rated 150 percent of phase bus bars with at least one terminal screw for each branch circuit.
- 4. Ground: Copper, installed on panelboard frame, bonded to box with at least one terminal screw for each circuit.
- 5. Lugs and Connection Points:
  - a. Suitable for either copper or aluminum conductors.
  - b. Solderless main lugs for main, neutral, and ground bus bars.
  - c. Subbed or through-feed lugs as shown.
- 6. Bolt together and rigidly support bus bars and connection straps on molded insulators.
- I. Circuit Breakers:
  - 1. NEMA AB 1 and UL 489.
  - 2. Thermal-magnetic, quick-make, quick-break molded case, of the indicating type showing ON/OFF and TRIPPED positions of operating handle.
  - 3. Noninterchangeable, in accordance with NFPA 70.
  - 4. Locking: Provisions for handle padlocking, unless otherwise shown.
  - 5. Type: Bolt-on circuit breakers in all panelboards.
  - 6. Multipole circuit breakers designed to automatically open all poles when an overload occurs on one pole.
  - 7. Do not substitute single-pole circuit breakers with handle ties for multipole breakers.
  - 8. Do not use tandem or dual circuit breakers in normal single-pole spaces.

- 9. Ground Fault Interrupter:
  - a. Equip with conventional thermal-magnetic trip and ground fault sensor rated to trip in 0.025 second for a 5-milliampere ground fault (UL 943, Class A sensitivity).
  - b. Sensor with same rating as circuit breaker and a push-to-test button.
- J. Manufacturers:
  - 1. General Electric
  - 2. Square D
  - 3. Siemens.
  - 4. No or approved equal.

## 2.07 CIRCUIT BREAKER, INDIVIDUAL, 0 TO 600 VOLTS

- A. Minimum Interrupt Rating: As shown or as required.
- B. NEMA AB I, UL 489 listed for use at location of installation.
- C. Thermal-magnetic, quick-make, quick-break, indicating type, showing ON/OFF and TRIPPED indicating positions of the operating handle.
- D. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- E. Locking: Provisions for padlocking handle.
- F. Multipole breakers to automatically open all poles when an overload occurs on one-pole.
- G. Enclosure: NEMA 250, Type 12, Industrial Use, 4X outdoors, wet locations and corrosive areas, unless otherwise shown.
- H. Interlock: Enclosure and switch shall interlock to prevent opening cover with switch in the ON position.
- I. Do not provide single-pole circuit breakers with handle ties where multipole circuit breakers are shown.
- 2.08 FUSED SWITCH, INDIVIDUAL, 0 TO 600 VOLTS

- A. UL 98 listed for use and location of installation.
- B. NEMA KS 1 and UL 98 Listed for application to system with available short circuit current of 22,000 amps rms symmetrical.
- C. Quick-make, quick-break, motor rated, load-break, heavy-duty (HD) type with external markings clearly indicating ON/OFF positions.
- D. Suitable for use with 75 degrees C wire at full NFPA 70, 75 degrees C ampacity.
- E. Fuse mountings shall reject Class H fuses and accept only current-limiting fuses specified.
- F. Enclosure: NEMA 250, Type 12, Industrial Use, 4X outdoors, wet locations and corrosive areas, unless otherwise shown.
- G. Interlock: Enclosure and switch to prevent opening cover with switch in the ON position.
- H. Provide switch with 2 normally open and two normally closed auxiliary contacts to indicate switch position.

## 2.09 <u>NONFUSED SWITCH, INDIVIDUAL, 0 TO 600 VOLTS</u> – NOT USED

- 2.10 <u>FUSE, 0 TO 600 VOLTS</u>
  - A. Current-limiting, with 200,000 ampere rms interrupting rating.
  - B. Provide to fit mountings specified with switches and features to reject Class H fuses.
  - C. Motor and Transformer Circuits, 0- to 600-Volt:
    - 1. Amperage: 0 to 600.
    - 2. UL 198E, Class RK-1, dual element, with time delay.
    - 3. Manufacturers:
      - a. Bussmann; Type LPS-RK.
      - b. Littlefuse; Type LLS-RK.
  - D. Motor and Transformer Circuits, 0- to 250-Volt:
    - 1. Amperage: 0 to 600.
    - 2. UL 198E, Class RK-1, dual element, with time delay.

- 3. Manufacturers:
  - a. Bussmann; Type LPN-RK.
  - b. Littlefuse; Type LLN-RK.
- E. Feeder and Service Circuits, 0- to 600-Volt:
  - 1. Amperage: 0 to 600.
  - 2. UL 198E, Class RK-I, dual element, with time delay.
  - 3. Manufacturers:
    - a. Bussmann; Type LPS-RK.
    - b. Littlefuse; Type LLS-RK.
- F. Feeder and Service Circuits, O- to 250-Volt:
  - 1. Amperage: 0 to 600.
  - 2. UL 198E, Class RK-I, dual element, with time delay.
  - 3. Manufacturers:
    - a. Bussmann; Type LPN-RK.
    - b. Littleluse; Type LLN-RK.
- G. Feeder and Service Circuits, 0- to 600-Volt:
  - 1. Amperage: 601 to 6,000.
  - 2. UL 198C, Class L, double O-rings and silver links.
  - 3. Manufacturers:
    - a. Bussmann; Type KRP-C.
    - b. Littlefuse; Type KLPC.

# 2.11 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCHES

A. Contact Rating: NEMA ICS 2, Type A600.

- B. Selector Switch Operating Lever: Standard.
- C. Indicating Lights: Push-to-test LED 30mm.
- D. Pushbutton Color:
  - 1. ON or START: Black.
  - 2. OFF or STOP: Red.
- E. Pushbuttons and selector switches lockable in the OFF position where indicated.
- F. Legend Plate:
  - 1. Material: Aluminum.
  - 2. Engraving: 11 character/spaces on one line, 14 character/spaces on each of two lines, as required, indicating specific function.
  - 3. Letter Height: 7/64 inch.
- G. Manufacturers:
  - 1. Heavy-Duty:
    - a. Square D; Type T.
    - b. General Electric.
    - c. Eaton (Crouse-Hinds).

### 2.12 TERMINAL JUNCTION BOX

- A. Cover: Hinged, unless otherwise shown.
- B. Terminal Blocks: Provide separate connection point for each conductor entering or leaving box.
  - 1. Spare Terminal Points: 25 percent.
- C. Interior Finish: Paint with white enamel or lacquer.
- 2.13 TERMINAL BLOCK (0 TO 600 VOLTS)

- A. UL 486E and UL 1059.
- B. Size components to allow insertion of necessary wire sizes.
- C. Capable of termination of all control circuits entering or leaving equipment, panels, or boxes.
- D. Screw clamp compression, dead front barrier type, with current bar providing direct contact with wire between the compression screw and yoke.
- E. Yoke, current bar, and clamping screw of high strength and high conductivity metal.
- F. Yoke shall guide all strands of wire into terminal.
- G. Current bar shall ensure vibration-proof connection.
- H. Terminals:
  - 1. Capable of wire connections without special preparation other than stripping.
  - 2. Capable of jumper installation with no loss of terminal or rail space.
  - 3. Individual, rail mounted.
- I. Marking system allowing use of preprinted or field-marked tags.
- J. Manufacturers:
  - 1. Weidmuller.
  - 2. Ideal.
  - 3. Electrovert.

### 2.14 MAGNETIC CONTACTOR

- A. NEMA ICS 2, UL 508.
- B. Electrically operated, electrically held.
- C. Main Contacts:
  - 1. Power driven in one direction with gravity dropout.
  - 2. Silver alloy with wiping action and arc quenchers.

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- 3. Continuous-duty rated 30 amperes, 600-volt.
- 4. Three-pole.
- D. Control: Two-wire.
- E. One normally open and one normally closed auxiliary contact rated 10 amperes at 480-volt.
- F. Enclosure: NEMA 250, Type 12, unless otherwise shown.
- G. Manufacturers:
  - 1. General Electric.
  - 2. Square D.
  - 3. Allen-Bradley; Bulletin 500 Line.
- 2.15 <u>MAGNETIC LIGHTING CONTACTOR</u> NOT USED
- 2.16 <u>THERMOSTAT</u> NOT USED
- 2.17 DRY TYPE TRANSFORMER (0- TO 600-VOLT PRIMARY)
  - A. UL 1561, NEMA ST 20, unless otherwise indicated.
  - B. Self-cooled, two winding, UL K-4 rated for nonlinear loads.
  - C. Insulation Class and Temperature Rise: Manufacturer's standard.
  - D. Core and Coil:
    - 1. Encapsulated for single-phase units  $\frac{1}{2}$  to 25 kVA and for three-phase units 3 to 15 kVA.
    - 2. Thermosetting varnish impregnated for single-phase units 37.5 kVA and above, and for three-phase units 30 kVA and above.
  - E. Enclosure:
    - 1. Single-Phase, 3 to 10 kVA: NEMA 250, Type 3R, non-ventilated.
    - 2. Single-Phase, 15 kVA and above: NEMA 250, Type 2, ventilated.

3. Three-Phase, 3 to 9 kVA: NEMA 250, Type 3R, non-ventilated.

Three-Phase, 15 kVA and above: NEMA 250, Type 2, ventilated.

- 5. Outdoor Transformers: NEMA 250, Type 3R.
- F. Wall Bracket: For single-phase units, 15 to 37-1/2 kVA, and for three-phase units, 15 to 30 kVA.
- G. Voltage Taps:
  - 1. Single-Phase, 3 to 10 kVA: Four 2-1/2 percent, full capacity; two above and two below normal voltage rating.
  - 2. Single-Phase, 15 kVA and Above: Four 2-1/2 percent, full capacity; two above and two below normal voltage rating.
  - 3. Three-Phase, 3 to 9 kVA: Four 2-1/2 percent, full capacity; two above and two below normal voltage rating.
  - 4. Three-Phase, 15 kVA and Above: Four 2-1/2 percent, full capacity; two above and two below normal voltage rating.
- H. Impedance: 4.5 percent minimum on units 75 kVA and larger.
- I. Maximum Sound Level: NEMA ST 20:
  - 1. 40 decibels for 0 to 9 kVA.
  - 2. 45 decibels for 10 to 50 kVA.
  - 3. 50 decibels for 51 to 150 kVA.
  - 4. 55 decibels for 151 to 300 kVA.
  - 5. 60 decibels for 301 to 500 kVA.
- J. Vibration Isolators:
  - 1. Rated for transformer's weight.
  - 2. Isolation Efficiency: 99 percent, at fundamental frequency of sound emitted by transformer.

- 3. Less Than 30 kVA: Isolate entire unit from structure with external vibration isolators.
- 4. 30 kVA and above: Isolate core and coil assembly from transformer enclosure with integral vibration isolator.
- K. Manufacturers:
  - 1. Square D
  - 2. General Electric.
  - 3. Eaton (Cutler-Hammer).

# 2.18 LOW VOLTAGE, SURGE ARRESTOR FOR MOTOR

- A. NEMA LA1, ANSI C62. 11, UL 1449 3<sup>RD</sup> edition.
- B. Suitable for Type 1 or Type 2 surge protection device.
- C. Approved for outdoor applications including: irrigation equipment, lighting fixtures, HVACR controls, and motors.
- D. Install at the line side of the motor disconnect where shown on plans.
- E. Intermatic model: AG65033, AG65033L3 or approved equal.

# 2.19 SUPPORT AND FRAMING CHANNELS

- A. Material:
  - 1. Dry indoor galvanized.
  - 2. All Other Areas: ASTM A167, Type 316 stainless steel.
- B. Finish:
  - 1. Dry indoor galvanized.
  - 2. All Other Areas: ASTM A167, Type 316 stainless steel.
- C. Inserts: Continuous.
- D. Beam Clamps: 316 stainless steel.

- E. Manufacturers:
  - 1. B-Line.
  - 2. Unistrut.

### 2.20 <u>NAMEPLATES</u>

- A. Material: Laminated plastic.
- B. Attachment Screws: Stainless steel.
- C. Color: White, engraved to a black core.
- D. Engraving:
  - 1. Pushbuttons/Selector Switches: Name of drive controlled on one, two, or three lines, as required.
  - 2. Panelboards: Panelboard designation, service voltage, and phases.
- E. Letter Height:
  - 1. Pushbuttons/Selector Switches: 1/8 inch.
  - 2. Panelboards: 1/4 inch.

### 2.21 SURGE PROTECTION DEVICE

- A. This section describes the material and installation requirements for transient voltage surge suppression devices (TVSS) or surge protective device (SPD) in switchboards, panelboards, main breaker, and motor control centers for the protection of all AC electrical circuits.
- B. SPD shall be listed and component recognized in accordance with UL 1449 4th edition and UL 1283.
- C. SPD shall be installed and warranted by and shipped from the electrical distribution equipment manufacturer's factory.
- D. SPD shall provide surge current diversion paths for all modes of protection; L-L, L-N, L-G, N-G in WYE systems, and L-L, L-G in DELTA systems.
- E. SPD shall be modular in design. Each module shall be fused with a surge rated fuse.

- F. A UL approved disconnect switch shall be provided as a means of disconnect in the switchboard device only.
- G. SPD shall meet or exceed the following criteria:
  - 1. Maximum surge current capability (single pulse rated) shall be:
    - a. Service entrance equipment, switchboard, switchgear: 300kA
    - b. Branch panelboards & MCC: 200kA
    - c. Lighting panelboards: 100kA
  - 2. UL 1449 Listed and Recognized Component Suppression Voltage Ratings shall not exceed the following:

Voltage	L-N	L-G	N-G
208Y/120	700V	700V	700V
480Y/277	1200V	1200V	1200V

- H. SPD shall be UL labeled with a 20kA I-nominal (ensuring UL 96A compliance), 200kA Short Circuit Current Rating (SCCR), and labeled as a Type 1 device.
- I. SPD shall be provided with 1 set of NO/NC dry contacts, visual LED diagnostics and indications.
- J. SPD shall have a warranty for a period of five years, incorporating unlimited replacements of suppressor parts if they are destroyed by transients during the warranty period. Warranty will be the responsibility of the electrical distribution equipment manufacturer.
- K. Approve manufactures are:
  - 1. Eaton (Cutler Hammer).
  - 2. General Electric.
  - 3. Siemans.
  - 4. Square D Company.
  - 5. Current Technology.
  - 6. Or Engineer approved equal.
- 2.22 <u>SMOKE DETECTORS</u> NOT USED.

### 2.23 <u>GENERAL PURPOSE RELAYS</u>

A. General purpose relays in the control panels shall be plug in type with contacts rated 10 amperes at 120 volts AC. The quantity and type of contacts shall be as shown on the Drawings. Each relay shall be enclosed in a clear plastic heat and shock resistant dust cover. Sockets for relays shall have screw type terminals. Relay shall be push to test type with LED indication light. Relays shall be Potter and Brumfield Type KRP or KUP, Square-D Type K, or equal.

## **PART 3 – EXECUTION**

### 3.01 <u>GENERAL</u>

A. Install equipment in accordance with NECA 5055.

### 3.02 OUTLET AND DEVICE BOXES

- A. Install suitable for conditions encountered at each outlet or device in the wiring or raceway system, sized to meet NFPA 70 requirements.
- B. Size:
  - 1. Depth: Minimum 2 inches, unless otherwise required by structural conditions. Box extensions not permitted.
    - a. Hollow Masonry Construction: Install with sufficient depth such that conduit knockouts or hubs are in masonry void space.
  - 2. Ceiling Outlet: Minimum 4-inch octagonal sheet steel device box, unless otherwise required for installed fixture.
  - 3. Switch and Receptacle: Minimum 2-inch by 4-inch sheet steel device box.
- C. Locations:
  - 1. Drawing locations are approximate.
  - 2. To avoid interference with mechanical equipment or structural features, relocate outlets as directed by Engineer.
  - 3. Light Switch: Install on lock side of doors.
  - 4. Light Fixture: Install in symmetrical pattern according to room layout unless otherwise shown.
- D. Mounting Height:

- 1. General:
  - a. Measured to centerline of box.
  - b. Where specified heights do not suit building construction or finish, mount as directed by Engineer.
- 2. Light Switch: 48 inches above floor.
- 3. Thermostat: 54 inches above floor.
- 4. Telephone Outlet: 6 inches above counter tops or 15 inches above floor.
- 5. Wall Mounted Telephone Outlet: 52 inches above floor.
- 6. Convenience Receptacle:
  - a. General Interior Areas: 15 inches above floor.
  - b. General Interior Areas (Counter Tops): Install device plate bottom or side flush with top of splashback, or 6 inches above countertops without splashback.
  - c. Industrial Areas, Workshops: 48 inches above floor.
  - d. Outdoor, All Areas: 24 inches above finished grade.
- 7. Special-Purpose Receptacle: 54 inches above floor or as shown.
- E. Install plumb and level.
- F. Flush Mounted:
  - 1. Install with concealed conduit.
  - 2. Install proper type extension rings or plasters covers to make edges of boxes flush with finished surface.
  - 3. Holes in surrounding surface shall be no larger than required to receive box.

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G. Support boxes independently of conduit by attachment to building structure or structural member.

- H. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws threaded into steelwork.
- I. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
- J. Provide plaster rings where necessary.
- K. Boxes embedded in concrete or masonry need not be additionally supported.
- L. Install stainless steel mounting hardware in industrial areas.
- M. Boxes Supporting Fixtures: Provide means of attachment with adequate strength to support fixture.
- N. Open no more knockouts in sheet steel device boxes than is required; seal unused openings.
- O. Box Type (Steel Raceway System):
  - 1. Exterior Locations:
    - a. Exposed Raceways: Cast metal.
    - b. Concealed Raceways: Cast metal.
    - c. Concrete Encased Raceways: Cast metal.
    - d. Class I, II, or III Hazardous Areas: Cast metal.
  - 2. Interior Dry Locations:
    - a. Exposed Rigid Conduit: Cast metal.
    - b. Concealed Raceways: Sheet steel.
    - c. Concrete Encased Raceways: Cast metal.
    - d. Lighting Circuits, Ceiling: Sheet steel.
    - e. Class I, II, or III Hazardous Areas: Cast metal.
  - 3. Interior Wet Locations:

- a. Exposed Raceways: Cast metal.
- b. Concealed Raceways: Cast metal.
- c. Concrete Encased Raceways: Cast metal.
- d. Lighting Circuits, Ceiling: Sheet steel.
- e. Class I, II, or III Hazardous Areas: Cast metal.
- 4. Cast-In-Place Concrete Slabs: Sheet steel.
- P. Box Type (Rigid Aluminum Raceway System): Cast aluminum.
- Q. Box Type (Nonmetallic Raceway System):
  - 1. Corrosive Locations: Nonmetallic.
  - 2. Exposed Raceways: Nonmetallic.
  - 3. Concealed Raceways: Nonmetallic.
  - 4. Concrete Encased Raceways: Nonmetallic.
- R. Box Type, Corrosive Locations (PVC-Coated Rigid Galvanized Steel Raceway System): PVC coated cast metal.

### 3.03 JUNCTION AND PULL BOXES

- A. Install where shown and where necessary to terminate, tap-off, or redirect multiple conduit runs.
- B. Install pull boxes where necessary in raceway system to facilitate conductor installation.
- C. Install in conduit runs at least every 150 feet or after the equivalent of three right-angle bends.
- D. Use outlet box as junction and pull boxes wherever possible and allowed by applicable codes.
- E. Installed boxes shall be accessible.
- F. Do not install on finished surfaces.
- G. Install plumb and level.

- H. Support boxes independently of conduit by attachment to building structure or structural member.
- I. Install bar hangers in frame construction, or fasten boxes directly with wood screws on wood, bolts and expansion shields on concrete or brick, toggle bolts on hollow masonry units, and machine screws or welded threaded studs on steelwork.
- J. Threaded studs driven in by powder charge and provided with lock washers and nuts are acceptable in lieu of expansion shields.
- K. Boxes embedded in concrete or masonry need not be additionally supported.
- L. At or Below Grade:
  - 1. Install boxes for below grade conduit flush with finished grade in locations outside of paved areas, roadways, or walkways.
  - 2. If adjacent structure is available, box may be mounted on structure surface just above finished grade in accessible but unobtrusive location.
  - 3. Obtain Engineer's written acceptance prior to installation in paved areas, roadways, or walkways.
  - 4. Use boxes and covers suitable to support anticipated weights.
- M. Flush Mounted:
  - 1. Install with concealed conduit.
  - 2. Holes in surrounding surface shall be no larger than required to receive box.
  - 3. Make edges of boxes flush with final surface.
- N. Mounting Hardware:
  - 1. Non-corrosive Interior Areas: Galvanized.
  - 2. All Other Areas: Stainless steel.
- O. Location/Type:
  - 1. Finished, Indoor, Dry: NEMA 250, Type 1.
  - 2. Unfinished, Indoor, Dry: NEMA 250, Type 12.

- 3. Unfinished, Indoor and Outdoor, Wet and Corrosive: NEMA 250, Type 4X.
- 4. Unfinished, Indoor and Outdoor, Wet, Dust, or Oil: NEMA 250, Type 13.
- 5. Unfinished, Indoor and Outdoor, Hazardous: NEMA 250, Type 7 and Type 9, where indicated.
- 6. Underground Conduit: Concrete Encased.

# 3.04 <u>WIRING DEVICES</u>

- A. Switches:
  - 1. Mounting Height: See Paragraph OUTLET AND DEVICE BOXES.
  - 2. Install with switch operation in vertical position.
  - 3. Install single-pole, two-way switches such that toggle is in up position when switch is on.
- B. Receptacles:
  - 1. Install with grounding slot down except where horizontal mounting is shown, in which case install with neutral slot up.
  - 2. Ground receptacles to boxes with grounding wire only.
  - 3. Weatherproof Receptacles:

a. Install in cast metal box.

b.Install such that hinge for protective cover is above receptacle opening.

- 4. Ground Fault Interrupter: Install feed-through model at locations where ground fault protection is specified for "downstream" conventional receptacles.
- 5. Special-Purpose Receptacles: Install in accordance with manufacturer's instructions.
- C. Multi-outlet Surface Raceway System:
  - 1. Install in accordance with manufacturer's instructions.
  - 2. Wire alternate outlets to each circuit where two-circuit, three-wire supply is shown.

### 3.05 <u>DEVICE PLATES</u>

- A. Securely fasten to wiring device; ensure a tight fit to the box.
- B. Flush Mounted: Install with all four edges in continuous contact with finished wall surfaces without use of mats or similar materials. Plaster fillings will not be acceptable.
- C. Surface Mounted: Plate shall not extend beyond sides of box unless plates have no sharp corners or edges.
- D. Install with alignment tolerance to box of 1/16 inch.
- E. Engrave with designated titles, panel and circuit number.
- F. Types (Unless Otherwise Shown):
  - 1. Office: Stainless Steel.
  - 2. Exterior: Weatherproof.
  - 3. Interior:
    - a. Flush Mounted Boxes: Stainless Steel.
    - b. Surface Mounted, Cast Metal Boxes: Cast metal.
    - c. Surface Mounted, Sheet Steel Boxes: Stainless Steel.
    - d. Surface Mounted, Nonmetallic Boxes: Plastic.

### 3.06 PUSHBUTTON, INDICATING LIGHT, AND SELECTOR SWITCH

- A. Heavy-Duty, Oil-tight Type: Locations (Unless Otherwise Shown): Non-hazardous, indoor, dry locations, including motor control centers, control panels, and individual stations.
- B. Heavy-Duty, Watertight, and Corrosion-Resistant Type:
  - 1. Locations (Unless Otherwise Shown): Non-hazardous, outdoor, or normally wet areas.
  - 2. Mounting: NEMA 250, Type 4X enclosure.

## 3.07 TERMINAL JUNCTION BOX

- A. Install in accordance with Paragraph JUNCTION AND PULL BOXES.
- B. Label terminal junction boxes
- C. Label each block and terminal with permanently attached, non-destructible tag.
- D. Do not install on finished outdoor surfaces.

# E. Location:

- 1. Finished, Indoor, Dry: NEMA 250, Type 1.
- 2. Unfinished, Indoor, Dry: NEMA 250, Type 12.
- 3. Unfinished, Indoor and Outdoor, Wet and Corrosive: NEMA 250, Type 4X.
- 4. Unfinished, Indoor and Outdoor, Wet, Dust, or Oil: NEMA 250, Type 13.

# 3.08 DRY TYPE TRANSFORMER (0- TO 600-VOLT PRIMARY)

- A. Load external vibration isolator such that no direct transformer unit metal is in direct contact with mounting surface.
- B. Provide moisture-proof, flexible conduit for electrical connections.
- C. Connect voltage taps to achieve (approximately) rated output voltage under normal plant load conditions.
- D. Provide wall brackets for single-phase units, 15 to 167-1/2 kVA, and three-phase units, 15 to 112 kVA.

# 3.09 SUPPORT AND FRAMING CHANNEL

- A. Furnish zinc-rich primer; paint cut ends before installation, where applicable.
- B. Install where required for mounting and supporting electrical equipment and raceway systems.

# END OF SECTION

# SECTION 16110 RACEWAYS

### PART 1 – GENERAL

### 1.01 <u>REFERENCES</u>

- A. The following is a list of standards that may be referenced in this section:
  - 1. American Association of State Highway and Transportation Officials (AASHTO): Division I, Standard Specifications for Highway Bridges, Fourteenth Edition.
  - 2. American National Standards Institute (ANSI):
    - a. C80.1, Rigid Steel Conduit-Zinc Coated.
    - b. C80.3, Electrical Metallic Tubing-Zinc Coated.
    - c. CS0.5, Rigid Aluminum Conduit.
    - d. C80.6, Intermediate Metal Conduit (IMC)-Zinc Coated.
  - 3. American Society for Testing and Materials (ASTM):
    - a. A123 El, Standard Specification for Zinc-Coated (Galvanized) Coatings on Iron and Steel Products.
    - b. C857, Standard Practice for Minimum Structural Design Loading for Underground Precast Concrete Utility Structures.
  - 4. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.
  - 5. National Electrical Manufacturers Association (NEMA):
    - a. RN 1, Polyvinyl-Chloride (PVC) Externally Coated Galvanized Rigid Steel Conduit and Intermediate Metal Conduit.
    - b. TC 2, Electrical Plastic Tubing (EPT) and Conduit (EPC-40 and EPC-80).
    - c. TC 3, PVC Fittings for Use with Rigid PVC Conduit and Tubing.
    - d. TC 6, PVC and ABS Plastic Utilities Duct for Underground Installation.

- e. VE 1, Metallic Cable Tray Systems.
- 6. National Fire Protection Association (NFPA): 70, National Electrical Code. (NEC)
- 7. Underwriters Laboratories, Inc. (UL):
  - a. 1, Standard for Safety Flexible Metal Conduit.
  - b. 6, Standard for Safety Rigid Metal Conduit.
  - c. 360, Standard for Safety Liquid-Tight Flexible Steel Conduit.
  - d. 514B, Standard for Safety Fittings for Conduit and Outlet Boxes.
  - e. 514C, Standard for Safety Nonmetallic Outlet Boxes, Flush-Device Boxes, and Covers.
  - f. 651, Standard for Safety Schedule 40 and 80 PVC Conduit.
  - g. 651A, Standard for Safety Type EB and Rigid PVC Conduit and HDPF Conduit.
  - h. 797, Standard for Safety Electrical Metallic Tubing.
  - i. 870, Standard for Safety Wireways, Auxiliary Gutters, and Associated Fittings.
  - j. 1242, Standard for Safety Intermediate Metal Conduit.
  - k. 1660, Standard for Safety Liquid-Tight Flexible Nonmetallic Conduit.

## 1.02 <u>SUBMITTALS</u>

- A. Shop Drawings:
  - 1. Manufacturer's Literature:
    - a. Rigid Rigid aluminum conduit.
    - b. Electric metallic tubing.
    - c. PVC Schedule 40 conduit.
    - d. PVC-coated rigid galvanized steel conduit.
    - e. Flexible metal, liquid-tight conduit.

- f. Flexible, nonmetallic, liquid-tight conduit.
- g. Conduit fittings.
- h. Raceway tags: Provide samples
- i. Wireways.
- j. Stainless Steel Conduits.
- 2. Precast Manholes and Handholes:
  - a. Dimensional drawings and descriptive literature.
  - b. Traffic loading calculations.
  - c. Accessory information.
- 3. Cable Tray Systems:
  - a. Dimensional drawings, calculations, and descriptive information.
  - b. NEMA load/span designation and how it was selected.
  - c. Support span length and pounds-per-foot actual and future cable loading at locations, with safety factor used.
  - d. Location and magnitude of maximum simple beam deflection of tray for loading specified.
  - e. Layout drawings and list of accessories being provided.
- 4. Conduit Layout Scale not greater than 1 inch equals 20 feet. Plan and section type, showing arrangement and location of exposed conduit for:
  - a. Low voltage feeder and branch circuits.
  - b. Instrumentation and control systems.
  - c. Communications systems.
  - d. Empty conduit for future use.
- 5. Equipment and machinery proposed for bending metal conduit.

6. Method for bending PVC conduit less than 30 degrees.

## 1.03 <u>UL COMPLIANCE</u>

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

## PART 2 – PRODUCTS

### 2.01 <u>CONDUIT AND TUBING</u>

- A. Rigid Aluminum Conduit:
  - 1. Meet requirements of ANSI C80.5 and UL6.
  - 2. Material: Type 6063, copper-free aluminum alloy.
- B. Electric Metallic Tubing (EMT):
  - 1. Meet requirements of ANSI C80.3 and UL 797.
  - 2. Material: Hot-dip galvanized, with chromated and lacquered protective layer.
- C. PVC Schedule 40 Conduit:
  - 1. Meet requirements of NEMA TC 2 and UL 651.
  - 2. UL listed for concrete encasement, underground direct burial, concealed or direct sunlight exposure, and 90 degrees C insulated conductors.
- D. PVC-Coated Rigid Galvanized Steel Conduit: Not Used
- E. Flexible Metal, Liquid-Tight Conduit:
  - 1. UL 360 listed for 105 degrees C insulated conductors.
  - 2. Material: Galvanized steel, with an extruded PVC jacket.
- F. Flexible, Nonmetallic, Liquid-Tight Conduit:
  - 1. Material: PVC core with fused flexible PVC jacket.
  - 2. UL 1660 listed for:

- a. Dry Conditions: 80 degrees C insulated conductors.
- b. Wet Conditions: 60 degrees C insulated conductors.
- 3. Manufacturers:
  - a. Carlon; Carflex or X-Flex.
  - b. T & B; Xtraflex LTC or EFC.
- G. Stainless Steel Conduit:
  - 1. Meet requirements of ANSI C80.1 and UL6A.
  - 2. Material: 316 stainless steel, polished to a bright, easily maintainable finish.

### 2.02 <u>FITTINGS</u>

- A. Rigid Aluminum:
  - 1. General:
    - a. Meet requirements of UL 514B.
    - b. Type: Threaded, copper-free. Set screw fittings not permitted.
  - 2. Insulated Bushing:
    - a. Material: Cast aluminum, with integral insulated throat, rated for 150 degrees C.
    - b. Manufacturer: O.Z. Gedney; Type AB.
  - 3. Grounding Bushing:
    - a. Material: Cast aluminum with integral insulated throat, rated for 150 degrees, with solderless lugs.
    - b. Manufacturer: O.Z. Gedney; Type ABLG.
  - 4. Conduit Hub:
    - a. Material: Cast aluminum, with insulated throat.
    - b. Manufacturers:

- i. O.Z. Gedney; Type CHA.
- ii. T & B; Series 370AL.
- 5. Conduit Bodies:
  - a. Manufacturers (For Normal Conditions):
    - iii. Appleton; Form 85 threaded Unilets.
    - iv. Crouse-Hinds; Mark 9 or Form 7-SA threaded condulets.
    - v. Killark; Series O Electrolets.
  - b. Manufacturers (For Hazardous Locations):
    - vi. Appleton.
    - vii. Crouse-Hinds.
    - viii. Killark.
- 6. Couplings: As supplied by conduit manufacturer.
- 7. Conduit Sealing Fitting Manufacturers:
  - a. Appleton; Type EYF-AL or EYM-AL.
  - b. Crouse-Hinds; Type EYS-SA or EZS-SA.
  - c. Killark; Type EY or EYS.
- 8. Drain Seal Manufacturers:
  - a. Appleton; Type EYDM-A.
  - b. Crouse-Hinds; Type EYD-SA or EZD-SA.
- 9. Drain/Breather Fitting Manufacturers:
  - a. Appleton; Type ECDB.
  - b. Crouse-Hinds; ECD.
- 10. Expansion Fitting Manufacturers:
  - a. Deflection/Expansion Movement: Steel City; Type DF-A.
  - b. Expansion Movement Only: Steel City; Type AF-A.

- 11. Cable Sealing Fittings: To form watertight nonslip cord or cable connection to conduit.
  - a. Bushing: Neoprene at connector entry.
  - b. Manufacturer: Appleton CG-S.
- B. Electric Metallic Tubing:
  - 1. Meet requirements of UL 514B.
  - 2. Type: Steel body and locknuts with steel or malleable iron compression nuts. Setscrew and drive-on fittings not permitted.
  - 3. Compression Ring: Stainless steel.
  - 4. Coupling Manufacturers:
    - a. Appleton; Type 95T.
    - b. Crouse-Hinds; Type CPR.
  - 5. Connector Manufacturers:
    - a. Appleton; Type 86T.
    - b. Crouse-Hinds; Type CPR.
- C. PVC Conduit and Tubing:
  - 1. Meet requirements of NEMA TC-3.
  - 2. Type: PVC, slip-on.
- D. PVC-Coated Rigid Galvanized Steel Conduit: Not Used
- E. Flexible Metal, Liquid-Tight Conduit:
  - 1. Metal insulated throat connectors with integral nylon or plastic bushing rated for 105 degrees C.
  - 2. Insulated throat and sealing O-rings.
  - 3. Long design type extending outside of box or other device at least 2 inches.

- 4. Manufacturer: T & B; Series 5300.
- F. Flexible, Nonmetallic, Liquid-Tight Conduit: Meet requirements of UL 514B.
  - 1. Type: One-piece fitting body, complete with lock nut, O-ring, threaded ferrule, sealing ring, and compression nut.
  - 2. Manufacturers:
    - a. Carlon; Type LT.
    - b. Kellems; Polytuff.
    - c. T & B; LT Series.
- G. Watertight Entrance Seal Device:
  - 1. New Construction:
    - a. Material: Oversized sleeve, malleable iron body with sealing ring, pressure ring, grommet seal, and pressure clamp.
    - b. Manufacturer: O.Z./Gedney; Type FSK or WSK, as required.
  - 2. Gored-Hole Application:
    - a. Material: Assembled dual pressure disks, neoprene sealing ring, and membrane clamp.
    - b. Manufacturer: O.Z./Gedney; Series CSM.
- H. Hazardous Locations: Approved for use in the atmosphere involved.
  - 1. Manufacturer: Crouse-Hinds; Type ECGJH.
- I. Stainless Steel:
  - 1. General:
    - a. Meet requirements of UL.
    - b. Type: Threaded, 316 stainless steel. Set screw or compression (threadless) fittings not permitted.

- 2. Bushing:
  - a. Material: 316 stainless steel.
  - b. Manufacturers:
    - i. Thomas & Betts.
    - ii. O.Z./Gedney.

### 2.03 ACCESSORIES

- A. Duct Bank Spacers:
  - 1. Type: Nonmetallic, interlocking, for multiple conduit sizes.
  - 2. Suitable for all types of conduit.
  - 3. Manufacturer: Underground Device, Inc.; Type WUNPEECE.
- B. Identification Devices:
  - 1. Raceway Tags:
  - 2. Material: Permanent, nylon.
  - 3. Shape: Round.
  - 4. Raceway Designation: Pressure stamped, embossed, or engraved.
  - 5. Tags relying on adhesives or taped-on markers not permitted.
  - 6. Warning Tape:
  - 7. Material: Polyethylene, 4-mil gauge.
  - 8. Color: Red.
  - 9. Width: Minimum 6-inch.
  - 10. Designation: Warning on tape that electric circuit is located below tape.
  - 11. Manufacturers:
    - a. Blackburn, Type RT.

- b. Griffolyn Co.
- C. Buried Raceway Marker:
  - 1. Material: Sheet bronze, consisting of double-ended arrows, straight for straight runs and bent at locations where runs change direction.
  - 2. Designation: Incise to depth of 3/32 inch, ELECTRIC CABLES. in letters 1/4-inch high.
  - 3. Minimum Dimension: 1/4-inch thick, 10 inches long, and 3/4-inch wide.
- D. Wraparound Duct Band:
  - 1. Material: Heat-shrinkable, cross-linked polyolefin, precoated with hot-melt adhesive.
  - 2. Manufacturer: Raychem; Type TWDB.

## PART 3 – EXECUTION

- 3.01 <u>GENERAL</u>
  - A. Conduit and Tubing sizes shown are based on the use of copper conductors.
  - B. All installed Work shall comply with National Electrical Code (NEC).
  - C. Crushed or deformed raceways not permitted.
  - D. Maintain raceway entirely free of obstructions and moisture.
  - E. Immediately after installation, plug or cap raceway ends with watertight and dust-tight seals until time for pulling in conductors.
  - F. Rigid Aluminum Conduit: Do not install in direct contact with concrete. Use unistrut or back and strap (clamp back strap) for installation on concrete wall or surface.
  - G. Sealing Fittings: Provide drain seal in vertical raceways where condensate may collect above sealing fitting.
  - H. Avoid moisture traps where possible. When unavoidable in exposed conduit runs, provide junction box and drain fitting at conduit low point.
  - I. Group raceways installed in same area.
  - J. Proximity to Heated Piping: Install raceways minimum 12 inches from parallel runs.

- K. Follow structural surface contours when installing exposed raceways. Avoid obstruction of passageways.
- L. Run exposed raceways parallel or perpendicular to walls, structural members, or intersections of vertical planes.
- M. Block Walls: Do not install raceways in same horizontal course with reinforcing steel.
- N. Install watertight fittings in outdoor, underground, or wet locations.
- O. Paint threads, before assembly of fittings, of galvanized conduit installed in exposed or damp locations with zinc-rich paint or liquid galvanizing compound.
- P. All metal conduit shall be reamed, burrs removed, and cleaned before installation of conductors, wires, or cables.
- Q. Do not install raceways in concrete equipment pads, foundations, or beams.
- R. Horizontal raceways installed under floor slabs shall lie completely under slab, with no part embedded within slab.
- S. Install concealed, embedded, and buried raceways so that they emerge at right angles to surface and have no curved portion exposed.

### 3.02 INSTALLATION IN CAST-IN-PLACE STRUCTURAL CONCRETE

- A. Minimum cover 1-1/2 inches.
- B. Provide support during placement of concrete to ensure raceways remain in position.
- C. Floor Slabs:
  - 1. Outside diameter of conduit not to exceed one-third of the slab thickness.
  - 2. Separate conduit by minimum six times conduit outside diameter, except at crossings.

### 3.03 <u>CONDUIT APPLICATION</u>

- A. Diameter: Minimum 3/4 inch.
- B. Exterior, Exposed:
  - 1. Rigid Aluminum.

## C. Interior, Exposed:

- 1. Rigid Aluminum.
- D. Interior, Concealed (Not Embedded in Concrete):
  - 1. PVC Schedule 40.
- E. Aboveground, Embedded in Concrete Walls, Ceilings, or Floors:
  - 1. PVC Schedule 40
- F. Direct Earth Burial: PVC Schedule 80.
- G. Concrete-Encased Raceways: PVC Schedule 40.
- H. Under Slabs-On-Grade: PVC Schedule 40.
- I. Corrosive Areas, Exterior: Rigid Aluminum.
- J. Corrosive Areas, Interior: Rigid Aluminum.
- K. NEC Class 1 Division 2 explosive areas: Rigid Aluminum.
- L. Lighting Protection: PVC Schedule 40.

### 3.05 <u>CONNECTIONS</u>

- A. For motors, wall or ceiling mounted fans and unit heaters, dry type transformers, electrically operated valves, instrumentation, and other equipment where flexible connection is required to minimize vibration:
- B. Conduit Size 4 Inches or less: Flexible metal, liquid-tight conduit.
- C. Conduit Size Over 4 Inches: Non-flexible.
- D. Corrosive Areas: Flexible, nonmetallic, liquid-tight or PVC-coated metallic, liquid-tight.
- E. Length: 18-inch minimum, 60-inch maximum, of sufficient length to allow movement or adjustment of equipment.
- F. Lighting Fixtures in Dry Areas: Flexible steel, non-liquid-tight conduit.
- G. Outdoor Areas, Process Areas Exposed to Moisture, and Areas required to be Oil-tight and Dust-Tight: Flexible metal, liquid-tight conduit.

- H. Transition from Underground or Concrete Embedded to Exposed: 316 stainless steel with heat shrink as shown on electrical detail drawings. 316 stainless steel nipple shall continue to above grade.
- I. Under Equipment Mounting Pads: Rigid Aluminum.
- J. Exterior Light Pole Foundations: conduit PVC Schedule 40.

### 3.06 **PENETRATIONS**

- A. Make at right angles, unless otherwise shown.
- B. Notching or penetration of structural members, including footings and beams, not permitted.
- C. Fire-Rated Walls, Floors, or Ceilings: Fire-stop openings around penetrations to maintain fire-resistance rating.
- D. Apply single layer of wraparound duct band to all metallic conduit in contact with concrete floor slabs to a point 2 inches above concrete surface.
- E. Concrete Walls, Floors, or Ceilings (Aboveground): Provide non-shrink grout dry-pack, or use watertight seal device.
- F. Entering Structures:
- G. General: Seal raceway at the first box or outlet with minimum 2 inches thick expandable plastic compound to prevent the entrance of gases or liquids from one area to another.
- H. Concrete Roof or Membrane Waterproofed Wall or Floor:
  - 1. Provide a watertight seal.
  - 2. Without Concrete Encasement: Install watertight entrance seal device on each side.
  - 3. With Concrete Encasement: Install watertight entrance seal device on the accessible side.
  - 4. Securely anchor malleable iron body of watertight entrance seal device into construction with one or more integral flanges.
  - 5. Secure membrane waterproofing to watertight entrance seal device in a permanent, watertight manner.

- 6. Heating, Ventilating, and Air Conditioning Equipment:
  - a. Penetrate equipment in area established by manufacturer.
  - b. Terminate conduit with flexible metal conduit at junction box or condulet attached to exterior surface of equipment prior to penetrating equipment.
  - c. Seal penetration with silicone type sealant as specified in Section 07270, FIRE STOPPING.
- 7. Corrosive-Sensitive Areas:
  - a. Seal all conduits passing through chlorine and ammonia room walls.
  - b. Seal all conduits entering equipment panel boards and field panels containing electronic equipment.
  - c. Seal penetration with silicone type sealant as specified in Section 07270, FIRE STOPPING.
- 8. Existing or Precast Wall (Underground): Core drill wall and install watertight entrance seal device.
- 9. Non-waterproofed Wall or Floor (Underground, without Concrete Encasement):
  - a. Provide Schedule 40 galvanized pipe sleeve or aluminum pipe sleeve, or watertight entrance seal device.
  - b. Fill space between raceway and sleeve with an expandable plastic compound on each side.
- 10. Manholes and Handholes:
  - a. Metallic Raceways: Provide insulated grounding bushings.
  - b. Nonmetallic Raceways: Provide bell ends flush with wall.
  - c. Install such that raceways enter as near as possible to one end of wall, unless otherwise shown.

### 3.07 <u>SUPPORT</u>

A. Support from structural members only, at intervals not exceeding 8 feet. Do not support from piping, pipe supports, or other raceways. Provide all necessary 316 stainless steel

mounting hardware, beam clamp, threaded rod, etc. for a complete support system for exposed raceways.

- B. Multiple Adjacent Raceways: Provide ceiling trapeze. For trapeze-supported conduit, allow 40 percent extra space for future conduit.
- C. Provide and attach wall brackets, strap hangers, or ceiling trapeze as follows:
- D. Wood: Wood screws.
- E. Hollow Masonry Units: Toggle bolts.
- F. Concrete or Brick: Expansion shields, or threaded studs driven in by powder charge, with lock washers and nuts.
- G. Steelwork: Machine screws.
- H. Nails or wooden plugs inserted in concrete or masonry for attaching raceway not permitted. Do not weld raceways or pipe straps to steel structures. Do not use wire in lieu of straps or hangers.
- 3.08 <u>BENDS</u>
  - A. Install concealed raceways with a minimum of bends in the shortest practical distance.
  - B. Make bends and offsets of longest practical radius.
  - C. Install with symmetrical bends or cast metal fittings.
  - D. Avoid field-made bends and offsets, but where necessary, make with acceptable hickey or bending machine. Do not heat metal raceways to facilitate bending.
  - E. Make bends in parallel or banked runs from same center or centerline with same radius so that bends are parallel.
  - F. Factory elbows may be installed in parallel or banked raceways if there is change in plane of run, and raceways are same size.
  - G. PVC Conduit:
  - H. Bends 30-Degree and larger: Provide factory-made elbows for exposed applications. Use 316 stainless steel elblow with heat shrink for underground applications.
  - I. 90-Degree Bends: Provide rigid aluminum elbows for exposed applications. Use 316 stainless steel elblow with heat shrink for underground applications.

- J. Use manufacturer's recommended method for forming smaller bends.
- K. Flexible Conduit: Do not make bends that exceed allowable conductor bending radius of cable to be installed or that significantly restricts conduit flexibility.

### 3.09 <u>EXPANSION/DEFLECTION FITTINGS</u>

- A. Provide on all raceways at all structural expansion joints, and in long tangential runs.
- B. Provide expansion/deflection joints for 50 degrees F maximum temperature variation.
- C. Install in accordance with manufacturer's instructions.

### 3.10 <u>PVC CONDUIT</u>

- A. Solvent Welding:
- B. Provide manufacturer recommended solvent; apply to all joints.
- C. Install such that joint is watertight.
- D. Adapters:
- E. PVC to Metallic Fittings: PVC terminal type.
- F. PVC to Rigid Metal Conduit or IMC: PVC female adapter.
- G. Belied-End Conduit: Bevel the unbelled end of the joint prior to joining.

### 3.11 <u>PVC-COATED RIGID STEEL CONDUIT</u> – Not Used

### 3.12 <u>WIREWAYS</u>

- A. Install in accordance with manufacturer's instructions.
- B. Locate with cover on accessible vertical face of wireway, unless otherwise shown.

### 3.13 TERMINATION AT ENCLOSURES

- A. Cast Metal Enclosure: Provide manufacturer's pre-molded insulating sleeve inside metallic conduit terminating in threaded hubs.
- B. NEMA 12 and NEMA 4X Enclosures: Provide conduit hubs
- C. Sheet Metal Boxes, Cabinets, and Enclosures:
  - 1. Rigid Aluminum Conduit:
    - a. Provide one lock nut each on inside and outside of enclosure.
    - b. Install grounding bushing.
    - c. Provide bonding jumper from grounding bushing to equipment ground bus or ground pad; if neither ground bus nor pad exists, connect jumper to lag bolt attached to metal enclosure.
    - d. Install insulated bushing on ends of conduit where grounding is not required.
    - e. Provide insulated throat when conduit terminates in sheet metal boxes having threaded hubs.
  - 2. Electric Metallic Tubing: Provide gland compression, insulated connectors.
  - 3. Flexible Metal Conduit: Provide two screw type, insulated, malleable iron connectors.
  - 4. Flexible, Nonmetallic Conduit: Provide nonmetallic, liquid-tight strain relief connectors.
  - 5. PVC Schedule 40 Conduit: Provide PVC terminal adapter with lock nut.
- D. Motor Control Center, Switchboard, Switchgear, and Free-Standing Enclosures: Terminate conduit entering bottom with grounding bushing; provide a grounding jumper extending to equipment ground bus or grounding pad.

#### 3.14 UNDERGROUND RACEWAYS

- A. Grade: Maintain minimum grade of 4 inches in 100 feet, either from one manhole, handhole, or pull box to the next, or from a high point between them, depending on surface contour.
- B. Cover: Maintain minimum 2-foot cover above conduit and concrete encasement, unless otherwise shown.
- C. Make routing changes as necessary to avoid obstructions or conflicts.
- D. Couplings: In multiple conduit runs, stagger so that couplings in adjacent runs are not in same transverse line.

- E. Union type fittings not permitted.
- F. Spacers:
  - 1. Provide preformed, nonmetallic spacers, designed for such purpose, to secure and separate parallel conduit runs in a trench or concrete encasement.
  - 2. Install at intervals not greater than that specified in NFPA 70 for support of the type conduit used, but in no case greater than 6 feet.
- G. Support conduit so as to prevent bending or displacement during backfilling or concrete placement.
- H. Installation with Other Piping Systems:
- I. Crossings: Maintain minimum 12-inch vertical separation.
- J. Parallel Runs: Maintain minimum 12-inch separation.
- K. Installation over valves or couplings not permitted.
- L. Metallic Raceway Coating: At couplings and joints and along entire length, apply wraparound duct band with one-half tape width overlap to obtain two complete layers.
- M. Concrete Encasement: As specified in Section 03300, Cast-In-Place Concrete.
- N. Concrete Color: Gray, dust top of concrete ductbank with powdered red concrete dye before concrete sets and trowel dry onto top of ductbank.
- O. Backfill:
- P. As specified in Section 02222, Excavation and Backfill for Utilities and Section 02224 Excavation and Backfill for Structures.
- Q. Do not backfill until inspected by Engineer.

#### 3.15 <u>EMPTY RACEWAYS</u>

- A. Provide permanent, removable cap over each end.
- B. Provide PVC plug with pull-tab for underground raceways with end bells.
- C. Provide nylon pull cord.

D. Identify, as specified in Paragraph IDENTIFICATION DEVICES, with waterproof tags attached to pull cord at each end, and at intermediate pull point.

## 3.16 **IDENTIFICATION DEVICES**

- A. Raceway Tags:
- B. Identify origin and destination.
- C. Install at each terminus, near midpoint, and at minimum intervals of every 50 feet of exposed Raceway, whether in ceiling space or surface mounted.
- D. Provide nylon strap for attachment.
- E. Warning Tape: Install approximately 12 inches above underground or concrete-encased raceways. Align parallel to, and within 12 inches of, centerline of runs.
- F. Buried Raceway Markers:
- G. Install at grade to indicate direction of underground raceways.
- H. Install at all bends and at intervals not exceeding 100 feet in straight runs.
- I. Embed and secure to top of concrete base, sized 14 inches long, 6 inches wide, and 8 inches deep; top set flush with finished grade.

#### 3.17 PROTECTION OF INSTALLED WORK

- A. Protect products from effects of moisture, corrosion, and physical damage during construction.
- B. Provide and maintain manufactured watertight and dust-tight seals over all conduit openings during construction.
- C. Touch up painted conduit threads after assembly to cover nicks or scars.
- D. Touch up damage to coating on PVC-coated conduit with patching compound approved by manufacturer.

# END OF SECTION

# SECTION 16120 CONDUCTORS

## PART 1 – GENERAL

#### 1.01 <u>REFERENCES</u>

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI): 386, Standard for Separable Insulated Connector Systems for Power Distribution Systems Above 600V.
  - 2. American Society for Testing and Materials (ASTM):
    - a. A167, Standard Specification for Stainless and Heat Resisting Chromium-Nickel-Plated Steel Plate, Sheet, and Strip.
    - b. B3, Standard Specification for Soft or Annealed Copper Wire.
    - c. B8, Standard Specification for Concentric-Lay-Stranded Copper Conductors, Hard, Medium-Hard, or Soft.
    - d. B263, Standard Test Method for Determination of Cross- Sectional Area of Stranded Conductors.
  - 3. Association of Edison Illuminating Companies (AEIC):
    - a. CS 5, Crosslinked Polyethylene Insulated Shielded Power Cables Rated 5 through 35 kV.
    - b. CS 6, Ethylene- Propylene-Rubber-Insulated Shielded Power Cables Rated 5 through 69 kV.
  - 4 Insulated Cable Engineer's Association, Inc. (ICEA): T-29-250, Procedure for Conducting Vertical Cable Tray Flame Test with a Theoretical Heat Input of 210,000 Btu/hour.
  - 5. Institute of Electrical and Electronics Engineers, Inc. (IEEE):
    - a. 48, Standard Test Procedures and Requirements or High-Voltage Alternating Current Cable Terminations.

- b. 404, Standard for Cable Joints for Use with Extruded Dielectric Cable Rated 5,000V through 46,000V and Cable Joints for Use with Laminated Dielectric Cable Rated 2,500V through 500,000V.
- 6. National Electrical Contractors Association, Inc. (NECA): 5055, Standard of Installation.
- 7. National Electrical Manufacturers' Association (NEMA):
  - a. CC 1, Electric Power Connectors for Substations.
  - b. WC 3, Rubber-insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
  - c. WC 5, Thermoplastic Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
  - d. WC 7, Crosslinked-Thermosetting-Polyethylene-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
  - e. WC 8, Ethylene-Propylene-Rubber-Insulated Wire and Cable for the Transmission and Distribution of Electrical Energy.
  - f. WC 55, Instrumentation Cables and Thermocouple Wire.
- 8. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
- 9. Underwriters Laboratories, Inc. (UL):
  - a. 13, Standard for Safety Power-Limited Circuit Cables.
  - b. 44, Standard for Safety Rubber-Insulated Wires and Cables.
  - c. 62, Standard for Safety Flexible Cord and Fixture Wire.
  - d. 486A, Standard for Safety Wire Connector and Soldering Lugs for Use with Copper Conductors.
  - e. 486B, Standard for Safety Wire Connectors and Soldering Lugs for Use with Aluminum Conductors.
  - f. 510, Standard for Safety Insulating Tape.
  - g. 854, Standard for Safety Service-Entrance Cables.

- h. 910, Standard for Safety Test Method for Fire and Smoke Characteristics of Electrical and Optical-Fiber Cables Used in Air Handling Spaces.
- i. 1072, Standard for Safety Medium-Voltage Power Cables.
- j. 1277, Standard for Safety Electrical Power and Control Tray Cables with Optional Optical-Fiber Members.
- k. 1581, Standard for Safety Reference Standard for Electrical Wires, Cables, and Flexible Cords.

# 1.02 <u>SUBMITTALS</u>

- A. Shop Drawings:
  - 1. Wire and cable descriptive product information.
  - 2. Wire and cable accessories for conductors 600 volts and below descriptive product information.
  - 3. Wire and cable accessories for conductors above 600 volts descriptive product information.
  - 4. Wire and cable Identification devices with samples of each type.
  - 5. Cable fault detection system descriptive product information.
- B. Quality Control Submittals:
  - 1. Certified Factory Test Report for conductors 600 volts and below.

#### 1.03 <u>UL COMPLIANCE</u>

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

# PART 2 – PRODUCTS

#### 2.01 CONDUCTORS 600 VOLTS AND BELOW

- A. Conform to applicable requirements of NEMA WC 3, WC 5, and WC 7.
- B. Conductor Type:
  - 1. 120- and 277-Volt Lighting, No. 10 AWG and Smaller: Stranded copper.

- 2. 120-Volt Receptacle Circuits, No. 10 AWG and Smaller: Stranded copper.
- 3. All Other Circuits: Stranded copper.
- C. Insulation: Type THHN/THWN, except for sizes No. 6 and larger, with XHHW insulation.
- D. Direct Burial and Aerial Conductors and Cables:
  - 1. Type USE/RHH/RHW insulation, UL IC54 listed, Type RHW-2/USE-2.
  - 2. Conform to physical and minimum thickness requirements of NEMA WC 3.
- E. Flexible Cords and Cables:
  - 1. Type SOW-A50 with ethylene propylene rubber insulation in accordance with UL 62.
  - 2. Conform to physical and minimum thickness requirements of NEMA WC 8.
- F. Cable Tray Conductors and Cables: Type TC.

# 2.03 <u>600-VOLT RATED CABLE</u>

- A. General:
  - 1. Type: TC, meeting requirements of UL 1277, including Vertical Tray Flame Test at 20,000 Btu/hr, and NFPA 70, Article 340, or UL 13 Listed Power Limited Circuit Cable meeting requirements of NFPA 70, Article 725.
  - 2. Permanently and legibly marked with manufacturer's name, maximum working voltage for which cable was tested, type of cable, and UL listing mark.
  - 3. Suitable for installation in open air, in cable trays, or conduit.
  - 4. Minimum Temperature Rating: 90 degrees C dry locations, 75 degrees C wet locations.
  - 5. Overall Outer Jacket: PVC, flame-retardant, sunlight- and oil-resistant.
- B. CABLE Type "A", Wire and Conductors Not Used
- C. Type l-Multiconductor Control Cable:

- 1. Conductors:
  - a. No. 14 AWG, seven-strand copper.
  - b. Insulation: 15-mil PVC with 4-mil nylon.
  - c. UL 1581 listed as Type THHN/THWN rated VW-I.
  - d. Conductor group bound with spiral wrap of barrier tape.
  - e. Color Code: In accordance with NEMA WC 5, Method 1, Sequence K-2.
- 2. Cable: Passes the ICEA T-29-520 210,000 Btu/hr Vertical Tray Flame Test.
- 3. Cable Sizes:

No. of	2.02	Max. Outside	2.04	Jacket Thickness
Conductors	2.03	Diameter (inches)	2.05	(mils)
3	2.06	0.41	2.07	45
5	2.08	0.48	2.09	45
7	2.010	0.52	2.011	45
12	2.012	0.72	2.013	60
19	2.014	00.83	2.015	60
25	2.016	1.00	2.017	60
37	2.018	1.15	2.019	80

#### 4. Manufacturers:

- a. Okonite Co.
- b. Rome Cable.
- D. Type 2-Multiconductor Power Cable:
  - 1. Conductors:
    - a. Class B stranded coated copper.
    - b. Insulation: Chemically cross-linked ethylene-propylene with Hypalon jacket.
    - c. UL 1581 listed as Type EPR rated VW-1.

- d. Color Code: Conductors, size No. 8 AWG and smaller, colored conductors, NEMA WC5 Method 1, color 5 per Article POWER CONDUCTOR COLOR CODING. Conductors, size No. 6 AWG and larger, NEMA WC5, Method 4.
- 2. Cable passes the ICEA T-29-520 210,000 Btu/hr Vertical Tray Flame Test.
- 3. Cable Sizes:

Conductor	Minimum	No. Of	Maximum	Nominal Jacket
Size	Ground Wire	Conductors	Outside	Thickness (Mils)
	Size		Diameter	
			(Inches)	
12	12	2	0.42	45
		3	0.45	45
		4	0.49	45
10	10	2	0.54	60
		3	0.58	60
		4	0.63	60
8	10	3	0.66	60
		4	0.72	
6	8	3	0.74	60
		4	0.81	
4	6	3	0.88	60
		4	0.97	80
2	6	3	1.01	80
		4	1.11	
1/0	6	3	1.22	80
		4	1.35	
2/0	4	3	1.32	80
		4	1.46	
4/0	4	3	1.56	80
		4	1.78	

- 4. Manufacturers:
  - a. Okonite Co.
  - b. Rome Cable.
- E. Type B-No. 16 AWG, Twisted, Shielded Pair, Instrumentation Cable: Single pair, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.

- 1. Outer Jacket: 45-mil nominal thickness.
- 2. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer overlapped to provide 100 percent coverage.
- 3. Dimension: 0.31-inch nominal OD.
- 4. Conductors:
  - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8
  - b. 20 AWG, seven-strand tinned copper drain wire.
  - c. Insulation: 15-mil nominal PVC, 600V rated.
  - d. Jacket: 4-mil nominal nylon.
  - e. Color Code: Pair conductors black and red.
- 5. Manufacturers:
  - a. Okonite Co.
  - b. Alpha Wire Corp.
- 6. The following test shall be performed on instrumentation and control system cables. All tests shall be end-to-end test of installed cables with the ends supported in free air, not adjacent to any ground object. All test data shall be recorded on forms acceptable to the Engineer. Complete records of all tests shall be made and delivered to the Engineer.
  - a. Continuity tests shall be performed by measuring wire/shield loop resistances of signal cable as the wires, taken one at a time, are shorted to the channel shield. No loop resistance measurement shall carry by more than  $\pm 2$  ohms from the calculated average loop resistance valve.
  - b. Insulation resistance tests shall be performed by using a 500 volt megohmmeter to measure the insulation resistance between each channel wire, between each channel wire and channel shield, between individual channel shields in a multi-channel cable, between each individual channel and the overall cable shield in multi-channel cable, between each wire and ground, and between each shield and ground. Values of resistance less than 10 megohms shall be unacceptable.

- F. Type B1-No. 16 AWG, Twisted, Shielded Triad Instrumentation Cable: Single triad, designed for noise rejection for process control, computer, or data log applications meeting NEMA WC 55 requirements.
  - 1. Outer Jacket: 45-mil nominal.
  - 2. Triad Shield: 1.35-mil, double-faced aluminum/synthetic polymer, overlapped to provide 100 percent coverage.
  - 3. Dimension: 0.32-inch nominal OD.
  - 4. Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, meeting requirements of ASTM B8.
    - b. 20 AWG, seven-strand, tinned copper drain wire.
    - c. Insulation: 15-mil nominal PVC.
    - d. Jacket: 4-mil nylon.
    - e. Color Code: Triad conductors: black, red, and blue.
  - 5. Manufacturers:
    - a. Okonite Co.
    - b. Alpha Wire Corp.
- G. Type B2-No. 18 AWG, Multi-Twisted, Shielded Pairs with a Common, Overall Shield Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable, meeting NEMA WC 55 requirements.
  - 1. Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8
    - b. Tinned copper drain wires.
    - c. Pair drain wire size AWG 20, group drain wire size AWG 18.
    - d. Insulation: 15-mil PVC.

- e. Jacket: 4-mil nylon.
- f. Color Code: Pair conductors black and red with red conductor numerically printed for group identification.
- g. Individual Pair Shield: 1.35-mil, double-faced aluminum/synthetic polymer.
- 2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.
- 3. Cable Sizes:

Number	Maximum Outside	Nominal Jacket
of Pairs	Diameter	Thickness
	(inches)	(mils)
4	0.50	45
8	0.68	60
12	0.82	60
16	0.95	80
24	1.16	80
36	1.33	80
50	1.56	80

- 4. Manufacturers:
  - a. Okonite Co.
  - b. Alpha Wire Corp.
- H. Type B3-No. 18 AWG, Multi-twisted Pairs with a Common Overall Shield Instrumentation Cable: Designed for use as instrumentation, process control, and computer cable meeting NEMA WC 55.
  - 1. Conductors:
    - a. Bare soft annealed copper, Class B, seven-strand concentric, in accordance with ASTM B8.
    - b. Tinned copper drain wire size 18 AWG
    - c. Insulation: 15-mil nominal PVC.
    - d. Jacket: 4-mil nylon.

- e. Color Code: Pair conductors black and red, with red conductor numerically printed for group identification.
- 2. Cable Shield: 2.35-mil, double-faced aluminum/synthetic polymer, overlapped for 100 percent coverage.
- 3. Cable Sizes:

Number	Maximum Outside	Nominal Jacket
of Pairs	Diameter	Thickness
	(inches)	(mils)
4	0.46	45
8	0.63	60
12	0.75	60
16	0.83	60
24	1.06	80
36	1.21	80
50	1.42	80

- 4. Manufacturers:
  - a. Okonite Co.
  - b. Alpha Wire Corp.
- I. Ethernet Cat. 6 Cable (Copper):
  - 1. Section applies to all Ethernet Cable (Copper) except for Fiber Optic cable.
  - Conductor Physical Characteristics: 4 twisted pairs (8 conductors), 24 AWG solid bare Copper with Polyolefin Insulation. Overall Nominal Diameter: 0.260 inch. Operating Temperature Range: -20°C to +75°C. Model Number – 1533R, Belden Inc.
  - 3. Manufacturer:
    - a. Belden Inc.

## 2.04 <u>GROUNDING CONDUCTORS</u>

- A. Equipment: Stranded copper with green, Type USE/RHH/RHW-XLPE or THHN/THWN, insulation.
- B. Direct Buried: Bare stranded tinned copper.

#### 2.05 ACCESSORIES FOR CONDUCTORS 600 VOLTS AND BELOW

- A. Tape:
  - 1. General Purpose, Flame-Retardant: 7-mil, vinyl plastic, Scotch Brand 33, rated for 90 degrees C minimum, meeting requirements of UL 510.
  - 2. Flame Retardant, Cold and Weather Resistant: 8.5-mil, vinyl plastic, Scotch Brand 88.
  - 3. Arc and Fireproofing:
    - a. 30-mil, elastomer
    - b. Manufacturers and Products:
      - 1) Scotch; Brand 77, with Scotch Brand 69 glass cloth tape binder.
      - 2) Plymount; Plyarc 30, with Plymount Plyglas glass cloth tape binder.
- B. Identification Devices:
  - 1. Sleeve: Permanent, PVC, yellow or white, with legible machine-printed black markings.
  - 2. Marker Plate: Nylon, with legible designations permanently hot stamped on plate.
  - 3. Grounding Conductor: Permanent green heat-shrink sleeve, 2-inch minimum.
- C. Connectors and Terminations:
  - 1. Nylon, Self-Insulated Crimp Connectors:
    - a. Manufacturers and Products:
      - 1) Thomas & Betts; Sta-Kon.
      - 2) Burndy; Insulink.
      - 3) ILSCO.
  - 2. Nylon, Self-Insulated, Crimp Locking-Fork, Torque-Type Terminator:
    - a. Manufacturers and Products:
      - 1) Thomas & Betts; Sta-Kon.
      - 2) Burndy; Insulink.
      - 3) ILSCO.
- D. Cable Lugs:

- 1. In accordance with NEMA CC I.
- 2. Rated 600 volts of same material as conductor metal.
- 3. Insulated, Locking-Fork, Compression Lugs:
  - a. Manufacturers and Products:
    - 1) Thomas & Betts; Sta-Kon.
    - 2) ILSCO; ILSCONS.
- 4. Un-insulated Crimp Connectors and Terminators:
  - a. Manufacturers and Products:
    - 1) Square D; Versitide.
    - 2) Thomas & Betts; Color-Keyed.
    - 3) ILSCO.
- 5. Un-insulated, Bolted, Two-Way Connectors and Terminators:
  - a. Manufacturers and Products:
    - 1) Thomas & Betts; Locktite.
    - 2) Burndy; Quiklug.
    - 3) ILSCO.
- E. Cable Ties: Nylon, adjustable, self-locking, and reusable.
  - 1. Manufacturer and Product: Thomas & Betts; TY-RAP.
- F. Heat Shrinkable Insulation: Thermally stabilized, crosslinked polyofin.
  - 1. Manufacturer and Product: Thomas & Betts; SHRINK-KON.

#### 2.06 <u>PULLING COMPOUND</u>

- A. Nontoxic, non-corrosive, noncombustible, nonflammable, wax-based lubricant; UL listed.
- B. Suitable for rubber, neoprene, PVC, polyethylene, hypalon, CPE, and lead-covered wire and cable.
- C. Suitable for zinc-coated steel, aluminum, PVC, bituminized fiber, and fiberglass raceways.
- D. Manufacturers and Products:
  - 1. Ideal Co.; Yellow 77.

- 2. Polywater, Inc.
- 3. Cable Grip Co.

## 2.07 MANUFACTURED WIRING SYSTEMS

- A. System Rating:
  - 1. 20 amperes load-carrying capacity each phase with final assemblies consisting of maximum of three phase conductors.
  - 2. Composition: Type MC cable with 90 degrees C insulation and stranded copper conductors.
- B. Cable Configuration: Three, single-phase, five-wire circuit with standard color wire coding:
  - 1. 208/120-Volt: Black, red, blue, white, green.
  - 2. 480/277-Volt: Brown, orange, yellow, gray, green.
- C. Locking Mechanism: Latch/strike with voltage clearly marked on latch.
- D. UL 910 listed for use in air handling plenums, listed to connect or disconnect under load, and manufactured in accordance with NFPA 70, Article No. 604.

#### 2.08 WARNING TAPE

A. As specified in Section 16110, RACEWAYS.

#### 2.09 SOURCE QUALITY CONTROL

A. Conductors 600-Volts and below: Test in accordance with UL 44 and 854 Standards.

# PART 3 – EXECUTION

#### 3.01 <u>GENERAL</u>

- A. Conductor installation to be in accordance with NEC.
- B. Conductor and cable sizing shown is based on copper conductors, unless noted otherwise.
- C. Do not exceed cable manufacturer's recommendations for maximum pulling tensions and minimum bending radii.

- D. Tighten screws and terminal bolts in accordance with UL 486A for copper conductors.
- E. Cable Lugs: Provide with correct number of holes, bolt size, and center-to-center spacing as required by equipment terminals.
- F. Bundling: Where single conductors and cables in manholes, handholes, vaults, and other indicated locations are not wrapped together by some other means, bundle conductors from each conduit throughout their exposed length with cable ties placed at intervals not exceeding 12 inches on center.
- G. Ream, remove burrs, and clear interior of installed conduit before pulling wires or cables.
- H. Concrete-Encased Raceway Installation: Before installation of conductors, pull through each raceway a mandrel approximately 1/4-inch smaller than raceway inside diameter.
- I. Cable Tray Installation:
  - 1. Install wire and cable parallel and straight in tray.
  - 2. Bundle, in groups, all wire and cable of same voltage having a common routing and destination; use cable ties, at maximum intervals of 8 feet.
  - 3. Clamp cable bundles prior to making end termination connections.
  - 4. Separate cables of different voltage rating in same cable tray with barriers.
  - 5. Fasten wires, cables, and bundles to tray with nylon cable straps at the following maximum intervals:
    - a. Horizontal Runs: 20 feet.
    - b. Vertical Runs: 5 feet.

#### 3.02 POWER CONDUCTOR COLOR CODING

- A. Conductors 600 Volts and Below:
  - 1. No. 6 AWG and Larger. Apply general purpose, flame retardant tape at each end, and at accessible locations wrapped at least six full overlapping turns, covering an area 1-1/2 to 2 inches wide.
  - 2. No. 8 AWG and Smaller: Provide colored conductors.
  - 3. Colors:

System	Conductor	Color	
All Systems	Equipment Grounding	Green	
240/120 Volts	Grounded Neutral	White	
Single-Phase, Three-Wire	One Hot Leg	Black	
	Other Hot Leg	Red	
208Y/120 Volts	Grounded Neutral	White	
Three-Phase, Four-Wire	Phase A	Black	
	Phase B	Red	
	Phase C	Blue	
240/120 Volts	Grounded Neutral	White	
Three-Phase, Four-Wire	Phase A	Black	
Delta, Center Tap	High (wild) Leg	Orange	
Ground on Single-Phase	Phase C	Blue	
480Y/277 Volts	Grounded Neutral	Gray	
Three-Phase, Four-Wire	Phase A	Brown	
	Phase B	Purple	
	Phase C	Yellow	
NOTE: Phase A, B, C implies direction of positive phase rotation			

4. Tracer: Outer covering of white with an identifiable colored strip other than green in accordance with NFPA 70.

#### 3.03 <u>CIRCUIT IDENTIFICATION</u>

- A. Circuits Appearing in Circuit Schedules: identify power, instrumentation, and control conductor circuits, using circuit schedule designations, at each termination and in accessible locations such as manholes, handholes, panels, switchboards, motor control centers, pull boxes, and terminal boxes.
- B. Circuits Not Appearing in Circuit Schedules:
  - 1. Assign circuit name based on device or equipment at load end of circuit.
  - 2. Where this would result in same name being assigned to more than one circuit, add number or letter to each otherwise identical circuit name to make it unique.
- C. Method:
  - 1. Conductors No. 3 AWG and Smaller: Identify with sleeves.
  - 2. Cables, and Conductors No. 2 AWG and Larger:
    - a. Identify with marker plates.

- b. Attach marker plates with nylon tie cord.
- 3. Taped-on markers or tags relying on adhesives not permitted.

#### 3.04 CONDUCTORS 600 VOLTS AND BELOW

- A. Install 10 AWG or 12 AWG conductors for branch circuit power wiring in lighting and receptacle circuits.
- B. No splicing of incoming service conductors and branch power distribution conductors will be allowed.
- C. Connections and Terminations:
  - 1. Install uninsulated crimp connectors and terminators for instrumentation, control, and power circuit conductors No. 4 AWG through No. 2/0 AWG.
  - 2. Install uninsulated, bolted, two-way connectors and terminators for power circuit conductors No. 4/0 AWG and larger.
  - 3. Install uninsulated bolted, two-way connectors for motor circuit conductors No. 12 and larger.
  - 4. Tape insulate all uninsulated connections.
  - 5. Place no more than one conductor in any single-barrel pressure connection.
  - 6. Install crimp connectors with tools approved by connector manufacturer.
  - 7. Install terminals and connectors acceptable for type of material used.
  - 8. Compression Lugs
    - a. Attach with a tool specifically designed for purpose.
    - b. Tool shall provide complete controlled crimp and shall not release until crimp is complete.
    - c. Do not use plier type crimpers.
- D. Do not use soldered mechanical joints.
- E. Splices and Terminations:
  - 1. Indoors: No splices are allowed.

- 2. Outdoors: No splices are allowed.
- F. Cap spare conductors and conductors with UL listed end caps.
- G. Cabinets, Panels, and Motor Control Centers:
  - 1. Remove surplus wires, bundle and secure.
  - 2. Where conductors pass through openings or over edges in sheet metal, remove bums, chamfer edges, and install bushings and protective strips of insulating material to protect the conductors.
- H. Control and Instrumentation Wiring:
  - 1. Where terminals provided will accept such lugs, terminate control and instrumentation wiring, except solid thermocouple leads, with insulated, locking-fork compression lugs.
  - 2. Terminate with methods consistent with terminals provided, and in accordance with terminal manufacturer's instructions.
  - 3. No splices are allowed.
  - 4. Where connections of cables installed under this section are to be made under Section 17000 Control and Information System Scope and General Requirements (PICS), leave pigtails of adequate length for bundled connections.
  - 5. Cable Protection:
    - a. Under Infinite Access Floors: May be installed without bundling.
    - b. All Other Areas: Install individual wires, pairs, or triads in flex conduit under the floor or grouped into bundles at least 1/2-inch in diameter.
    - c. Maintain integrity of shielding of instrumentation cables.
    - d. Ensure grounds do not occur because of damage to jacket over the shield.
- I. Extra Conductor Length: For conductors to be connected by others, install minimum 6 feet of extra conductor in freestanding panels and minimum 2 feet in other assemblies.
- J. Install Ethernet Cat. 6 Cable (Copper) as per manufacturer recommendation.

#### END OF SECTION

# SECTION 16450 GROUNDING

#### PART 1 – GENERAL

#### 1.01 <u>REFERENCES</u>

- A. The following is a list of standards that may be referenced in this section:
  - 1. American National Standards Institute (ANSI): C2, National Electrical Safety Code (NESC).
  - 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).

## 1.02 <u>SUBMITTALS</u>

- A Shop Drawings:
  - 1. Product Data:
    - a. Exothermic weld connectors.
    - b. Mechanical connectors.

#### 1.03 <u>UL COMPLIANCE</u>

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

# PART 2 – PRODUCTS

# 2.01 GROUND ROD

- A. Material: Copper clad.
- B. Diameter: Minimum 5/8 inch.
- C. Length: 20 feet.

# 2.02 <u>GROUND CONDUCTORS</u>

- A. As specified in Section 16120, CONDUCTORS.
- 2.03 CONNECTORS

- A. Exothermic Weld Type:
  - 1. Outdoor Weld: Suitable for exposure to elements or direct burial.
  - 2. Indoor Weld: Use low-smoke, low-emission process.
  - 3. Manufacturers:
    - a. Erico Products, Inc.; Cadweld and Cadweld Exolon.
    - b. Thermoweld.
- B. Mechanical Type: Split-bolt, saddle, or cone screw type; copper alloy material.
  - 1. Manufacturers:
    - a. Burndy Corp.
    - b. Thomas and Betts Co.

#### 2.04 <u>GROUNDING WELLS</u>

- A. Ground rod box complete with cast iron riser ring and traffic cover marked GROUND ROD.
- B. Manufacturers:
  - 1. Christy Co.; No. G5.
  - 2. Lightning and Grounding Systems, Inc.; I-R Series.

# PART 3 – EXECUTION

#### 3.01 <u>GENERAL</u>

- A. Grounding shall comply with NFPA 70 and ANSI C2.
- B. Ground electrical service neutral at service entrance equipment to supplementary grounding electrodes.
- C. Ground each separately derived system neutral to nearest effectively grounded building structural steel member or separate grounding electrode.

- D. Bond together system neutrals, service equipment enclosures, exposed non-currentcarrying metal parts of electrical equipment, metal raceways, ground conductor in raceways and cables, receptacle ground connections, and metal piping systems.
- E. Shielded Power Cables: Ground shields at each splice or termination in accordance with recommendations of splice or termination manufacturer.
- F. Shielded Control Cables:
  - 1. Ground shield to ground bus at power supply for analog signal.
  - 2. Expose shield minimum I inch at termination to field instrument and apply heat shrink tube.
  - 3. Do not ground control cable shield at more than one point.

#### 3.02 <u>WIRE CONNECTIONS</u>

- A. Ground Conductors: Install in conduit containing power conductors and control circuits above 50 volts.
- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to non-current carrying grounding bus.
- C. Connect ground conductors to raceway grounding bushings.
- D. Extend and connect ground conductors to ground bus in all equipment containing a ground bus.
- E. Connect enclosure of equipment containing ground bus to that bus.
- F. Bolt connections to equipment ground bus.
- G. Bond grounding conductors to metallic enclosures at each end, and to intermediate metallic enclosures.
- H. Junction Boxes: Furnish materials and connect to equipment grounding system with grounding clips mounted directly on box, or with 3/8-inch machine screws.

#### 3.03 MOTOR GROUNDING

A. Extend equipment ground bus via grounding conductor installed in motor feeder raceway; connect to motor frame.

- B. Nonmetallic Raceways and Flexible Tubing: Install an equipment-grounding conductor connected at both ends to non-current carrying grounding bus.
- C. Motors Less Than 10 hp: Furnish compression, spade-type terminal connected to conduit box mounting screw.
- D. Motors 10 hp and above: Tap motor frame or equipment housing; furnish compression, one-hole, lug type terminal connected with minimum 5/16-inch brass threaded stud with bolt and washer.
- E. Circuits 20 Amps or Above: Tap motor frame or equipment housing; install solderless terminal with minimum 5/16-inch diameter bolt.

#### 3.04 <u>GROUND RODS</u>

- A. Install full length with conductor connection at upper end.
- B. Install with connection point below finished grade, unless otherwise shown.

#### 3.05 GROUNDING WELLS

- A. Install inside buildings, asphalt, and paved areas.
- B. Install riser ring and cover flush with surface.
- C. Place 9 inches crushed rock in bottom of each well.

#### 3.06 <u>CONNECTIONS</u>

- A. General:
  - 1. Above grade Connections: Use exothermic weld, mechanical, or compression-type connectors.
  - 2. Below grade Connections: Install exothermic weld type connectors.
  - 3. Remove paint, dirt, or other surface coverings at connection points to allow good metal-to-metal contact.
  - 4. Notify Engineer before backfilling ground connections.
- B. Exothermic Weld Type:
  - 1. Wire brush or file contact point to bare metal surface.

- 2. Use welding cartridges and molds in accordance with manufacturer's recommendations.
- 3. Avoid using badly worn molds.
- 4. Mold to be completely filled with metal when making welds.
- 5. After completed welds have cooled, brush slag from weld area and thoroughly clean joint.
- C. Mechanical Type:
  - 1. Apply homogeneous blend of colloidal copper and rust and corrosion inhibitor before making connection.
  - 2. Install in accordance with connector manufacturer's recommendations.
  - 3. Do not conceal mechanical connections.

# 3.07 METAL STRUCTURE GROUNDING

- A. Ground metal sheathing and exposed metal vertical structural elements to grounding system.
- B. Bond electrical equipment supported by metal platforms to the platforms.
- C. Provide electrical contact between metal frames and railings supporting pushbutton stations, receptacles, and instrument cabinets, and raceways carrying circuits to these devices.

# 3.08 MANHOLE AND HANDHOLE GROUNDING

- A. Install one ground rod inside each.
- B. Ground Rod Floor Protrusion: 4 to 6 inches above floor.
- C. Make connections of grounding conductors fully visible and accessible.
- D. Connect all non-current-carrying metal parts, and any metallic raceway grounding bushings to ground rod with No. 6 AWG copper conductor.

# 3.09 TRANSFORMER GROUNDING

A. Bond neutrals of transformers within buildings to system ground network, and to any additional indicated grounding electrodes.

- B. Bond neutrals of substation transformers to substation grounding grid and system grounding network.
- C. Bond neutrals of pad-mounted transformers to four locally driven ground rods and buried ground wire encircling transformer and system ground network.

#### 3.10 SURGE PROTECTION EQUIPMENT GROUNDING

A. Connect surge arrestor ground terminals to equipment ground bus.

## 3.11 INSTRUMENT GROUND- SURGE SUPPRESSION

A. Connect all instrument surge protection with #6 insulated copper groundwire (in conduit where above grade) to closest plant ground system

## 3.12 <u>BONDING</u>

- A. Bond to Main Conductor System:
- B. All roof mounted ventilators, fans, air handlers, masts, flues, cooling towers, handrails, and other sizeable metal objects.
- C. Roof flashing, gravel stops, insulation vents, ridge vents, roof drains, soil pipe vents, and other small metal objects if located within 6 feet of main conductors or another grounded object.
- D. Provide air terminals as required.
- E. Bond steel columns or major framing members to grounding system per National Electrical Code.
- F. Bond each main down conductor to grounding system.

#### 3.13 <u>GROUNDING SYSTEM</u>

- A. Grounding Conductor:
- B. Completely encircle building structure.
- C. Bury minimum 30" below finished grade.
- D. Minimum 2 feet distance from foundation walls.
- E. Interconnect ground rods by direct-buried copper cables.

## F. Connections:

- G. Install ground cables continuous between connections.
- H. Exothermic welded connections to ground rods, cable trays, structural steel, handrails, and buried and non-accessible connections.
- I. Provide bolted clamp type mechanical connectors for all exposed secondary connections.
- J. Use bolded offset parapet bases or through-roof concealed base assemblies for air terminal connections.
- K. Provide interconnections with electrical and telephone systems and all underground water and metal pipes.
- L. Provide electric service arrestor ground wire to building water main.

# END OF SECTION

# SECTION 16500 LIGHTING

#### PART 1 – GENERAL

#### 1.01 <u>REFERENCES</u>

- A. The following is a list of standards which may be referenced in this section:
  - 1. National Electrical Manufacturers Association (NEMA): 250, Enclosures for Electrical Equipment (1,000 Volts Maximum).
  - 2. National Fire Protection Association (NFPA): 70, National Electrical Code (NEC).
  - 3. Uniform Building Code (UBC): Section 2329, Earthquake Requirements.
  - 4. Underwriters Laboratories, Inc. (UL):
    - a. 595, Standard for Safety Marine-Type Electric Lighting Fixtures.
    - b. 844, Standard for Safety Electric Lighting Fixtures for Use in Hazardous (Classified) Locations.
    - c. 924, Standard for Safety Emergency Lighting and Power Equipment.

#### 1.02 <u>SUBMITTALS</u>

- A. Shop Drawings:
  - 1. Interior Luminaires:
    - a. Catalog data sheets and pictures.
    - b. Luminaire finish and metal gauge.
    - c. Lens material, pattern, and thickness.
    - d. Candle power distribution curves in two or more planes.
    - e. Candle power chart 0 to 90 degrees.
    - f. Lumen output chart.
    - g. Average maximum brightness data in foot lamberts.

- h. Coefficients of utilization for zonal cavity calculations.
- i. Mounting or suspension details.
- j. Heat exchange and air handling data.
- 2. Exterior Luminaires:
  - a. Catalog data sheets and pictures.
  - b. Luminaire finish and metal gauge.
  - c. Lens material, pattern, and thickness.
  - d. IES lighting classification and isolux diagram.
  - e. Fastening details to wall or pole.
  - f. Ballast type, location, and method of fastening.
  - g. For light poles, submit wind loading, complete dimensions, and finish.

#### 3. Lamps:

- a. Voltages.
- b. Colors.
- c. Approximate life (in hours).
- d. Approximate initial lumens.
- e. Lumen maintenance curve.
- f. Lamp type and base.
- g. Copy of lamp order, including individual quantities, for Project.
- 4. Ballasts:
  - a. Type.
  - b. Wiring diagram.

- c. Nominal watts and input watts.
- d. Input voltage and power factor.
- e. Starting current, line current, and restrike current values.
- f. Sound rating.
- g. Temperature rating.
- h. Efficiency ratings.
- i. Low temperature characteristics.
- j. Emergency ballasts rating and capacity data.
- 5. Photo-Time Control:
  - a. Wiring diagram.
  - b. Contact ratings.
- 6. Photocells:
  - a. Voltage, and power consumption.
  - b. Capacity.
  - c. Contacts and time delay.
  - d. Operating levels.
  - e. Enclosure type and dimensions.
  - f. Temperature range.

# 1.03 <u>UL COMPLIANCE</u>

A. Materials manufactured within scope of Underwriters Laboratories shall conform to UL Standards and have an applied UL listing mark.

#### **PART 2 – PRODUCTS**

#### 2.01 <u>LUMINAIRES</u>

- A. Specific requirements relative to execution of Work of this section is shown on Site Light Pole Detail Drawing.
- B. Feed-through type, or separate junction box.
- C. Ballasts: Two-lamp when possible.
- D. Tandem wired for three-lamp, fluorescent fixtures.
- E. Wire Leads: Minimum 18 AWG.
- F. Component Access: Accessible and replaceable without removing luminaire from ceiling.
- G. Soffit Installations:
  - 1. UL Labeled: SUITABLE FOR DAMP LOCATIONS.
  - 2. Ballast: Removable, prewired.
- H. Exterior Installations:
  - 1. UL Labeled: SUITABLE FOR WET LOCATIONS.
  - 2. Ballast: Removable, prewired.
  - 3. When factory-installed photocells are provided, entire assembly shall have UL label.
- I. Emergency Lighting:
  - 1. Power Pack: Self-contained, 120-volt transformer, inverter/charger, sealed nickel cadmium battery, and indicator switch in accordance with UL 924.
  - 2. Lighted, push-to-test indicator.
  - 3. Capable of providing full illumination for 1-1/2 hours in emergency mode.
  - 4. Capable of full recharge in 24 hours, automatically upon resumption of normal line voltage.
  - 5. Capable of protecting against excess charging and discharging.
- 2.02 <u>LAMPS</u>
  - A. LED
    - 1. Type Efficiency: Energy, Low power consumption. Instant on/off response.

- 2. Color, Lumens Output, Wattage, etc.: As shown on plans.
- 3. UL listed.
- B. Manufacturers:
  - 1. Sylvania.
  - 2. General Electric.
  - 3. North American Phillips.
  - 4. Or approved equal.

#### 2.03 <u>BALLASTS</u>

- A. General:
  - 1. Meet requirements for fixture light output, reliable starting, radio interference, total harmonic distortion, electromagnetic interference, and dielectric rating.
  - 2. Certified by electrical testing laboratories to conform to Certified Ballast Manufacturer's specifications.
- B. LED Driver:
  - 1. LED driver shall have built-in heat sink to compensate for the heat.
  - 2. Standard 0-10V Dimming driver, unless otherwise noted on plan.
  - 3. LED driver shall have minimum of 3 year warranty.
  - 4. See drawings for additional information.

#### 2.04 <u>LIGHTING CONTROL AND SWITCHES</u>

- A. Photocell:
  - 1. Automatic ON/OFF switching photo control.
  - 2. Housing: Self-contained, die-cast aluminum, unaffected by moisture, vibration, or temperature changes.
  - 3. Setting: ON at dusk and OFF at dawn.
  - 4. Time delay feature to prevent false switching.

- 5. Field adjustable to control operating levels.
- 6. Manufacturers:
  - a. Tork.
  - b. Paragon.

#### 2.05 <u>POLES</u>

- A. Rating (with Luminaire): All pole installation shall be suitable for wind loading and appropriate gust factor per applicable zone of installation as defined in the Florida Building Code. The contractor shall include with the shop drawing submittal, a pole wind loading calculation signed and sealed by a structural engineer registered in Florida showing that the proposed installations will meet the given wind loading requirement.
- B. Material: Concrete or as shown on plans.

## **PART 3 – EXECUTION**

#### 3.01 <u>LUMINAIRES</u>

- A. General:
  - 1. Install in accordance with manufacturer's recommendations.
  - 2. Provide proper hangers, pendants, and canopies as necessary for complete installation.
  - 3. Provide additional ceiling bracing, hanger supports, and other structural reinforcements to building and to concrete pole bases required to safely mount.
  - 4. Install plumb and level.
  - 5. Mounting heights shown for wall mounted or pendant mounted luminaires are measured from bottom of luminaire to finished floor or finished grade, whichever is applicable.
  - 6. Install each luminaire outlet box with galvanized stud.
- B. Pendant Mounted:
  - 1. Provide swivel type hangers and canopies to match luminaires, unless otherwise noted.

- 2. Space single-stem hangers on continuous-row fluorescent luminaires nominally 48 inches apart.
- 3. Provide twin-stem hangers on single luminaires.
- C. Pole Mounted:
  - 1. Provide precast concrete base.
  - 2. Provide branch circuit in-line fuses in pole base handhole.
- D. Swinging Type:
  - 1. Provide, at each support, safety cable capable of supporting four times the vertical load from the structure to the luminaire.
- E. Finished Areas:
  - 1. Install symmetrically with tile pattern.
  - 2. Locate with centerlines either on centerline of tile or on joint between adjacent tile runs.
  - 3. Install recessed luminaires tight to finished surface such that no spill light will show between ceilings and sealing rings.
  - 4. Combustible Low Density Cellulose Fiberboard: Provide spacers and mount luminaires 1-1/2 inches from ceiling surface, or use fixtures suitable for mounting on low density ceilings.
  - 5. Junction Boxes:
    - a. Flush and Recessed Luminaires: Locate minimum 1 foot from luminaire.
    - b. In concealed locations, install junction boxes to be accessible by removing luminaire.
  - 6. Wiring and Conduit:
    - a. Provide wiring of temperature rating required by luminaire.
    - b. Provide flexible steel conduit.
  - 7. Provide plaster frames when required by ceiling construction.

- 8. Independent Supports:
  - Provide each recessed fluorescent luminaire with two safety chains or two No. 12 soft-annealed galvanized steel wires of length needed to secure luminaire to building structure independent of ceiling structure.
  - b. Tensile strength of chain or wire, and method of fastening to structure shall be adequate to support weight of luminaire.
    - c. Fasten chain or wire to each end of luminaire.
- F. Unfinished Areas: Locate luminaires to avoid either conflict with other building systems or blockage of luminaire light output.
  - 1. Fixture Suspension: Provide 1/4-inch threaded steel hanger rods. Scissor type hangers not permitted.
  - 2. Attachment to Steel Beams: Provide flanged beam clips and straight or angled hangers.
- 3.02 <u>LAMPS</u>
  - A. Provide in each fixture, the number and type for which the fixture is designed, unless otherwise noted.
- 3.03 <u>BALLASTS</u>
  - A. Install in accordance with manufacturer's recommendations.
  - B. Utilize all ballast mounting holes to fasten securely within luminaire.
  - C. Replace noisy or defective ballasts.

#### 3.04 <u>LIGHTING CONTROL</u>

A. Outdoor Luminaires: Photocells switch lights ON at dusk and OFF at dawn.

#### 3.05 CLEANING FOLLOWING CONSTRUCTION

- A. Remove all labels and other markings, except UL listing mark.
- B. Wipe luminaires inside and out to remove construction dust.
- C. Clean luminaire plastic lenses with antistatic cleaners only.

- D. Touch up all painted surfaces of luminaires and poles with matching paint ordered from manufacturer.
- E. Replace all defective lamps at time of Substantial Completion.

END OF SECTION
### **APPENDIX A**

## MINOR REVISION TO A WASTEWATER FACILITY OR ACTIVTY PERMIT

(PENDING)

# **APPENDIX B**

# **CONTRACTOR EVALUATION REPORT**

#### CONTRACTOR EVALUATION REPORT

	Loxahatchee River Environmental Control District	CONTRACT NO.		
ADDRESS	2500 Jupiter Park Drive	CONTRACTOR		
CITY / STATE/ ZIP	Jupiter, FL 33458	PERIOD OF PERFORMANCE	FROM	TO
CONTRACT PROJECT MANAGER		LOCATION OF PERFORMANCE		
INSTRUCTIONS: This form can be completed on the computer or printed and completed by hand. Use the mouse to navigate. To check or uncheck a box, 'double click' the box. If further direction is required on how to complete this evaluation or where to submit it, please contact your Contracting Officer. Comment boxes are formatted to automatically wrap the entered text. Check the box that best describes the level in which the Contractor supported the area described. Comments are essential and must substantiate your rating selection. N/A = not applicable. If additional space is required, use page 2 of the form or attach additional page(s).				
1. Quality. Contractor contract. Provided w forth in the contract.	or conformed to contract requirements. Was cap vell maintained equipment and highly qualified po	bable, efficient and ersonnel. Finished	l effective in supporting t I product meets the quali	he programs of this ty requirements set
□ N/A	Satisfactory Unsatisfactory			
COMMENTS:	_			
2. Schedule. Contra	actor was prepared and available to begin work	on contract start	date and provided daily	r coverage during the
and any approved ex	tensions of time.		work within the dates sp	
	-			
3. Change Orders. Contractor conformed to contract requirements, providing complete documentation and was reasonable in the negotiations for time and costs. Contractor did not engage with frivolous our unsupported change order requests. Contractor met time requirements in the contract for identification and quantification of additional or deleted work.				
□ N/A □	Satisfactory Unsatisfactory			
COMMENTS:				

4. Management. and safety of ope correct or replace and other require	Contractor and on-site re rations. Contractor prove any personnel. Contractor d submittals.	presentatives were professional, well qualified, and committed to customer satisfaction ided necessary support for key personnel and if applicable, took necessary action to for was timely and complete with shop drawings, pay applications, releases, schedules
	Satisfactory	Unsatisfactory
COMMENTS:	<i>.</i>	
6. Regulatory Cor others.	npliance. How well does	the contractor comply with governing regulations such as the FDEP, FDOH, SFWMD or
□ N/A	Satisfactory	
COMMENTS:	D	
7. Safety. Contra general safety of	ctor and on-site represer operations?	tatives attitude and efforts, as well as actual application, towards
□ N/A	Satisfactory	
COMMENTS:	D	
9. Other Areas:	Satisfactory	
10 Other Areas:		
	Satisfactory	Unsatisfactory
11. Other Areas:	Satisfactory	Unsatisfactory
<b>12. Other Areas:</b>	Satisfactory	Unsatisfactory

12. Overall Con	12. Overall Contractor Rating:			
□ N/A	Satisfactory	Unsatisfactory		
Additional com	ments to support your i	response to any item above or other items.		
Name Title of	Individual Completing	this Form (include agapey, phone and electronic address.)		
Name, The Of	individual Completing	this Form (include agency, phone and electronic address )		
Signature				

RATING	DEFINITION	NOTE
Satisfactory	Performance meets contractual requirements. The contractual performance of the element being assessed may contain some minor problems for which corrective actions taken by the Contractor were satisfactory.	To justify a Satisfactory rating, there should have been only minor problems, or major problems the contractor recovered from without impact to the contract. There should have been NO significant weaknesses identified.

Unsatisfactory Performance does not meet most contractual requirements and recovery is not likely in a timely manner. The contractual performance of the element contains a serious problem(s) for which the contractor's corrective actions appear or were ineffective.

To justify an Unsatisfactory rating, identify multiple significant events in each category that the Contractor had trouble overcoming and state how it impacted the Government. A singular problem, however, could be of such serious magnitude that it alone constitutes an unsatisfactory rating. An Unsatisfactory rating should be supported by referencing the management tools used to notify the contractor of the contractual deficiencies (e.g. management, quality, safety, etc.)

### **APPENDIX C**

### STANDARD OPERATING PROCEDURE: SYSTEM SHUTDOWNS AND BYPASS



Standard Operating Procedure: System Shutdowns and Bypass

Project Name: \_\_\_\_\_

Work Order #:

Shutdown Schedule	Date:
	Time Start:
	Time Complete:

- 1. All work for the system shutdown shall be done under one work order specific to the system shutdown, not the work requiring the system shutdown. System Shutdown Work Order # to be noted above.
- 2. Scope: Develop a scope fully encompassing the work to be performed. The scope shall be attached as **Exhibit A**.
- 3. Map: Develop a system map overlaid on an aerial clearly showing the location of the work, relation of the work to other infrastructure, primary and secondary isolation points for the work. All infrastructure shown on the map shall be field located and GPS'd. The map shall be attached as **Exhibit B**.
- 4. Isolation Point Verification: All isolation points, primary and secondary, shall be field verified, if possible, prior to scheduling the work. Verification shall confirm isolation points are operable and <u>substantially</u> isolate the work area from the remainder of the collection/transmission system. Substantially isolate, at a minimum, shall mean all flows except those that can reasonably be managed with a vacuum truck are isolated from the work. Upstream System Capacity: Upstream system capacity (holding time) shall be determined. Prior to scheduling the work adequate values for the following shall be agreed upon. The scheduled shutdown duration, staff, equipment and materials shall be planned around the Low Risk Holding Time.
  - a. Low Risk Holding Time:
  - b. Unacceptable Risk Holding Time:
- 5. Wastewater Management/Spill Response Plan: Prior to scheduling the work:
  - a. The Contractor shall have an approved wastewater management plan to address capture and disposal of wastewater. The Contractor's Wastewater Management/Spill Response Plan shall be attached as **Exhibit C**.
  - b. The District shall have an approved Wastewater Management Plan to address management of wastewater in the collection/transmission system. The Wastewater Management Plan shall include Emergency Operation Measures in the event the shutdown exceeds the Unacceptable Risk Holding Time. The District's Wastewater Management Plan shall be attached as **Exhibit D**.

- 6. Personnel: The Contractor and the District shall have adequate staff to manage the shutdown and work. The Contractor shall have one designated person in-charge of his employees and work. The District shall have one designated person in-charge of his employees and work.
  - i. Contractor Representative In-Charge: \_\_\_\_\_cell #: \_\_\_\_\_ # of Contractor's supporting staff: \_\_\_\_\_
  - b. District Representative In-Charge: \_\_\_\_\_ cell #: \_\_\_\_\_
    - i. *#* of District supporting staff:
- 7. Schedule: Prior to scheduling the work predetermined times to implement various steps, back-up plans, cancel the tie-in or failure response shall be agreed upon.
  - a. Primary Isolation:
  - b. Secondary Isolation:
  - c. System Evacuation Deadline:
  - d. Low Risk Work Completion Deadline:
  - e. Unacceptable Risk Deadline:

If the system is not adequately isolated and evacuated by the System Evacuation Deadline. Work is CANCELLED, the force main secured and placed back in service.

Once the Work has commenced progress shall be monitored with direct communication between the Contractor Representative In-Charge and the District Representative In-Charge. At any time during the performance of the Work the projected completion time exceeds the Unacceptable Risk Deadline Emergency Operation Measures shall be implemented. See **Exhibit D**.

- 8. Equipment:
  - a. The Contractor shall have adequate equipment on site by Close of Business preceding the scheduled shutdown. All equipment shall be on site by:
    The list of equipment shall be attached as Exhibit E.
  - b. The District shall have adequate equipment on site by Close of Business preceding the scheduled shutdown. All equipment shall be on site by: \_\_\_\_\_\_.
    The list of equipment shall be attached as Exhibit F.
- Materials: All materials required for the work shall be on site by Close of Business preceding the scheduled shutdown. All materials shall be on site by: \_\_\_\_\_\_. The approved Material List shall be attached as Exhibit G.
- 10. Vendors: All vendors required for the work shall be issued Purchase Orders by Close of Business preceding the scheduled shutdown. All vendor Purchase Orders shall be confirmed by

\_\_\_\_\_. The Vendor list shall be attached as **Exhibit H.** 

### System Shutdown Checklist

Description	Approved By	Scheduled Time	Scheduled Date
Work Order			
Exhibit A			
Exhibit B			
Exhibit C			
Exhibit D			
Exhibit E			
Exhibit F			
Exhibit G			
Exhibit H			
Low Risk Holding Time			
Unacceptable Risk Holding Time			
Primary Isolation Time			
Secondary Isolation Time			
System Evacuation Deadline			
Low Risk Work Completion			
Deadline			
Unacceptable Risk Deadline			
Contractor Equipment Onsite			
District Equipment Onsite			
Materials Onsite			
Vendor's Confirmed			

Contractor's Representative Name: Cell:

District's Representative Name: Cell:



